Environmental Education: Inventory of Current Practices

Summary of Findings

SUSAN GRACIA

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The following is a report to the Rhode Island Environmental Educational Association (RIEEA) on the results of the Environmental Education: Inventory of Current Practices survey that was developed in Fall 2017 and administered to RI teachers and administrators in Spring 2018. The purpose of this report is to address the questions that guided the survey:

- What is the current state of environmental education (Environmental Education) in RI schools?
- What are the needs of RI teachers and administrators to successfully implement Environmental Education practices?

Methodology

Instrument

The Environmental Education: Inventory of Current Practices is an online survey for PreK-12 teachers and administrators. The purpose of the survey is to gain an accurate understanding of the current state of environmental education (Environmental Education) in RI schools and to assess what educators need to successfully implement Environmental Education practices. Field tested in Fall 2017, the instrument was revised in Winter 2018 and administered in Spring 2018. The survey contains a combination of closed-ended and open-ended questions that elicit teacher and administrator input on the following topics and themes:

- Teachers and Administrators:
  - Definition of Environmental Education in your own words (open-ended)
  - Beliefs about Environmental Education (rating scale, 15 items)
  - Current role: teacher or administrator
  - Attitudes toward Environmental Education (rating scale, 8 items)
  - Knowledge of Impact of Environmental Education (rating scale, 11 items)
  - Science or Environmental Education Resources at Your School (checklist, 11 options, plus Other)
  - Degree to Which Environmental Education Curriculum/Resources Support Teaching (rating scale, 1 item)
  - School Setting (checklist, 3 options)
  - Type of School (checklist, 3 options plus Other)
  - Environmental Education in Teacher Preparation (checklist, 4 options)
  - Environmental Education-Related PD-12 Months (checklist 4 options)
  - Environmental Education-Related PD-3 Years (checklist, 4 options)
  - Primary Teaching Area (20 options plus Other)[1]
  - Science Course(s) Teaching (8 options plus Other)[2]
- Teachers
  - Frequency of Inclusion of Environmental Education in Instruction (rating scale, 1 item)
  - Frequency of Inclusion of Environmental Education topics in Instruction (rating scale, 1 item)

[1] Answered by administrators only if they taught in the past

[2] Answered by administrators only if they were science teachers in the past

    - Frequency of Instruction in Natural World (rating scale, 1 item)
    - Methods/Strategies Used to Teach Environmental Education (checklist, 14 items plus Other)
    - Environmental Issues Included in Subject Matter (checklist, 10 options plus Other)
    - Level of Preparation to Engage Students in NGSS-Aligned Student Practices (rating scale, 6 items)
    - Methods Used for Assessment in Environmental Education (checklist, 12 options plus Other)
    - How Environmental Education Is Integrated in Teaching (rating scale, 9 items plus Other)
    - Examples of How Environmental Education is Incorporated into School Day (open-ended)
    - Motivators to Engage in Environmental Education (rating scale, 12 items plus Other)
    - Barriers to Engaging in Environmental Education (rating scale, 13 items plus Other)
    - Most Helpful to Include More Environmental Education in Teaching (ranking, 5 items)
    - Other Helpful (open-ended)
    - Science or Environmental Education Resources (checklist, 11 options, plus Other)
    - Degree to Which Environmental Education Curriculum/Resources Support Teaching (rating scale, 1 item)
    - Grade Level Teaching (checklist, 14 options)
    - School Setting (checklist, 3 options)
    - Type of School (checklist, 3 options plus Other)
    - Primary Teaching Area (checklist, 20 options plus Other)
    - Science Course(s) Teaching (checklist, 8 options plus Other)
    - Years Taught (open-ended)
- Administrators:
    - Teachers at Your School: Frequency of Inclusion of Environmental Education in Instruction (rating scale, 1 item)
    - Teachers at Your School: Frequency of Inclusion of Environmental Education topics in Instruction (rating scale, 1 item)
    - Teachers at Your School: Frequency of Instruction in Natural World (rating scale, 1 item)
    - Teachers at Your School: Methods/Strategies Used to Teach Environmental Education (checklist, 14 items plus Other)
    - Teachers at Your School: Environmental Issues Included in Subject Matter (checklist, 10 options plus Other)
    - Your Level of Preparation to Support Teachers to Engage Students in NGSS-Aligned Student Practices (raging scale, 6 items)
    - Teachers at Your School: How Environmental Education Is Integrated in Teaching (rating scale, 9 items plus Other)
    - Teachers at Your School: Examples of How Environmental Education is Incorporated into School Day (open-ended)
    - Motivators to Support Teachers to Engage in Environmental Education (rating scale, 12 items plus Other)
    - Teachers at Your School: Barriers to Engaging in Environmental Education (rating scale, 13 items plus Other)

- Most Helpful to Supporting Teachers to Include More Environmental Education in Teaching (ranking, 5 items)
- Other Helpful (open-ended)
- School Structure (checklist, 5 options plus Other)
- Teacher Before Administrator? Yes or No
- Years Administrator (open-ended)

Sample

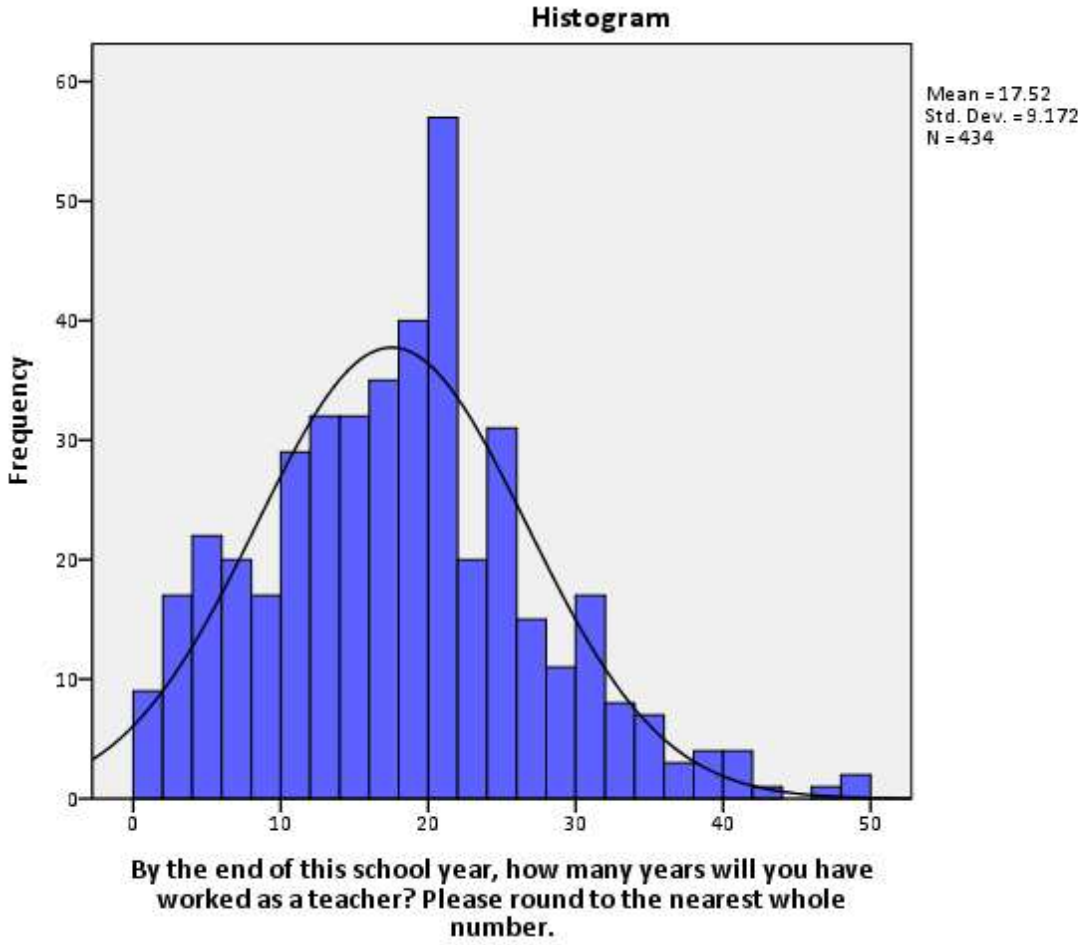
The survey sample consisted of 702 survey respondents. Of these 702 respondents, 664 responded to the final Environmental Education: Inventory of Current Practices survey that was administered in Spring 2018. Thirty-eight of the 702 respondents responded to the field test version of the Environmental Education: Inventory of Current Practices survey and their responses to items that were not changed in the final version of the survey were added to the final survey data set, for a total sample of 702 respondents.

Across all 702 respondents, 615, or 88%, identified themselves as teachers, compared to a total of 87, or 12% who identified themselves as school administrators. Further, almost 5% (n=30) of the teacher sample consisted of teachers who participated in the field test. In contrast, slightly more than 9% (n=8) of the administrator sample consisted of administrators who participated in the field test. (See table below.)

What is your current role at your school?			N	Percent
Teacher	Valid	official survey administration	585	95.1
		field test	30	4.9
		Total	615	100.0
Administrator	Valid	official survey administration	79	90.8
		field test	8	9.2
		Total	87	100.0

Teacher Characteristics

Teacher survey respondents tended to be quite experienced in terms of how long they had been teaching. The number of years of teaching experience of teacher survey respondents ranged from one year to 49, with a mean of 17.52 years among teachers who responded to the survey question asking them how many years they had worked as a teacher (n=434). By the end of the 2018-19 school year, half of all teachers in the sample would have worked 18 years. Further, the most common amount of years of experience for teachers in the sample was 20 years (see histogram below).



Almost half of teacher survey respondents who described their school setting (n=41%) described it as suburban (see table below). The next most common school setting for survey respondents was urban (20%), followed by rural (11%). However, almost 29% of teacher survey respondents (n=175) declined to answer this question, perhaps due to survey fatigue or fear of identifying themselves.

		Frequency	Percent	Valid Percent
Valid	Rural	65	10.6	14.8
	Suburban	252	41.0	57.3
	Urban	123	20.0	28.0
	Total	440	71.5	100.0
Missing	System	175	28.5	
Total		615	100.0	

A similar number of teacher respondents declined to indicate the type of school in which they were employed (n=174). Among those who did respond to this survey question, most taught at a public school (n=360 or 82% of those who provided information). In this same group, almost 13% of teacher respondents (n=55) were employed at private schools, followed by almost 6% of teachers (n=26) who taught at charter schools. However, as more than one survey respondent pointed out, charter schools are also public schools, so the proportion of public school teacher survey respondents may also be calculated as 87.5% (% public + % charter).

		Frequency	Percent	Valid Percent
Valid	Public	360	58.5	81.6
	Private	55	8.9	12.5
	Charter	26	4.2	5.9
	Total	441	71.7	100.0
Missing	System	174	28.3	
Total		615	100.0	

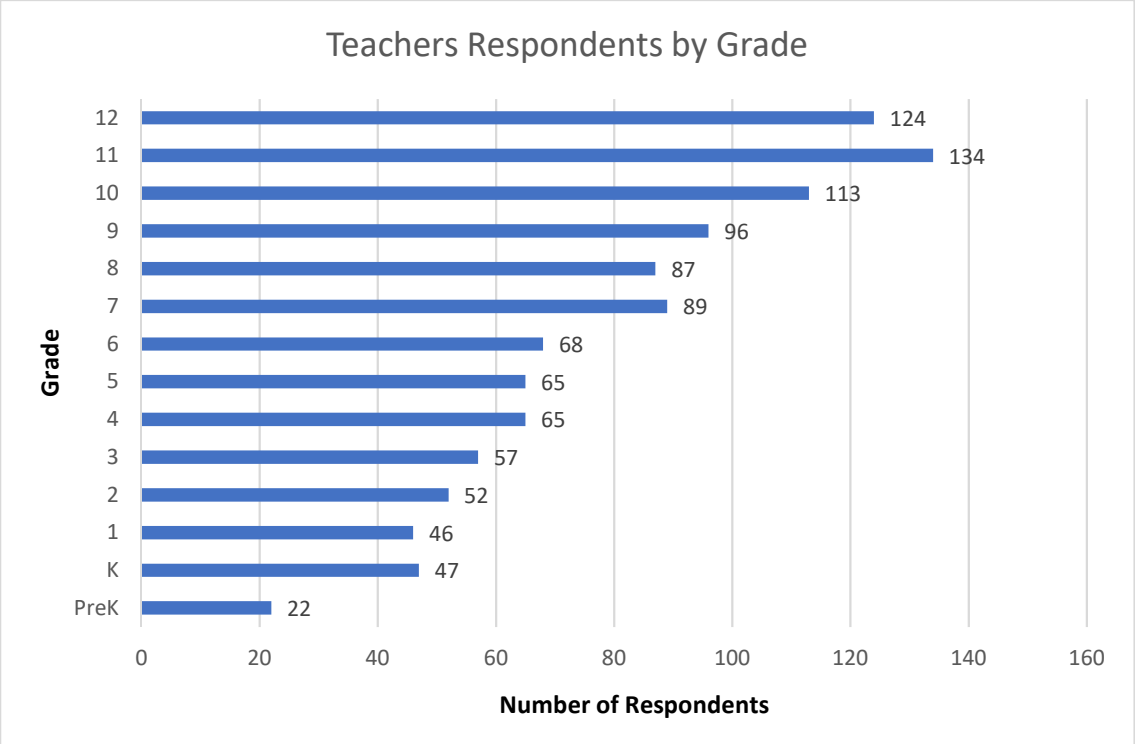
Teacher survey respondents were asked to indicate all of the grade levels that they were teaching during the 2017-2018 academic school year. Four hundred forty-one teachers, or almost 72% of teacher respondents, answered this question (see table below). Among those who did respond, almost half (43%) were teaching a single grade. Overall, however, the number of grade levels that respondents were teaching ranged from 1 to 13, with the majority of respondents teaching between one and four grade levels. Six respondents taught between nine and thirteen grade levels during the 2017-2018 academic year.

Total # Grades Teaching				
		Frequency	Percent	Valid Percent
Valid	1.00	190	30.9	43.1
	2.00	76	12.4	17.2
	3.00	73	11.9	16.6
	4.00	67	10.9	15.2
	5.00	5	.8	1.1
	6.00	11	1.8	2.5
	7.00	13	2.1	2.9
	9.00	3	.5	.7
	10.00	2	.3	.5
	13.00	1	.2	.2
	Total	441	71.7	100.0
Missing	System	174	28.3	
Total		615	100.0	

The breakdown of teacher survey respondents by grade level taught is presented in the figure below. The grade level with the highest representation by teacher survey respondents was 11th grade (n=134), followed by 12th grade (n=124), 10th grade (n=113), and 9th grade (n=96). It should be kept in mind, however, that these numbers do not represent 134+ 124+ 113+ 96=467 teachers. Rather, these results include teachers who teach multiple grades. In fact, only 160 teacher survey respondents indicated that they taught grades 9, 10, 11, or 12.

In Rhode Island, teacher certification by grade level is as follows: middle level: grades 5-8; elementary: grades 1-6; early childhood education: pre-K -grade 2. For ease of interpretability and to avoid redundancy in reporting, the number of teacher survey respondents at the grades within each of these grades level will be reported as follows: middle level: grades, 6-8; elementary: grades 1-5; early childhood, PreK-K. As displayed in the figure below, the numbers of teachers indicating that they taught middle school grades (6, 7, or 8) were 68, 89, and 87, respectively. These findings correspond to a total of 129 respondents who indicated that they taught any middle school grade. Similarly, the number of teachers who reported that they currently taught grades 1 through 5 ranged from 46 to 65 per grade

level. This includes a good number of teachers who taught more than one grade level. In all, however, 156 teachers reported that they taught at any of these elementary grade levels. Finally, 47 teacher respondents taught kindergarten, and 22 taught pre-kindergarten. In reality, this population included 54 unique teachers, many of whom taught more than one grade level.

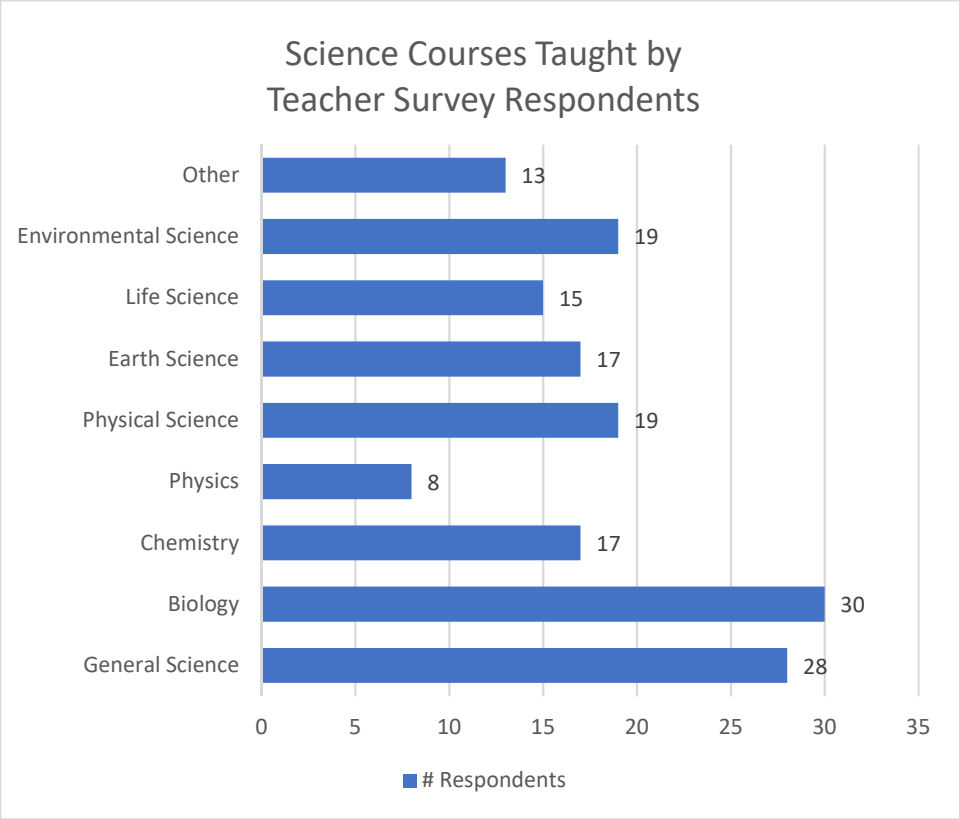


Approximately 71% of teacher survey respondents (n=436) identified their primary teaching area (see table below). In all, 23 areas were identified by teacher survey respondents. The most frequently indicated teaching area was elementary education (n=88), followed by science (n=70), special education (n=46), mathematics (n=36), English (n=31), and early childhood education (n=22). There were also numerous teaching areas with twenty or fewer respondents that were represented among teacher survey respondents. Similar "other" responses offered by responses were consolidated and also appear in the table.

Primary Teaching Area	Frequency	Percent	Valid Percent
Elementary education	88	14.3	20.2
Science	70	11.4	16.1
Special education	46	7.5	10.6
Mathematics	36	5.9	8.3
English	31	5.0	7.1
Early childhood education	22	3.6	5.0
Social Studies	19	3.1	4.4
World languages	16	2.6	3.7
Physical education	12	2.0	2.8
Technology education	12	2.0	2.8

Primary Teaching Area	Frequency	Percent	Valid Percent
Reading Specialist	12	2.0	2.8
Art	11	1.8	2.5
Health education	10	1.6	2.3
Guidance/School Psychology	8	1.3	1.8
Library media	7	1.1	1.6
Career and technical education	7	1.1	1.6
Music	6	1.0	1.4
STEM/STEAM	5	.8	1.1
Multiple subjects	5	.8	1.1
English as a Second Language	3	.5	0.7
Religion	3	.5	0.7
Business education	2	.3	0.5
Dance	1	.2	0.2
Other	4	.7	0.9
Total Responses	436	70.9	100.0
Missing	179	29.1	
Total	615	100.0	

Teacher survey respondents who indicated that their primary teaching area was science were directed to an additional item requesting them to indicate the specific science courses that they teach. This item presented them with a list of science courses and also allowed them to write in other science courses that did not appear on the list. As shown in the figure below, the most commonly taught science courses were Biology (n=30) and General Science (n=28), followed by Environmental Science and Physical Science (n=19 each). The least commonly taught science course among survey respondents was Physics (n=8). After recoding "other" responses and integrating them into the existing list of science courses, where appropriate, 13 "other" science courses taught by teacher survey respondents remained. These included: anatomy and physiology, aquaculture, microbiology, oceanography, forensics, floriculture, Next Generation Science, religion, and English.



When asked about previous training/preparation in Environmental Education, not all teacher survey respondents replied; however, results indicate that the majority were not exposed to Environmental Education during their teacher preparation (see table below). Over half of teacher respondents did not recall that any Environmental Education was included in their teacher preparation, either as a standalone course or infused into methods or content courses. In contrast, almost 11% reported that Environmental Education had been infused into one or more content courses. Further, almost 8% indicated that it had been infused into one or more methods courses. Finally, 6% of respondents (n=37) revealed that they had taken a standalone course in Environmental Education as part of their teacher preparation.

Infusion of Environmental Education in Teacher Preparation (Teachers)	Frequency	Percent
I took a standalone course in Environmental Education.	37	6.0
Environmental Education was infused into one or more of my methods courses.	47	7.6
Environmental Education was infused into one or more of my content courses.	67	10.9
None of the above	315	51.2

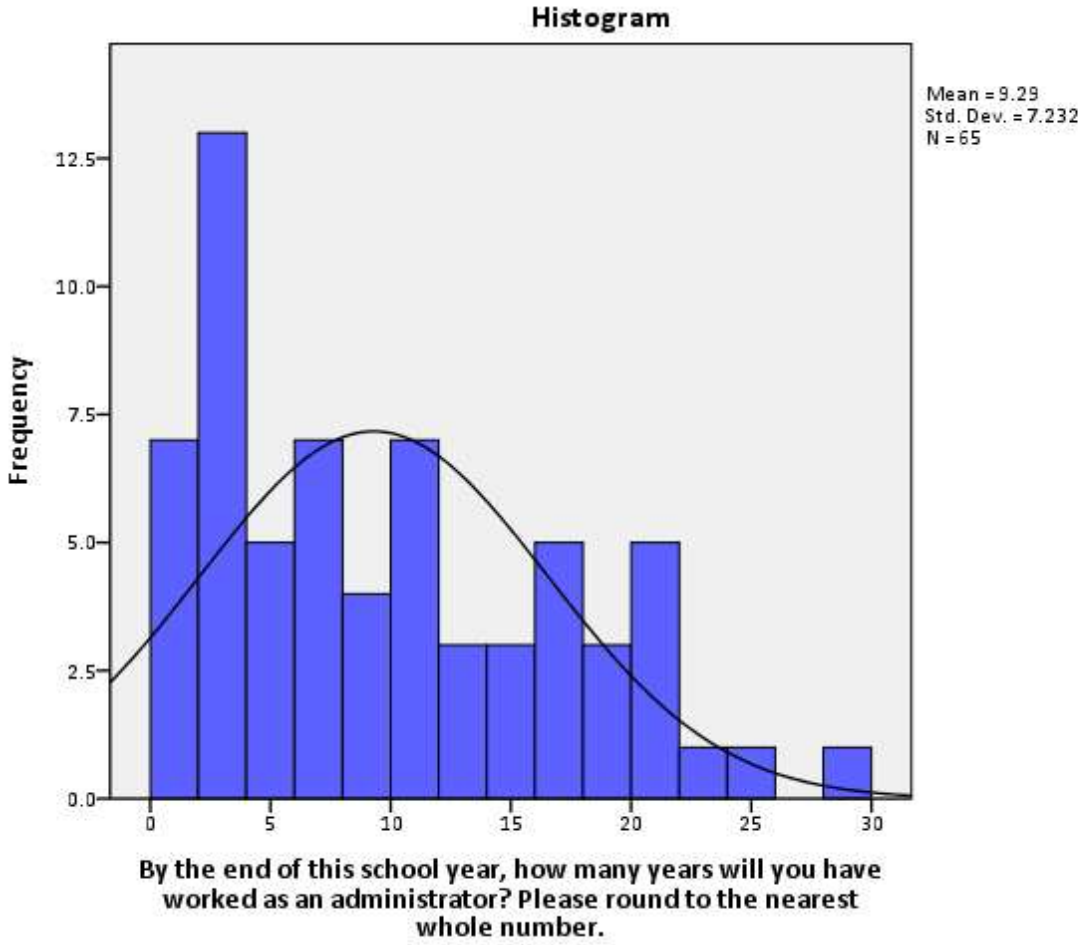
As displayed in the table below, slightly more than three quarters of teacher survey respondents who provided data (n=433) indicated that they had spent no time whatsoever on professional development in Environmental Education in the last 12 months. Alternatively, almost 15% stated that they had spent 1-5 hours on training in this area, and 6% indicated that they devoted between six and 15 hours to professional development in Environmental Education.

Considering the past three years, fewer teacher survey respondents provided data; yet those who did so indicated that they had participated in more professional development in Environmental Education than in the past year. For example, approximately 15% fewer teachers reported having participated in no professional development in Environmental Education over the last three years. Additionally, 28% had participated in up to 1-5 hours of Environmental Education-focused training. Approximately 11% indicated having completed 16 hours or more of training in this area.

Total amount of time you spent on professional development in Environmental Education (Teachers)	Last 12 Months (n=433)	Last 3 Years (n=371)
	Percent	Percent
None	75.8	60.6
1-5 hours	14.5	17.3
6-15 hours	6.0	11.1
16-35 hours	1.8	4.9
More than 35 hours	1.8	6.2
Total	100.0	100.0

Administrator Characteristics

On the whole, administrator survey respondents had spent a shorter time in their current role than their teacher respondent counterparts. While 22 of the 87 administrator survey respondents (25%) declined to provide information regarding the number of years they had worked as an administrator, results for the remaining 75% of the administrator sample revealed that they had been administrators for a range of one to 28 years, with a mean tenure of 9.26 years. By the end of the 2018-19 school year, half of all administrators in the sample would have worked 8 years. Further, the most common amount of years of experience for teachers in the sample was 2 years (see histogram below). In fact, 12 administrators were in their second year in this role.



Almost 40% of administrator survey respondents who described their school setting (39%) described it as suburban (see table below). The next most common school setting for survey respondents was urban (33%), followed by rural (3%). However, 24% of administrator survey respondents (n=21) declined to answer this question.

Administrator School Setting		Frequency	Percent	Valid Percent
Valid	Rural	3	3.4	4.5
	Suburban	34	39.1	51.5
	Urban	29	33.3	43.9
	Total	66	75.9	100.0
Missing	System	21	24.1	
Total		87	100.0	

The same number of administrator respondents declined to indicate the type of school in which they were employed (n=21). Among those who did respond to this survey question, most were employed at a public school (n=42 or 64% of those who provided information). In this same group, almost 26% of administrator respondents were employed at private schools, followed by almost 11% of teachers who taught at charter schools. Considering charter schools as public schools, the proportion of public school administrator survey respondents may also be calculated as 73.9% (% public + % charter).

Administrator School Type		Frequency	Percent	Valid Percent
Valid	Public	42	48.3	63.6
	Private	17	19.5	25.8
	Charter	7	8.0	10.6
	Total	66	75.9	100.0
Missing	System	21	24.1	
Total		87	100.0	

Administrator survey respondents tended to be employed in elementary schools more than any other type of school (see table below), with 29 respondents employed in a school of this structure. The next most common school structure for administrator respondents was high school (n=19), followed by PK-8 (n=6), middle school (n=5), PK-12 (n=3), and Other (n=3). "Other" school types in which respondents worked included: "7-12," "Network team for K-12 system," and "We have three K-5 Schools, one PK-5 School, one middle school, and one high school." Finally, 22 administrator respondents did not indicate the structure of the school in which they were employed.

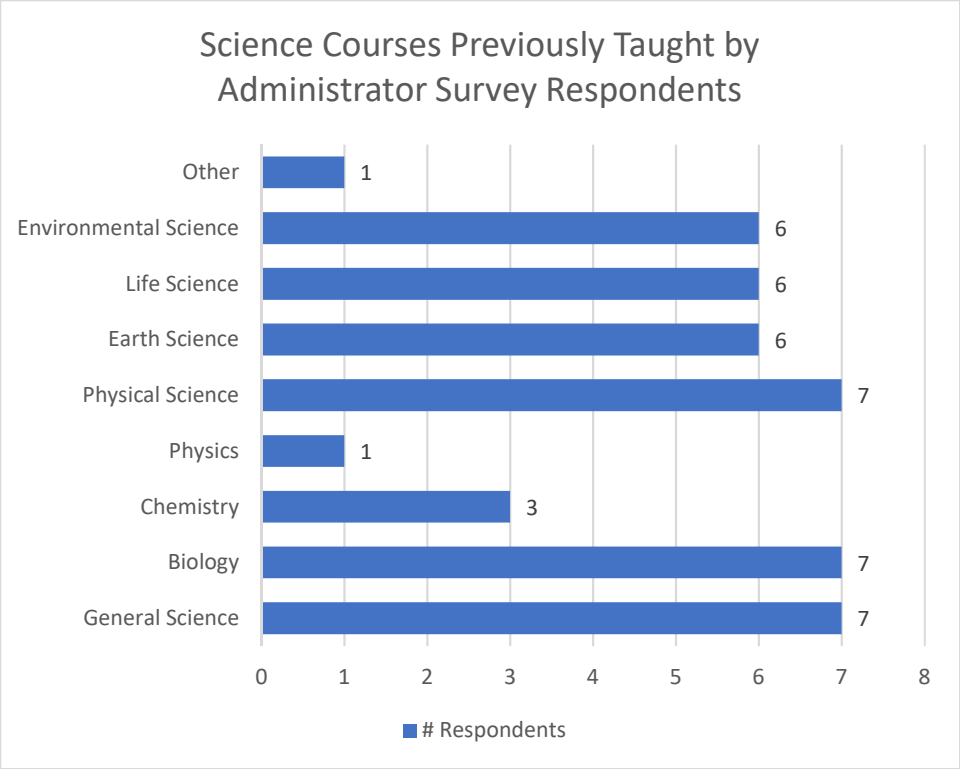
Administrator School Structure		Frequency	Percent	Valid Percent
Valid	Other	3	3.4	4.6
	Elementary School	29	33.3	44.6
	Middle School	5	5.7	7.7
	High School	19	21.8	29.2
	PK-8	6	6.9	9.2
	PK-12	3	3.4	4.6
	Total	65	74.7	100.0
Missing	System	22	25.3	
Total		87	100.0	

Among administrator respondents who provided information (n=60), 49, or 82%, indicated that they had been teachers before becoming administrators. These same individuals identified their primary teaching

area (see table below). In all, 11 areas were identified by administrator survey respondents. The most frequently indicated teaching area was elementary education (n=11), followed by science (n=7), special education (n=6), social studies (n=6), and English (n=6). Other subject areas with fewer than six respondents included mathematics, early childhood education, religion, physical education, world languages, and "multiple subjects" (administrators could not identify a single primary teaching area).

		Frequency	Percent	Valid Percent
Valid	Elementary education	11	12.6	22.4
	Science	7	8	14.3
	Special Education	6	6.9	12.2
	English	6	6.9	12.2
	Social Studies	6	6.9	12.2
	Mathematics	4	4.6	8.2
	Early childhood education	3	3.4	6.1
	Religion	2	2.3	4.1
	Multiple subjects	2	2.3	4.1
	Physical education	1	1.1	2
	World languages	1	1.1	2
	Total Responses	49	56.3	100
Missing	System	38	43.7	
Total		87	100.0	

The seven administrator survey respondents who indicated that their primary teaching area was science were directed to an additional item requesting them to indicate the specific science courses that they had taught. This item presented them with a present list of science courses and also allowed them to write in other science courses that did not appear on the list. As shown in the figure below, all seven administrators had taught Biology, General Science, and Physical Science. Six of the seven had also taught Environmental Science, Life Science, and Earth Science. The least commonly taught science courses among administrators were Chemistry (n=3) and Physics (n=1), and Other (Horticulture) (n=1).



When asked about previous training/preparation in Environmental Education, not all administrator survey respondents replied; however, results indicate that the vast majority were not exposed to Environmental Education during their teacher or administrator preparation (see table below). Half of administrator respondents did not recall that any Environmental Education was included in their teacher/administrator preparation, either as a standalone course or infused into methods or content courses. In contrast, 14.9% reported that Environmental Education had been infused into one or more content courses. Further, 13.8% indicated that it had been infused into one or more methods courses. Finally, 6.9% of respondents (n=7) revealed that they had taken a standalone course in Environmental Education as part of their teacher or administrator preparation.

Infusion of Environmental Education in Teacher or Administrator Preparation (Administrators)	Frequency	Percent
I took a standalone course in Environmental Education.	7	6.9
Environmental Education was infused into one or more of my methods courses.	12	13.8
Environmental Education was infused into one or more of my content courses.	13	14.9
None of the above	44	50.6

As displayed in the table below, almost two-thirds of administrator survey respondents who provided data (n=67) indicated that they had spent no time whatsoever on professional development in Environmental Education in the last 12 months. Alternatively, almost 21% stated that they had spent 1-5 hours on training in this area, and 5% indicated that they devoted between six and 15 hours to professional development in Environmental Education. None reported having spent more than 35 hours on training in Environmental Education in the past 12 months.

Considering the past three years, fewer administrator survey respondents provided data; yet those who did so indicated that they had participated in more professional development in Environmental Education than in the past year. For example, approximately 8% fewer administrators reported having participated in no professional development in Environmental Education over the last three years. Additionally, 24% had participated in up to 1-5 hours of Environmental Education-focused training. Furthermore, almost 21% indicated having completed 16 hours or more of training in this area.

Total amount of time you spent on professional development in Environmental Education (Administrators)	Last 12 Months (n=67)	Last 3 Years (n=59)
	Percent	Percent
None	64.2	55.9
1-5 hours	20.9	23.7
6-15 hours	10.4	6.8
16-35 hours	4.5	6.8
More than 35 hours	0.00	6.8
Total	100.0	100.0

Survey Administration

The final version of the Environmental Education: Inventory of Current Practices survey was administered via SurveyMonkey between February 14, 2018 and March 27, 2018. Due to teacher privacy concerns, RIEEA was not able to obtain contact information for RI teachers to send the survey. Consequently, the electronic survey, survey link, survey pre-notice, survey invitations, and survey reminders were developed by the survey designer and forwarded to RIEEA staff who then promoted and coordinated the administration of the survey as follows during the above time frame:

- Notification of the survey (with survey link) was included in RIDE Commissioner of Education's weekly Commissioner's Memo
- Notification of the survey (with survey link) was included in group email (bcc) sent to all Rhode Island public school district superintendents
- Survey reminder (with survey link) was included in individual emails sent directly to all Rhode Island public school principals (reminder)
- Survey notification and reminder were sent in two emails (bcc) to heads/principals of individual private schools
- Notification of the survey (with survey link) was included in email sent to all heads/principals of charter schools by League of Charter Schools Executive Director
- Survey notification and reminder were sent in two group emails (bcc) sent to all heads/principals of charter schools
- Notification of the survey (with survey link) was included in announcement by RIEEA Board Member at a League of Charter Schools meeting
- Survey notification and reminder were sent in two individual emails directly to all heads of mayoral academies
- Survey notification and reminder were sent in two emails to all heads/principals of Diocese of Providence Catholic Schools by Superintendent
- Survey notification and reminder were sent in two emails to members of RI Association of School Principals by Executive Director

- Notification of the survey (with survey link) was included in multiple posts to RIEEA listserv and social media platforms
- Notification of the survey (with survey link) was included in announcement in RIEEA member e-newsletter (monthly for 2 months)
- Notification of the survey (with survey link) was included in announcement made at RIEEA Annual Meeting
- Notification of the survey (with survey link) was included in post on RIEEA website

Data Analysis

SPSS was used to analyze quantitative survey data. Descriptive statistics were run on all variables. ANOVA and t-tests were conducted to explore group differences. Chi square analyses were conducted to explore differences in proportions, and correlations were conducted to examine relationships between quantitative variables.

Open-ended survey data were uploaded into the qualitative software program, HyperResearch, and coded for themes. Text data with extensive responses were also uploaded into IBM SPSS Modeler and voytant-tools.org and analyzed for concepts and categories.

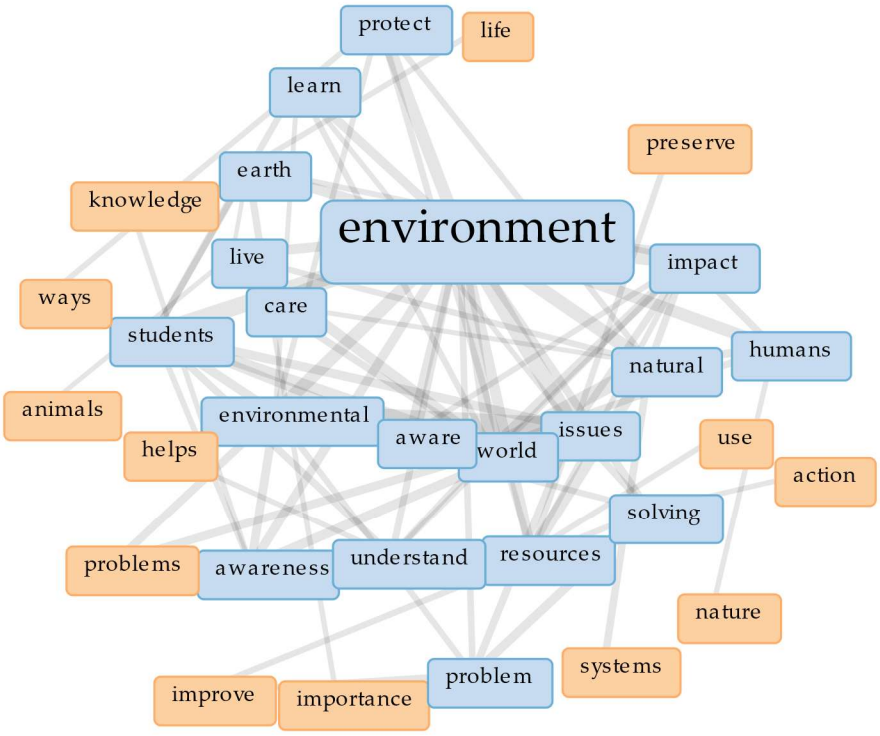
Findings

The following sections present overall findings from the Environmental Education: Inventory of Current Practices survey.

Knowledge and Attitudes

Definitions of Environmental Education

The first question in the Environmental Education: Inventory of Current Practices was as follows: "In your opinion, what is Environmental Education? How would you explain Environmental Education in your own words?" This open-ended question allowed respondents to write in their reply without limitations on space or content. The purpose of this initial question was to construct a baseline understanding of teachers' and administrators' understanding of and conception of Environmental Education, based on their prior experiences and before interacting with any survey questions that could potentially influence their thinking on the topic. This question was a required survey question; participants were not able to proceed to the rest of the survey without writing something in the response field. Consequently, all 702 survey respondents provided a response to this question. Collectively, teacher and administrator responses to this question included 13,898 total words and 1,486 unique word forms. After eliminating redundant terms such as "environmental education", the most frequent words in the corpus were: environment (485); world (154); students (140); issues (121); and environmental (118). The collocates graph below represents keywords and terms that occurred in close proximity in respondents' definitions. This represents a network graph where keywords (the most frequently occurring words in the corpus) in blue are shown linked to collocates (words frequently in the context of the linked keywords) in orange. In this view, it is clear that other frequent words in respondents' answers include protect, learn, earth, live, care, aware(ness), understand, resources, problems, solving, natural, humans, and impact. Other words in the same context of these keywords include life, preserve, use, action, nature, systems, importance, improve, problems, helps, animals, ways, and knowledge.



View interactive graph at http://voyant-tools.org/?corpus=c9f96c86d54d50783d37359147aaf3f4

Qualitative analyses of respondents' definitions of Environmental Education revealed three main concepts among their definitions. In fact, their descriptions of Environmental Education related to teaching students or student learning:

1. About or in the environment
2. Related to impacts on the environment
3. About environmental issues

Analyses of open-ended responses reveal substantial overlap in themes among the three topics. However, the following distinctions were also observed.

Environmental Education as Student Learning ABOUT or IN the Environment

The first general theme among definitions of Environmental Education is that of student learning about or in the environment. This theme was able to be divided into three sub-themes:

1. Fostering student understanding of and appreciation for the "natural world"
2. Helping students learn to care for and be stewards of the world
3. Student learning IN the environment

Fostering Student Understanding of and Appreciation for the "Natural World"

A key term in this sub-theme was "natural world." Teachers and administrators who defined Environmental Education in relation to the natural world saw the goal of Environmental Education as teaching students to understand the natural world and their role in it, as well as to appreciate and value the natural world. Typical responses defined Environmental Education as:

- *Having students become literate in the interaction of man and the natural world.*
- *Understand systems and cycles in the natural world through direct exposure and well-constructed environmental experiences.*
- *Is the connecting of scientific understandings of our natural world to the functions of our ecosystems and biosphere as a whole?*
- *Is designed to teach students about the natural world and the role they play in it.*
- *It is the study of the natural world works and how humans impact the natural world.*
- *Is the process of about the world we live in and how to protect and preserve the natural resources that we have?*
- *About their connection to the natural world around them and the importance of healthy ecosystems and the interconnectedness of all living things and their responsibilities towards the environment.*
- *Is about exposing students to the natural world around them and helping them understand the various environmental issues in their local community as well as issues on a state, national and international level.*
- *To teach about the interaction between human activities and the natural world.*
- *Gaining an understanding of how the natural world works.*
- *The natural world around us and how to insure that the ecosphere, hydrosphere goes on uninterrupted by human activity.*
- *The natural world around us.*
- *Instruction that focuses on the relationship between human activity and the natural world.*
- *Is about the environment and giving them a better appreciation of the natural world around us.*
- *The study of the natural world and how it shapes us and we shape it.*
- *Creating an awareness and value for the natural world.*
- *Connects the natural world to the child's everyday experiences and beyond.*
- *Is having students explore and develop their own understanding of action, cause and effect within their natural, observable world.*
- *Science and problem solving to address issues related to our natural world.*
- *Systems in the natural world and how humans affect these systems both negatively and positively by working with nature to achieve human goals.*
- *Man's reliance on the natural world and man's impact on it.*
- *It gives them an appreciation for the natural world.*
- *Is the natural world in which animals and plants live? the natural environments help us understand how animals and plants are supported by natural resources and how things can effect that very important balance.*
- *Is /exposing/exploring our natural world and the balance and the unbalance of all its parts (land, air, humans, plants). Is about the natural world around them.*
- *Not only about the things that live in the world, but the things that affect the natural world, and how we can protect it. Is about the interconnection between humans and the natural world including all realms of conflict and mitigation within those realms.*

- *But I believe it means to get a better understanding of the natural world around them, in terms of weather, etc.*
- *Is an experience that encourages children and adults to engage with the natural world and understanding the impact on the space we occupy and the responsibility we share in caring for this planets natural resources.*
- *How our natural environment works and how humans can help to maintain and support our natural world?*
- *Helping students learn about and engage with the science, history, politics and beauty of the natural world.*
- *It's about the natural world around us both in understanding the ecological systems that support living things and valuing the need to care for and make responsible decisions.*
- *About the environment or natural world in the geographical area where we live to help youth understand human impact both positively and negatively thus enhancing their opportunity to engage in projects and efforts to take care of our world.*
- *Is the and every aspect of the natural world we live in*
- *Our natural world and how our actions, or those of others, can impact our world.*

Helping Students Learn to Care for and Be Stewards of the World

The second sub-theme of Learning About and In the Environment was that Environmental Education sought to teach students to care for and be stewards of their world. Here, the idea of Environmental Education went beyond simply understanding or appreciating the natural world and into a more active stance of protecting it. In this case, respondents described Environmental Education as follows:

- *Students should learn ways to care for and preserve the world and resources around them.*
- *help students learn how to show compassion and respect to the world around them.*
- *Teach our students about how to practically care for the world around them.*
- *Is meant to make students aware of the impact on the world.*
- *Creating an awareness with our students about their role in preserving our fragile world and the dangers facing it and what their role is in this process.*
- *It helps bring our worlds environmental issues into the lives of our students to help them be more mindful and contribute to protecting, preserving and enhancing our natural environments and even indoor air quality and becoming mindful of our surroundings.*
- *Educate people (students) on how to not only appreciate the beauty in our world but on how to protect it.*
- *Showing students how to implement practices that help the environment and world we live in.*
- *Making sure our students know and understand the world around them and how to improve the quality of life by maintaining and enhancing the world around them.*
- *Providing opportunities for students to learn about the impact we have on our environment and how we are responsible for taking care of the world around us.*
- *It is to educate our students about being stewards of our natural world.*

Learning IN the Environment

A third and minor sub-theme was student learning IN the environment. In these cases, Environmental Education was viewed as an opportunity for students to learn IN the natural world or use their environment as a learning tool. Respondents wrote that Environmental Education was:

- *Using natural environment to reinforce learning concept in all academic areas and play.*
- *Using the natural environment as tool and learning environment for students.*
- *Is engaging students in learning through being outdoors and in different environments.*
- *Students learn about the environment and in the environment.*
- *Is linking curriculum whenever possible in all subject areas to incorporate and learning in/experiencing especially our outdoor environment.*
- *Incorporating environmental learning into everyday experiences and activities to help children explore things from the natural world around us to see and learn how the environment works and functions daily.*
- *Gives our students the opportunity to learn outside of the classroom in their natural environment.*
- *To be able to actually learn this specific area one would be working in the environment and collection dissolved oxygen samples, collecting biological samples and studying the impact of the surround area that you are studying.*

A very small number of respondents also defined Environmental Education as relating to the learning environment in a school:

- *I would explain as being the degree to which our school environment impacts and effects our student learners.*
- *The learning environment of a school.*

Environmental Education Related to Impacts on the Environment

The second general theme among definitions of Environmental Education is that of students learning about impacts on the environment. This theme was able to be divided into three sub-themes:

1. Human impact on the environment
2. Other factors influencing the environment
3. Awareness and protection of natural resources

Environmental Education as Teaching/Learning about Human Impacts on the Environment

This sub-theme was characterized by depictions of Environmental Education as helping students understand the impact of humans on the environment, the world, the planet, the eco-system, and other settings in which they are members. Representative quotes included:

- *Gain knowledge of their environment and how humans impact both positively and negatively and how to be better stewards of Earth. Generally, it is our planet and specifically the resources found on it and how humans have an impact on those resources.*
- *A program that about the science behind ecology, the impacts of humans on ecosystems, and what consequences may result from changes in climate and ecosystems.*
- *Is helping the students increase their awareness of how human activity impacts the surrounding environment.*
- *About the inter-connection between the lives of people and the life of our planet, how human behavior impacts the planet and what we can do to sustain our planet.*
- *Habitats, pollution, human impact on environment.*
- *Earth science, and human impact on the environment.*

- *It is the study of how humans impact the natural world. Air, and space and how human activity impacts the environment.*
- *To understand the impacts that humans have on the environment, and how to change/minimize that impact.*
- *The environment and human impacts on the environment.*
- *Would relate to ecosystems, natural resources and how our everyday environment is being impacted on a daily basis within the world we live in as humans and animals.*
- *how humans and other living organisms impact earth.*
- *Is thethe impact that humans have on their natural surroundings through the way we live, gather, eliminate -all the ways we interact with the world in which we live - and the long and short term effects these actions have.*
- *Students should understand the impact of human behavior on these functions and encourage them to practice more mindful behaviors.*
- *Should aim to empower youth to recognize the impacts that humans have on the environment and problem solve to make changes that will better impact future generations.*
- *Learning how humans impact the environment.*
- *How human activity is impacting the environment/ecosystems and things we can do to make it a positive impact to halt or reverse climate change.*
- *how human impact the Earth.*
- *Is and learning focused on one's natural surroundings, near and far including human impacts in our past and of our future.*
- *About how the environment works and humans impact on it.*
- *Human impact in the environment.*
- *To inform human impact on the earth.*
- *How do humans impact nature as a whole?*
- *The connectivity between our lives and the environment and the impacts humans are having on it.*
- *Is a curriculum designed to teach students about ecosystems and the roles of humans in the impact and management of those ecosystems?*
- *Helps students to understand the impact that humans have on the environment (land, and air) both as individuals, and as a species.*
- *To be aware of the human impact on our environment.*
- *About human impacts on the environment and means of improving environmental "health".*
- *Is a learning process in which one learns about natural environmental systems and the impact human behavior has on the environment?*
- *Impact of humans on our planet.*
- *a connection between humans and their impact on the environment.*

Environment as Education about Other Factors Influencing the Environment

Other respondents characterized Environmental Education as educating students about multiple factors (other than the human factors) that influence or impact the environment. In these instances, teachers and administrators defined Environmental Education as:

- *Analyzing, factors that affect our environment and working that into teachers' curricula.*
- *Allow students to understand what factors affect our environment, what is damaging it, and what we can do to reduce its negative effects.*

- *About factors that impact the environment in a negative way such as fracking, clear-cutting of forests, dependence upon fossil fuels.*
- *I would explain to be on the factors that affect our environment*
- *That promotes awareness and knowledge of our environment and all factors affected by environmental change (climate, renewable resources, etc.*
- *Would revolve around how our environment works, along with the factor of technology and how the environment is forced to change as a result of technology.*
- *The impact of various factors on the environment (pollution, etc.), how to try to fix (as much as possible) damage already done & how to avoid doing damage in the first place (alternate energy, etc.).*
- *The complex factors (biotic and abiotic) that are part of the environment and their interactions.*
- *A study of science on the environment (our natural resources - how they are used, factors impacting them, on cause/effect).*
- *Students will learn the importance of the environment, the interconnectedness of many factors and sustainability.*
- *Is environments and the interactions of living and nonliving factors within different ecosystems.*
- *Providing students with an understanding of the how we define environment and the many factors which impact the Earth's environment.*
- *It helps define their experiences with the environment, and the factors that may be contributing to their own lives.*

Environmental Education as Building Awareness and Protection of Natural Resources

Finally, a third sub-theme of the Environmental Education related to impacts on the environment had to do with teaching students or helping them learn to be aware of and conserve/protect natural resources. Representative respondent definitions included:

- *This will form the basis for understanding the developing of land (also the building of roads, reservoirs) the protection of natural resources and wildlife, waste management and the federal, state and local agencies that oversee all.*
- *It is awareness of natural resources and the effects on humans and vice versa.*
- *It would also include the balance between people and nature, the conservation of resources, ecological impact of pollution on air, land and water.*
- *Is an effort to inform children and adult of …their responsibility each person has to recycle, conserve and/or renew natural and manmade resources.*
- *Is the shared with us about how to preserve nature's resources, how to take care of our earth and all its living things.*
- *Improving the understanding of …how to protect our natural resources.*
- *Is the process of about the world we live in and how to protect and preserve the natural resources that we have?*
- *Would relate to ecosystems, natural resources and how our everyday environment is being impacted on a daily basis within the world we live in as humans and animals.*
- *Multi-grade level curriculum which brings together many disciplines including science, sociology, and math to help build children's awareness of nature and natural resources and the role of humans in helping foster a healthy world for future generations.*
- *Is making the students aware of the environment and how to take care of it and use its natural resources is a more efficient way.*
- *The study of natural resources and surroundings.*

- *Resources, protecting our surroundings, and the relationship between humans and nature.*
- *Consuming/recycling/replacing natural resources.*
- *Instruction that teaches how to protect our natural resources and global health both short and long term.*
- *Topics like natural resources, global warming, etc.*
- *Natural resources and the effect humans have on nature as well as the reverse.*
- *A study of science on the environment (our natural resources - how they are used, factors impacting them, on cause/effect).*
- *I believe is students and teachers working outside with the environment, talking about natural resources, etc.*
- *Is multi-subject instruction designed to develop an appreciation of the environment and our natural resources.*
- *Water resources, preservation of natural resources of all kinds, and the U.S./world laws and governmental regulations that impact all of the above.*
- *How to protect and conserve our environment and natural resources.*
- *About the importance of taking care of and protecting our natural resources, plant life, etc.*
- *It includes use and preservation of natural resources, as well as, respect for nature.*
- *Is an experience that encourages children and adults to engage with the natural world and understanding the impact on the space we occupy and the responsibility we share in caring for this planets natural resources.*
- *Scientific themes - like ecology, food webs-, history of how man work with the environment- e.g., indigenous people of America-, as well as mathematical studies of how increased human population can affect natural resources.*
- *Related to protecting natural resources.*
- *How to preserve and protect our natural resources and environment.*

Environmental Education Focusing on Environmental Issues

The third theme uncovered among definitions of Environmental Education is that of student learning about environmental issues. This theme was able to be divided into two sub-themes:

1. Exploring environmental issues
2. Solving environmental issues

Environmental Education as an Exploration of Environmental Issues

Respondents who viewed Environmental Education as an opportunity for students to explore and learn about environmental issues stressed the importance of understanding local, national, and international issues that affect and pertain to the environment. Typical definitions of Environmental Education in this regard include:

- *Researching issues in our environment and developing/carrying out plans to solve these problems.*
- *What issues impact the environment and ecological systems.*
- *The goal is to have society achieve a deeper understanding of environmental issues, acquire skills to live sustainably, and preserve the environment. It is when students are aware of the issues in the environment.*
- *An effort to understand issue regarding the environment in Rhode Island.*

- *Raising awareness and about ecological issues that affect the environment.*
- *Educate people about issues that negatively impact our environment and ways to problem solve and minimize impacts to our planet.*
- *To explore issues in the environment and to learn how to take action to solve environmental problems.*
- *Would mean connecting students to their environment, understanding human impact, encourage environmentally responsible behavior and practices, exposing them to laws and legislation, the history of the movement, and alerting them to current problems facing the environment today, including political situations.*
- *Inclusion of environmental issues into all disciplines to increase student knowledge around these topics.*
- *Informing students about what is happening to the environment, up to date issues and problems that this generation and future generations will be forced to deal with.*
- *It is about the environment including issues.*
- *The study of the environment whereby you explore environmental issues.*
- *Increases public awareness about issues and problems around the environment.*
- *Is providing opportunities for and learning to take place about issues that affect the environment.*
- *It helps bring our worlds environmental issues into the lives of our students to help them be more mindful and contribute to protecting, preserving and enhancing our natural environments and even indoor air quality and becoming mindful of our surroundings.*
- *It about issues and problems within the environment and community.*
- *To be made aware of issues surrounding the environment.*
- *Fluency, and understanding of the environment in its systems, functions and issues across the planet.*
- *It is the study of how the environment plays a role in and has an effect on global issues.*
- *Is gaining knowledge and understanding of issues pertaining to the environment.*
- *I believe that would be groups gathering to discuss problems with ecosystems, and any other issues that pertain to the environment.*
- *Explaining issues or current situations that are happening around the environment.*
- *A process for individuals to explore environmental issues and to examine ideas/ways to improve the environment.*
- *Encourages students and teachers to explore environmental issues, engage in problem solving, and take action to improve the environment.*

Environmental Education as Building Student Capacity to Address and Solve Environmental Issues

The final sub-theme revealed in analyses of respondents' open-ended responses to the question, "In your opinion, what is Environmental Education? How would you explain Environmental Education in your own words?", goes one further than helping students understand environmental issues. Instead, this sub-theme focuses on empowering students to make decisions and act on environmental issues, as well as work to solve them. Respondents defined Environmental Education in this regard as follows:

- *Create opportunities for becoming aware of issues that affect the environment and how we can proactively attempt to alleviate those issues or find solutions for them. It is the process of problem solving environmental issues, learning to sustain our environment, and understanding environmental changes.*

- *Is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment.*
- *Is pedagogy that focuses on environmental issues and helps people develop strategies to improve the environment also develops problem solving skills.*
- *Is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment.*
- *We need to encourage students to be part of the solution while increasing awareness and solve tough environmental issues.*
- *Is providing students with instruction and experiences that foster environmental stewardship and an appreciation for planet Earth.*
- *Providing information to students so that they may make their own informed decisions regarding the future of our environmental quality.*
- *Allowing real-life, hands-on and technological experiences for students will make the learning interesting and important to them, which is what we need to have a positive impact on the environmental future of our world.*
- *how to more effectively handle environmental concerns.*
- *Is science content that focuses on environmental issues, real world issues that students can learn about and problem solve.*
- *Seeks to provide students with the background knowledge needed to make informed decisions on issues affecting environmental sustainability and natural systems.*
- *Students develop a deeper understanding of environmental issues and have the skills to make informed and responsible decisions.*
- *Is a curriculum that focuses on engaging students in the exploration of environmental issues in order to devise strategies for solving them effectively.*
- *Encourages students and teachers to explore environmental issues, engage in problem solving, and take action to improve the environment.*

Beliefs about Environmental Education

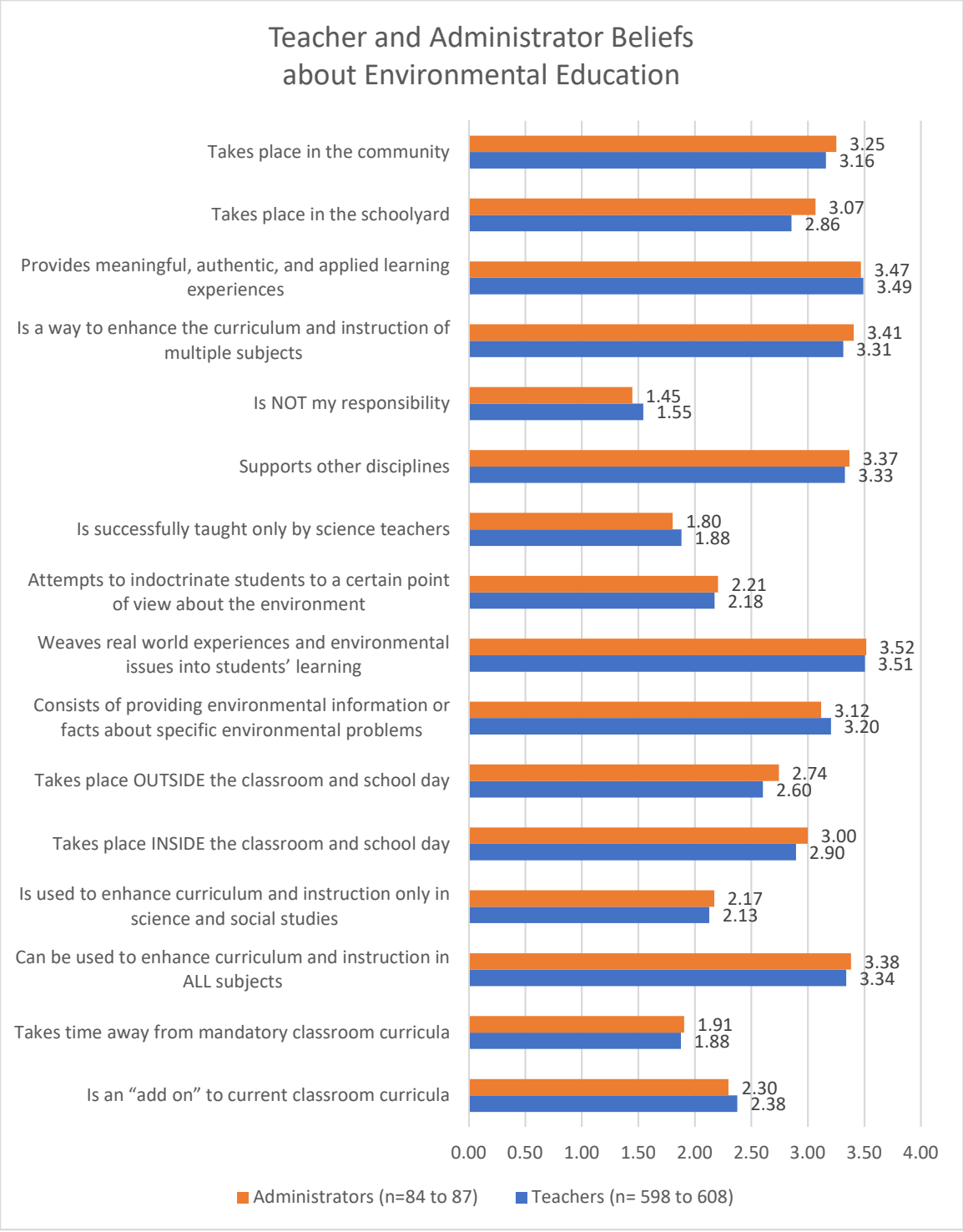
Findings from the Environmental Education: Inventory of Current Practices survey reveal that teacher and administrator respondents tended to have similar beliefs about Environmental Education. Presented with a series of statements about Environmental Education with which they rated their agreement using a 1 (Strongly disagree) to 5 (Strongly agree) scale, mean teacher and administrator ratings for each of the sixteen items differed by an average of ± 0.03 point. As displayed in the figure below, teacher and administrator respondents tended to agree that Environmental Education takes place in the community, provides meaningful learning experiences, enhances learning and supports other subjects, integrates real world experiences into student learning, and provides information/facts about specific environmental problems. Both groups also disagreed that Environmental Education is successfully taught only by science teachers or appropriate mainly for science/social studies, is an "add on," takes time away from mandatory subjects, and attempts to indoctrinate students. In fact, mean teacher ratings on related survey items differed by -0.09 to 0.09 points.

Beliefs in which teachers and administrators differed most had to do with *where* Environmental Education takes place and whose responsibility it is. Administrators in the survey sample[3] were more

[3] It is important to keep in mind that while some teacher and administrator survey respondents undoubtedly came from the same schools, this information could not be tracked, and teachers and administrators were not "matched" by school. Consequently, the differences in attitudes, etc. between teachers and administrators do not

likely than teachers to agree that Environmental Education takes place in the school yard (teacher mean=2.86; administrator mean=3.07; difference=0.21). Likewise, both groups tended toward disagreement, but teachers disagreed more strongly that Environmental Education takes place OUTSIDE the classroom (teacher mean=2.60; administrator mean=2.74; difference=0.14). Paradoxically, administrators were also slightly more likely to agree that Environmental Education takes place INSIDE the classroom (teacher mean=2.90; administrator mean=3.00; difference=0.10). Finally, teachers were more likely than administrators to disagree that Environmental Education was NOT their responsibility, with a 0.10-point discrepancy between the two mean sets of ratings for this item.

necessarily reflect "disconnects" or disagreement between teachers and administrators who work together in the same school settings. Rather, the findings are more descriptive in nature, highlighting differences in opinions, perceptions, and values between sample respondents in these two important roles.



Scale: 1=Strongly disagree; 2=Disagree; 3=Agree; 4=Strongly agree

Attitudes toward Environmental Education and the Environment

After gauging respondents' existing views/understandings of Environmental Education, the Environmental Education: Inventory of Current Practices survey presented them with a two-pronged

definition of Environmental Education from which to consider the next set of questions. This definition was as follows:

Environmental Education has a two-pronged definition.

First, it is the learning process through which students and citizens attain E*nvironmental Literacy*. The Partnership for 21st Century Skills defines an environmentally literate student as one who can:

- demonstrate knowledge and understanding of the environment and the circumstances and conditions affecting it, particularly as relates to air, climate, land, food, energy, water and ecosystems
- demonstrate knowledge and understanding of society's impact on the natural world (e.g., population growth, population development, resource consumption rate, etc.)
- Investigate and analyze environmental issues, and make accurate conclusions about effective solutions
- Take individual and collective action towards addressing environmental challenges (e.g., participating in global actions, designing solutions that inspire action on environmental issues) (Partnership for 21st Century skills, 2011)

Second, Environmental Education is any learning process that takes place in the natural world—i.e., outdoors, such as in a school yard, an outdoor classroom, an outdoor habitat, a park, a nature center, etc.

Given this "official" definition, the next sets of questions were intended to evaluate respondents' attitudes toward the environment, Environmental Education, and the impact of Environmental Education on student engagement and learning.

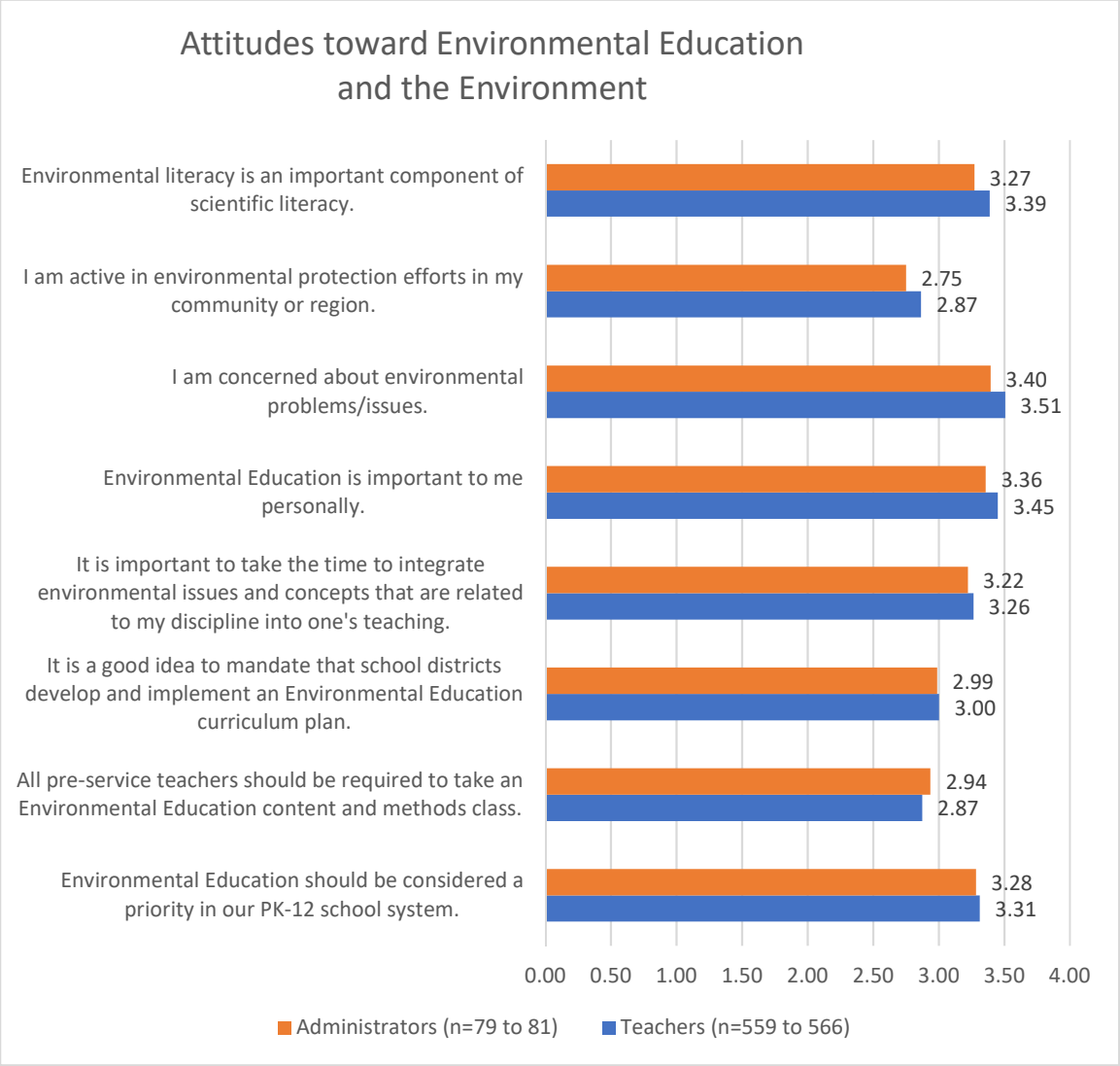
Results revealed that teacher and administrator respondents also profess similar attitudes about Environmental Education and the Environment. Presented with a series of statements about Environmental Education with which they rated their agreement using a 1 (Strongly disagree) to 5 (Strongly agree) scale, mean teacher and administrator ratings for each of the sixteen items differed by an average of ± 0.07 point.

Teacher and administrator survey respondents differed very little in the degree to which they agreed that Environmental Education should be considered a K-12 priority, it is important for teachers to integrate environmental issues into their teaching, and that districts should develop/implement Environmental Education curriculum. Both groups agreed with these assertions. Likewise, the two groups reported very similar levels of uncertainty about whether pre-service teachers should be required to take an Environmental Education content and methods class. Mean ratings for this item did not quite reach agreement (administrator mean=2.94; teacher mean=2.87). It is evident that the groups were divided on this issue, with teachers more likely to disagree with this idea.

The areas of greatest difference between teachers and administrator attitudes concerned their personal conviction about and involvement in environmental issues. While both groups disagreed that they were active in environmental protection efforts in their community, teachers agreed less that this was the case (administrator mean=2.75; teacher mean=2.87; difference=0.12). Similarly, teachers reported more concern about environmental problems/issues (administrator mean=3.40; teacher mean=3.51; difference=0.11). Teachers were also slightly more likely to agree that Environmental Education was

important to them personally, as compared to administrators (administrator mean=3.36; teacher mean=3.45; difference=0.09).

Interestingly, teachers were also more likely than administrators to agree that environmental literacy is an important component of scientific literacy (administrator mean=3.27; teacher mean=3.39; difference=0.12). This represents an important difference not just in attitude, but also in understanding.



Scale: 1=Strongly disagree; 2=Disagree; 3=Agree; 4=Strongly agree

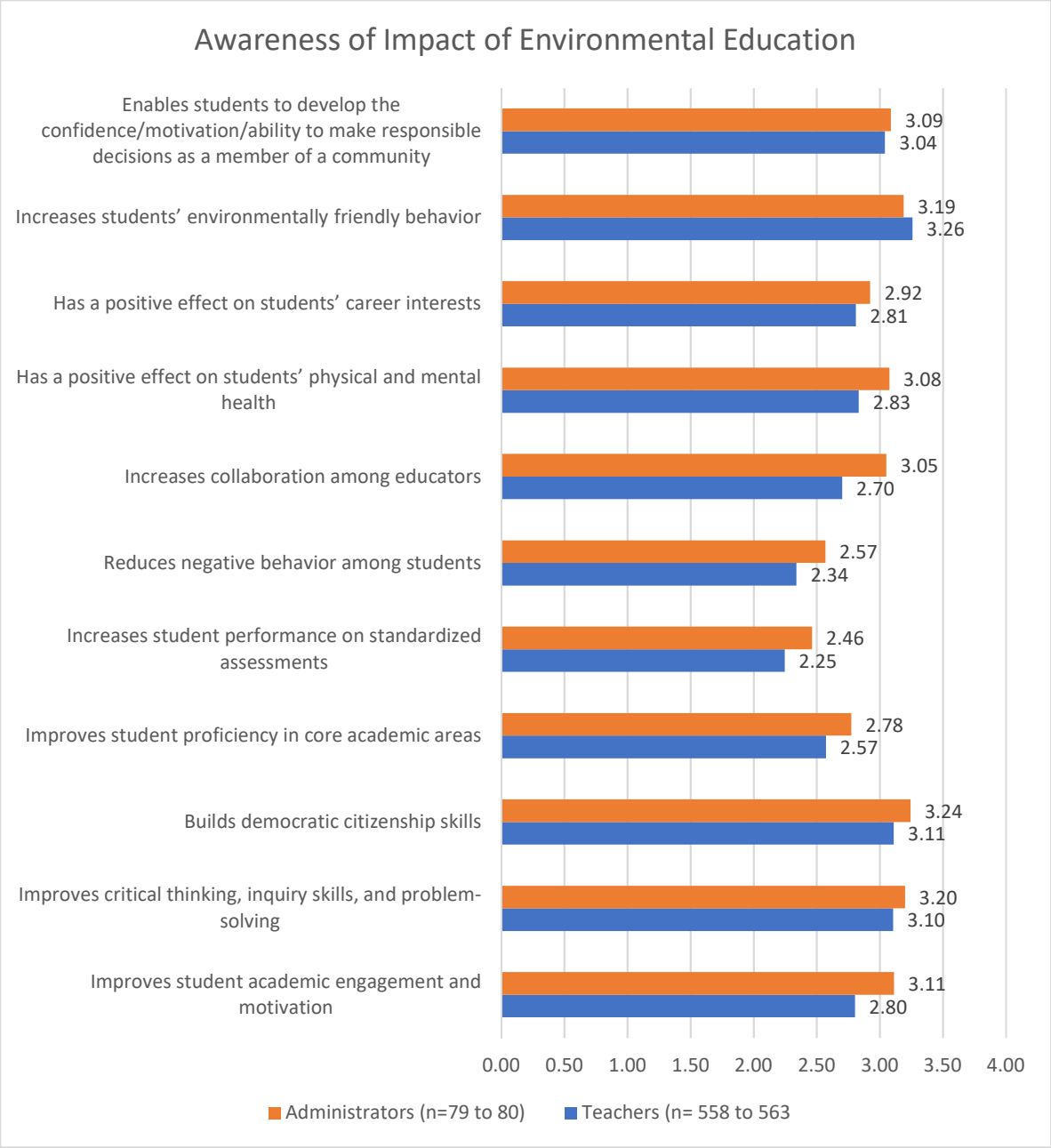
Knowledge of Impact of Environmental Education

Findings from the Environmental Education: Inventory of Current Practices survey revealed differences in teacher and administrator awareness of the impact of Environmental Education on student learning, behavior, and engagement. Respondents were asked, “Prior to filling out this survey, how aware were you of the following?” and then presented with 11 statements that they then rated on the following scale: 1=Not at all aware; 2=Somewhat aware; 3=Moderately aware; 4=Very aware. Mean teacher and administrator ratings for each of the sixteen items differed by an average of ± 0.18 point. In all areas,

administrators indicated greater awareness of the impact of Environmental Education on students and teachers (see figure below). The points where administrator and teacher awareness differed most were as follows:

Environmental Education:

- Improves student academic engagement and motivation: difference between teacher and administrator mean rating=0.31
- Improves student proficiency in core academic areas: difference between teacher and administrator mean rating=0.20
- Increases student performance on standardized assessments: difference between teacher and administrator mean rating=0.22
- Reduces negative behavior among students: difference between teacher and administrator mean rating=0.23
- Increases collaboration among educators: difference between teacher and administrator mean rating=0.35



Scale: 1=Not at all aware; 2=Somewhat aware; 3=Moderately aware; 4=Very aware

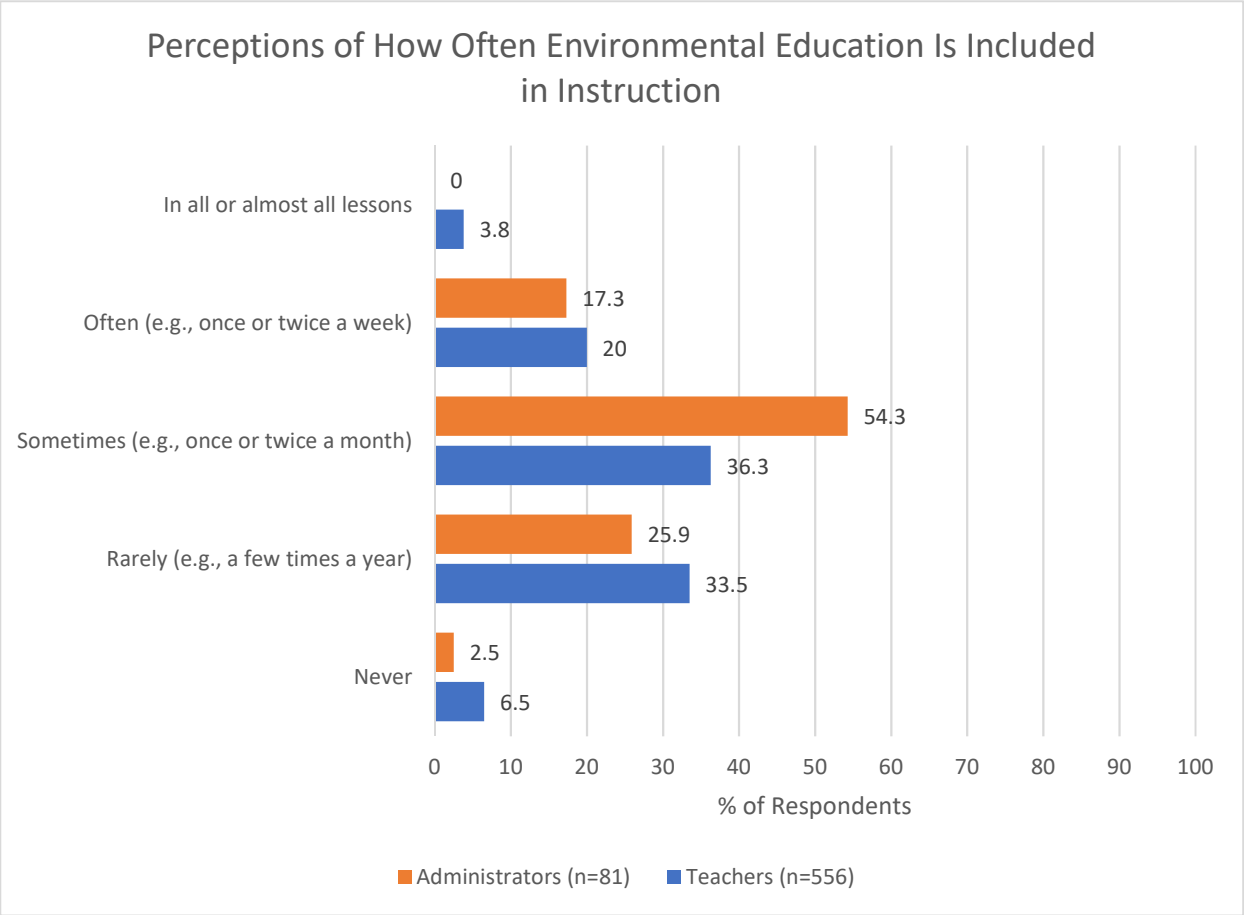
Environmental Education at School

Frequency of Implementation

After reminding teachers and administrators regarding the pre-existing understanding and attitudes toward Environmental Education, the Environmental Education: Inventory of Current Practices survey asked teachers and administrators parallel questions about the frequency with which Environmental Education was included in instruction at their schools. Teachers were asked, "Given this definition of Environmental education, approximately how often do you include Environmental Education in your instruction?" The administrator version of this question was as follows: "Given this definition of

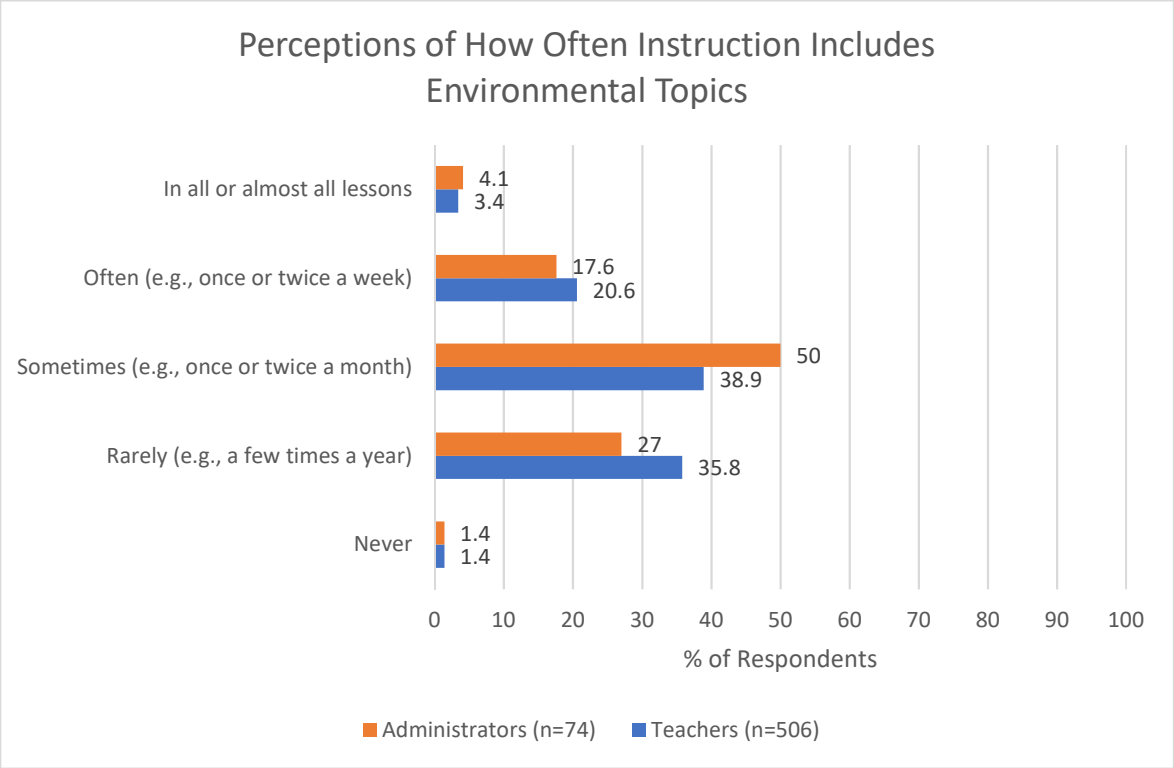
Environmental Education, approximately how often do teachers in your school include Environmental Instruction in their instruction?"

As displayed in the table below, administrator survey respondents tended to think that Environmental Education was included in teachers' instruction more than teachers reported. For example, almost 4% of administrators reported that it was included in all or almost all lessons, as opposed to 0% of teachers. Similarly, 6.5% of teachers reported that they never included Environmental Education in their teaching, while only 2.5% of administrators thought that this was the case. Likewise, 54.3% of administrators estimated that Environmental Education was included in instruction once or twice a month, as compared to 36.3% of teachers who indicated that this was actually the case. Similarly, 33.5% of teachers reported including Environmental Education in their instruction a few times per year (i.e., rarely), while administrators thought this was less rare. In contrast, teachers and administrators were nearly in agreement in one respect, with approximately 20% of each group reporting that Environmental Education was included in instruction often (e.g., once or twice a week).

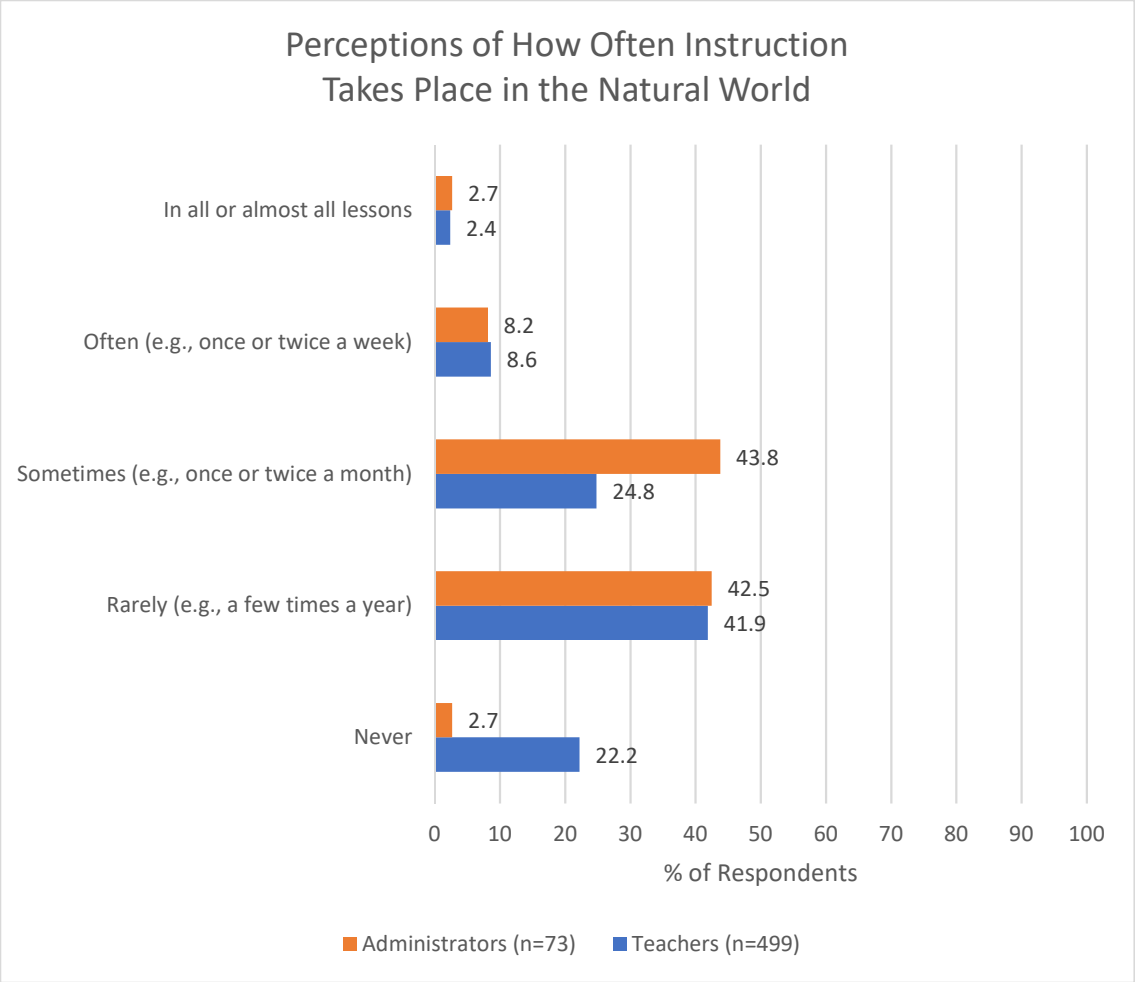


When asked to indicate how often they believed their own or teachers' classroom instruction included environmental topics, nearly equal, very small proportions of teachers and administrators reported that this was happening in all or almost all lessons or never (see figure below). Likewise, similar proportions of both groups indicated that instruction included environmental topics once or twice a week (17.6% for administrators and 20.6% for teachers). However, a larger proportion of administrators than teachers (50% versus 38.9%) indicated that environmental topics were sometimes addressed (e.g., once or twice

per month). Finally, more teachers than administrators reported that instruction rarely included environmental topics, with 35.8% of teachers indicating so, in comparison to just 27% of administrators.



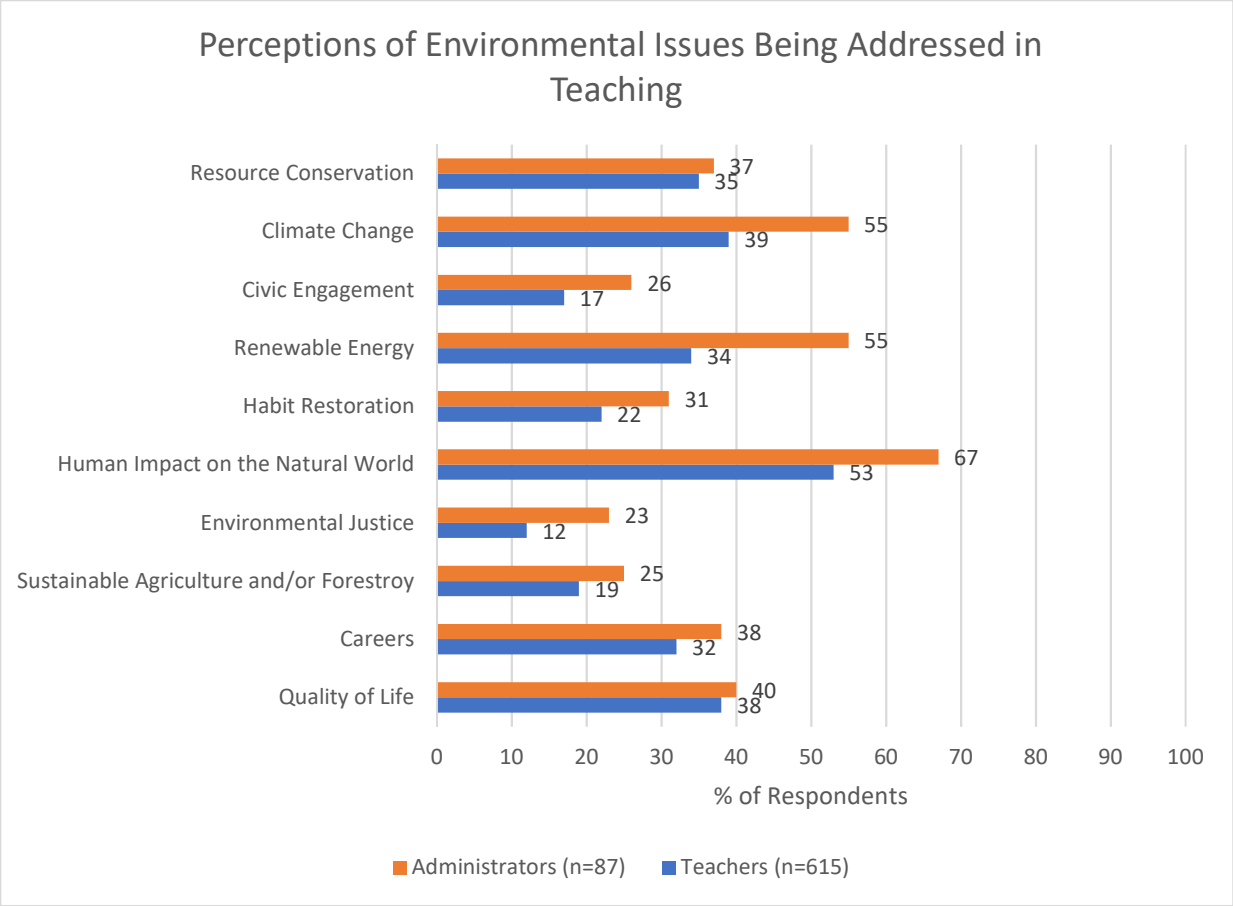
Among teacher and administrator survey respondents, approximately 11% of each group reported that their own or teachers' instruction took place in the natural world often or in all or almost all lessons. Further, nearly equal proportions of each group (just over 40%) reported that this was a rare event, occurring just a few times per year. In contrast, 43.8% of administrators thought that instruction at their school sometimes took place in the natural world (e.g., once or twice a month), while only 24.8% of teachers agreed. Finally, almost one-quarter (22.2%) of teacher respondents responded that their instruction never took place in the natural world. Very few administrators thought the same (2.7%).



Instruction and Assessment in Environmental Education

Issues Addressed

Presented with a list of environmental issues, teachers indicated which one(s) they addressed in their teaching. Similarly, administrators viewed the same list of issues and indicated the ones they believed were being addressed in their teaching by teachers at their schools. As displayed in the figure below, administrators indicated that their teachers were addressing the human impact on the natural world, climate change, and renewable energy more than any other Environmental Education topics. Teachers, on the other hand, reported that the most frequent Environmental Education topics that they addressed in their teaching were human impact on the natural world, climate change, and quality of life. Both groups agreed that civic engagement, sustainable agriculture/forestry, and environmental justice were Environmental Education topics that were being addressed least in classrooms. In all areas, administrators were more likely to indicate that an Environmental Education topic was being addressed than were teachers. This may be because administrators applied a more global view of what was being addressed in their schools than did teachers who focused on their own instruction. On the other hand, these findings could also suggest that administrators are not completely aware of the degree to which Environmental Education issues are or are not being addressed in classrooms in their schools.



Survey respondents were encouraged to identify "other" Environmental Education topics that they addressed in their teaching and that did not appear in the previous survey question. 51 teacher respondents provided "other" responses; however, most of these "other" topics actually fell under the topics listed in the original question. The most common other Environmental Education issues mentioned included: recycling, health issues (air quality/asthma), natural disasters, conservation, and water quality. Some respondents also identified activities they conducted in the classroom, rather than Environmental Education issues that they addressed. Examples included:

- *genius hour projects - inform school community/town/state and federal government - persuasive essays sent to the president.*
- *I am a librarian and have book displays and promote new books on the topics.*
- *Occasional articles/research opportunities in context of HS English class.*
- *We are doing the Volvo Ocean Race program with the 2nd graders this year.*

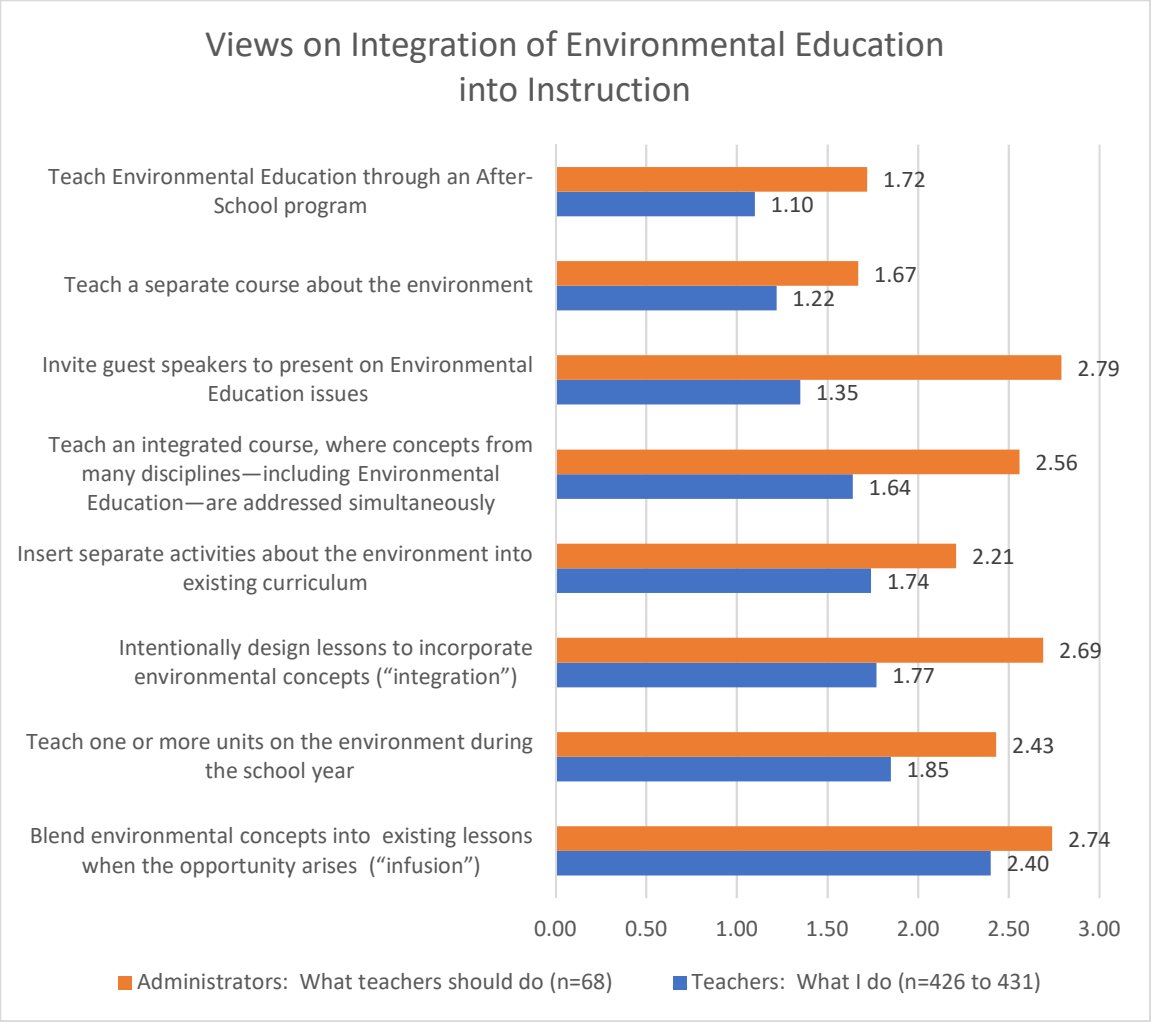
"Other" Environmental Education issues that administrators mentioned that teachers in their school were addressing in their reaching included: "plant life and food source," "weather, plants, sand and soil, animals and habitats," and "various other science topics."

Environmental Education Integration Strategies

Environmental Education: Inventory of Current Practices survey respondents were also asked to share their views about the integration of Environmental Education into instruction. Presented with a list of strategies for Environmental Education integration, teachers responded to the prompt, "For each of the following concepts, indicate how accurately it describes the way or ways in which you include Environmental Education in your teaching." Administrators viewed parallel prompts and were asked, "For each of the following concepts, indicate how accurately it describes the way or ways in which you believe that Environmental Education should be integrated into instruction at your school." In both cases, respondents utilized the following scale: 1=Not accurate; 2=Somewhat accurate; 3=Accurate; 0=Not Sure.

Teacher and administrator feedback on the integration of Environmental Education into instruction are presented in the figure below, which reveals that "infusion" (blending environmental concepts into existing lessons when the opportunity arises) is the most common way in which teachers integrated Environmental Education. Teachers rated this approach higher than any other option, with a mean rating of 2.40 on a 1 (Not accurate) to 3 (Accurate) scale. The next most common integration approaches for teachers consisted of teaching one or more Environmental Education units during the school year, intentionally designing lessons to incorporate Environmental Education concepts, and inserting separate Environmental Education activities into their curriculum. However, teachers rated these approaches as far less accurate of their instruction than infusion. In fact, the mean ratings for these three approaches do not even meet the "somewhat accurate" rating of 2.00. Alternatively, the integration approaches that teachers clearly did not endorse as accurate of their instruction were teaching Environmental Education through an After-School program, teaching a separate course about the environment, and inviting guest speakers to present on Environmental Education issues.

In terms of administrator feedback on how Environmental Education *should be* integrated into teachers' instruction, the results were quite different (see figure below). For example, the integration strategy most endorsed by administrators was inviting guest speakers to present on Environmental Education issues, with a mean rating of 2.79 out of 3.00. Administrators embraced infusion second most (mean=2.74), followed by "integration" (intentionally designing lessons to incorporate environmental concepts (mean=2.69). These three approaches accurately captured how administrators believed educators should integrate Environmental Education into their instruction. The integration approaches least endorsed by administrators included teaching Environmental Education in an After-School program and teaching a separate course on the environment, with mean ratings of 1.75 or less.



Scale: 1=Not accurate; 2=Somewhat accurate; 3=Accurate; 0=Not Sure

The response scale used for the survey items about ways to integrate Environmental Education into teachers' instruction also included a zero point "not sure" option. Teachers selected this option if they were uncertain whether a listed integration strategy was accurate of them or not. Administrators chose "not sure" to indicate their uncertainty about whether teachers should utilize a particular integration strategy. Very few teachers selected "not sure"; in fact, 3% or fewer teachers selected "not sure" for all items except one. The exception was "Environmental education is embedded in resources provided by my district." In this case, 5% of teacher respondents indicated that they were not sure if this was accurate or not.

On the other hand, administrators were more likely to select the "not sure" option to indicate how they believed Environmental Education should be integrated into teachers' instruction. The degree of administrator uncertainty regarding the appropriateness of each integration strategy are presented in the table below. In particular, it is evident that 5% to 10% of administrator respondents are not certain about the best approach to integrate Environmental Education. For example, 9% were unsure about whether Environmental Education should be integrated into separate Environmental Education units or a separate course about the environment. Further, 6% expressed uncertainty about whether

Environmental Education should be integrated into district resources or addressed in an integrated, interdisciplinary course.

How Administrator Respondents Think Teachers Should Integrate Environmental Education into Instruction	% not sure (n=68)
Teachers should teach one or more units on the environment during the school year	9
There should be a separate course about the environment	9
Environmental Education should be embedded in the resources provided by the district.[4]	6
There should be an integrated course, where concepts from many disciplines—including Environmental Education—are addressed simultaneously	6
Separate activities about the environment should be inserted into the curriculum	4
Environmental concepts should be blended into existing lessons when the opportunity arises (also known as "infusion")	3
Lessons should be intentionally designed to incorporate environmental concepts (also known as "integration")	3
Guest speakers should be invited to present on Environmental Education issues	2
Environmental Education should be taught through an After-School program	2

Survey respondents were encouraged to describe "other" ways that they integrated Environmental Education into their instruction. Teachers' responses largely overlapped with the options they previously rated and tended to include environmental clubs, separate environmental units, and discussing environmental issues when they come up in class. Only two administrators described "other" ways they believed Environmental Education should be integrated into teachers' instruction. They commented:

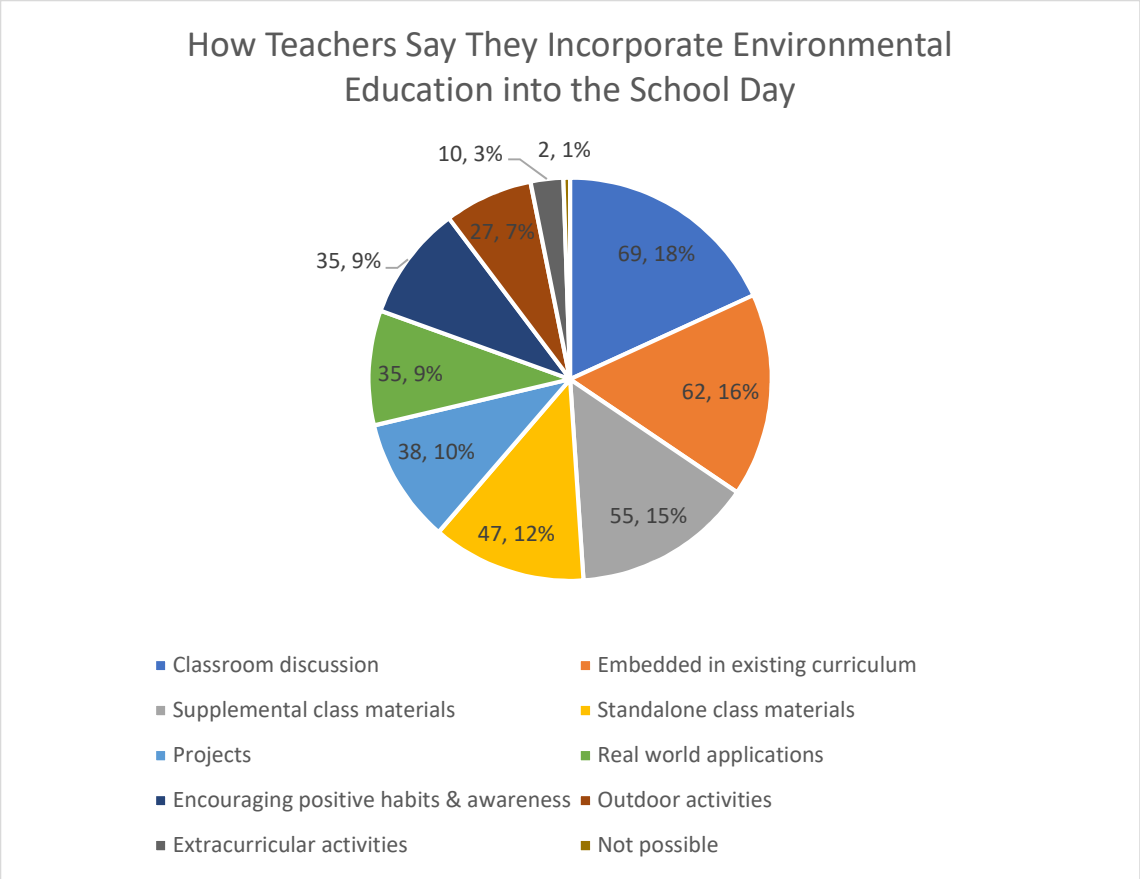
> *We should have a relentless focus on all the systems that impact the bay as a way to build a knowledge base and understanding human and natural impacts on the bay.*

> *I'm really not big on curricular mandates so I respond to "should" as meaning "it can be valuable" rather than "I insist that it happen." There are many effective and worthwhile approaches. As a leader, I'm not interested in making sure every teacher does a particular thing.*

Examples of How Teachers Incorporate Environmental Education into the School Day

The survey contained an open-ended question asking teachers to provide examples of how they incorporated Environmental Education into the school day. Three hundred eighty-one individuals responded to this question. The figure below summarizes the various ways that respondents reported that they incorporated Environmental Education into their school day.

[4] Note: This item did not appear in the teacher version of this survey question.



The sections below provide details that illustrate and clarify the characteristics of the ways in which teacher respondents reported that they integrated Environmental Education into their school day.

Class Discussion (n=69)

Class discussion was the most popular method for teachers to incorporate Environmental Education in the classroom. Sixty-nine respondents (18%) explained that conversation was one of the most powerful ways to get students thinking and involved in class. Most specifically, teachers found it useful to discuss current events, as they were occurring, in the classroom. This shows that Environmental Education is infused when the opportunity arises. One respondent explained how his/her class discussed topics such as natural disasters and how they affect animals' habitats. The respondent shared "teaching students about respecting the environment through conservation" makes students more aware of the environment around them.

Many of the teachers explained that they discussed various environmental topics with their classes. Topics include pollution, climate change, conservation, weather, recycling and alternative energy, etc. Some of the teachers taught science classes and added that the topics seamlessly integrate into their discussions while others added environmental topics into interdisciplinary subjects. Three respondents were math teachers and the students used models and data that involved the environment which led to class discussion. Similarly, one respondent included that his/her class had discussions about protecting the environment. One teacher explained that in his/her classroom, the students "discuss climate science, natural resources, alternate energy sources, human impacts on the environment and human

responsibilities to the earth as much as possible. Although the district "does not seem interested in formally entertaining environmental education in the science curriculum, [he/she has] not yet received push back" for incorporating topics into his/her lessons.

It was most common for teachers to discuss topics such as recycling and pollution with their class (n=16). Similarly, multiple respondents explained that their classes discussed topics relating to reducing, such as water consumption, plastic water bottles, responsibility in the community, technology and other conservation efforts (n=8). Ten respondents explained that environmental topics arose naturally in discussion throughout the day (n=10). Six respondents explained that their classes discussed human impact in history on the environment and its impact on society (n=6).

Embedded in Existing Curriculum (n=62)

Sixteen percent of teachers noted that Environmental Education was already embedded in the curriculum they taught (n=62). This meant that these 62 teachers integrated Environmental Education throughout the year in their lessons. Some taught courses that were directly related to science, such as Environmental Biology, Ecology, AP Environmental Science, Environmental Science, Biology, Integrated River Studies, Chemistry, Forensics, Science Theology, Renewable Energies, and Physics, while other respondents taught other subjects, such as Technology and Global Business and Economy, Marketing, Animal Behavior, or Oceanography at the elementary, middle, and high school level (n=25).

A fourth-grade teacher explained that Environmental Education begins at the start of the school year in the classroom. The students meet their senior buddies at Brookdale Manor, interview and write essays on their lives, topics include environmental education, the growth in technology and simple childhood pleasures. This respondent continued to explain that "throughout the year in all subject areas a focus on environmental issues from the effects of climate change as seen through erosion, weather patterns, catastrophic storms, floods, fires etc. are studied. Experiments that involve solutions to erosion and weathering are conducted". The Social Studies program infuses these topics as students learn the different regions throughout the United States. Students learn about water scarcity around the world as well as the pollution of soil, air and oceans. Next, students chose an environmental issue to become experts on specific topics. They write persuasive essays and create Google slides to educate the school community. Similarly, another elementary school teacher explained that Environmental Education is incorporated into the reading lessons. The science area in the classroom "extends beyond curriculum kits and is accessible at free time and indoor recess." During outdoor recess, students use science tools such as magnifying glasses, tweezers and small containers to explore nature.

Multiple respondents added that Environmental Education is brought up through the FOSS inquiry-based science kits, GEMS-NET science kits or through STEAM courses (n=9). Another respondent explained that they work with Farm Fresh RI and they teach a curriculum on food justice. Multiple respondents shared that they teach about sustainability throughout the year (n=2). One of these respondents added that they are preparing proposals to remediate areas and propose solutions to environmental problems. Another shared that most of their lessons are taught through the lens of the three pillars of sustainability. His/her curriculum covers a unit on weather and he/she incorporates concepts about ocean currents, hurricanes, polar regions, water temperature and its influence on local weather and climate. Another respondent explained that he/she utilizes environmental topics to "expand student's listening, reading, speaking and writing skills."

Four respondents explained that their school has a strong emphasis on the natural world (n=4). One respondent explained "our school has ten design principles that students strive towards embodying, one of which is the natural world. Students are recognized during our weekly community gathering on Friday for their ability to apply these design principles. Greene School teaches semesters as an interdisciplinary learning expedition that typically has an environmental component". Another explained that outside of their school's direct curricular connections, they discuss the importance of sustainable personal practices including "recycling, energy and water conservation, minimizing their energy footprints, walking or riding the bus to school, bringing their own water bottles." Lastly, a respondent shared that their school has a "semester wide expedition that focuses on Community, Climate, and Culture."

Supplemental Class Materials (n=55)

It was common for teachers to utilize supplemental class materials relating to environmental education throughout the year. Fifteen percent of respondents shared that they commonly use readings, articles, news, Ted Talks, YouTube videos and other media text to teach about the environment in their lectures and class activities (n=55). One respondent further explained "a lot of times, Environmental Education is incorporated through reading non-fiction texts, discussions, and able to be infused through ELA curriculum most especially. Most times, we provide texts involving animals, habitat, and how humans impact them. We then talk about that problem and solutions to that problem. A lot of times we debate about recycling, use of plastics and other man-made materials and how they impact the environment." Multiple respondents explained that their class has guided readings throughout the year and they select books related to the environment as much as possible (n=5). Many of the respondents explained that they use these supplemental class materials in order to stimulate class discussion, as writing prompts and for research topics (n=7). One respondent further explained this:

> *"Oftentimes we'll talk about themes like "the individual's responsibility to the community" and make connections to environmental education that way. Some of the fiction we read is futuristic dystopian novels, so we can make connections to bleak predictions for the future of our planet. Basically, I try to weave in a global consciousness on as many topics as possible. I'm trying to teach English, but also coach young people into productive, conscious, and meaningful adult lives."*

Standalone Units and Lessons (n=47)

The fourth most common theme in respondents' answers to how they integrate Environmental Education into the school day is through standalone units and lessons. These consists of various units or lessons on topics such as human population growth, weather, air, life science, food chain, etc. This differs from the "Embedded in Existing Curriculum" theme because it represents activities/units that are not part of existing or official curriculum. Twelve percent of respondents explained that they incorporated Environmental Education in this way.

The following are various units that these respondents incorporated into their classes:

- Alternative energy (n=2)
- Animal habitats, ecosystems and rainforest conservation (n=3)
- Conservation of the environment for human needs
- Crayfish
- Deforestation: food chain and food web, soil erosion (n=2)
- Diseases in Microbiology: how the problem of clean water impacts it
- Ecology: "hatching chicken and salmon eggs, analyzing case studies, learning

about invasive species, projects on ecosystems" (n=2)
- E-Waste
- Greenhouse effect and the ozone layer (n=3)
- Humans and the environment: impacts of current and future human population growth (n=4)
- Human disturbance and biodiversity
- Hydroponics
- Insect art: "We draw scientifically accurate insects, discuss host plants, and paint live plants. The insects are cut out and glued to painting. We make a model of a mantis, discuss camouflage, and hide them in school yard in brief game outside."
- Life science: environment and ecosystems
- Non-traditional farming practices
- Ocean acidification and buffers in chemistry
- Pollution
- Problems facing our environment and impact as citizens on the environment: "We explore vocabulary related to the topic, we discuss problems, i.e. our carbon footprint, and possible solutions. It is not very in depth as it is done in Spanish."
- Product waste
- Protest music involving pollution: "Mercy Mercy Me (The Ecology)" and "Big Yellow Taxi."
- Recycling (n=2)
- Reducing carbon footprints and waste (n=3)
- Safe disposal of chemicals
- Safe sun lesson
- Sanitation
- Saving the Planet (n=2)
- Small houses movement in architectural design: technological devices and its environmental impacts
- Social issues
- Solutions in Chemistry: "the lesson is on water and the water cycle. The dice demonstrate that water does not move in a cycle, as is often the misconception, but that is subject to a multiple of changes of state or direction depending on its location and composition".
- Weather, air, climate change (n=3)
- Weather seasons (n=2)

Projects (n=38)

Ten percent of respondents integrated Environmental Education in their classes by creating various projects and labs for their students (n=38). Projects included creating posters, biospheres, field guides, and oral presentations on environmental topics. One respondent explained that his/her students complete "projects designed to focus on researching problems that hurt the environment by drawing, building things or making posters to communicate these issues". This respondent's class uses recyclables to create projects to reuse waste. Many of these projects are designed for students to find ways to lessen their impact on the environment. Similarly, many of the respondents explained that their classes have a gardening project throughout the year and practice sustainable small-scale agriculture (n=3).

One respondent explained that his/her classroom has various artwork competitions throughout the year that involve Environmental Education. Other examples of projects are a stewardship project, wilderness program, pen pal programs, energy expo, social justice projects, engineering projects, composting, cooking with fruits and vegetables and having "class pets" in the classroom. Five respondents explained that their students raise salmon or worms each year or have a self-sustaining fish tank (n=5).

Real World Applications (n=35)

Nine percent of respondents explained that Environmental Education is incorporated in the classroom through real world applications, such as guest speakers, career exploration and field trips (n=35). Two of the respondents explained that their past jobs as an Energy Manager and Environmental Scientist were related to the environment which added to classroom discussions and increase their knowledge on the subjects. Another teacher shared that her class reacted to President Trump's withdrawal from the Paris Agreement by writing 54 persuasive essays addressing their concerns and sent them to Washington. This teacher explained "students not only become aware of our local environmental issues but look at worldwide problems and solutions that exist to assist our planet. It is a powerful learning experience and many children tell us how it has changed their habits and the people around them. They become passionate about environmental issues and realize they have a voice, and impact on examples creating change." Six respondents explained that their classrooms work with outside organizations like Save the Bay, Revive the Roots, the Scituate Reservoir, Narraganset Bay Woonsaquatucket Watershed Program, Surf Rider Foundation, and Intercostal Waterway. Another six respondents bring guest speakers on environmental issues to the classroom.

Three respondents shared that they provide career exploration activities for their students through job shadows and information about jobs within renewable energy. Another ten respondents explained that their classes went on Environmental Education based field trips throughout the year. Trips included:

- Yearlong program sponsored by the Narragansett Bay Commission/Watershed Program with trips to the Water Treatment Plant, Mowry Conservation Area for water testing
- Canoeing field trip
- Local recycling facility
- RI Resource Recovery
- Environmental Education learning expeditions
- Local natural reserves
- Service learning opportunities

- Hikes in the woods
- Postsecondary institutions with programs in environmental sustainability

Encouraging Positive Habits & Awareness (n=35)

Nine percent of respondents explained that they frequently try to raise awareness of environmental issues by encouraging positive habits such as recycling, reducing waste and appreciating nature daily (n=35). This means that Environmental Education was not embedded in the curriculum but the teachers were trying to change habits through conservation efforts. Some respondents explained that their classes participate in Earth Day clean-up activities or reduce, reuse, recycle campaigns through their school (n=19). One explained that his/her school "has a recycling practice in which every classroom's recycle bin is sorted and weighed. This keeps students aware and engaged in how they are upholding good recycling practices during the school year. A classroom is awarded weekly for being the best recyclers in the school and recognized for their conscientious efforts."

Similarly, these teachers encouraged other positive habits like reusable water bottles, straws, and bags; picking up litter; reducing waste, limiting paper, or composting (n=12). Additionally, one respondent shared that students were creating a group mural that reflects the natural environment on the outer wall of the school.

Outdoor Activities (n=27)

Seven percent of respondents noted that they incorporated Environmental Education through outdoor activities and observation (n=27). Many science teachers explained that they integrated outdoor learning through FOSS lessons and investigation, such as collecting schoolyard soil samples or tending to the garden. Six respondents noted that their students participated in planting, tending and observing a class garden. One respondent explained that taking the students outside "allows them as scientists to make observations and be able to investigate all of the matter in their outdoor environment compared to their indoor environment."

However, many teachers who taught other subjects like reading or art incorporated the outdoors by allowing students to read, sit, or explore outside during class (n=15). Many had outdoor learning spaces that are utilized to enhance class discussion. One teacher explained "we do a series of activities classifying seeds, planting and we go out to the park to observe leaves, trees and how we can protect our green areas. We encourage our students to enjoy nature and look at their surroundings in a way that they need to care and be aware that this is their community and they are responsible of it as good citizens." Two respondents shared that as the opportunity arose, such as a severe weather day or the changing of seasons, they took the students outside to observe the environment first hand. This respondent explained that "close observation of the natural environment inspires students to look more closely at nature." Similarly, some respondents explained that they taught their students about keeping the neighborhood clean and would pick up trash in the playground. Two respondents took students on nature walks and hikes during class. During these hikes, students recorded their observations in their science notebooks. One respondent explained that he/she incorporated Environmental Education through the use of their ropes course and adventure education at their school.

Extracurricular Activities (n=10)

Three percent of respondents shared that they were advisors to an environmental club at their school (n=10). In these clubs, the advisors "bring materials into school" and cover local and global issues. One respondent leads a play every year called Update Earth. The production includes all students in fourth grade. This play entertains and educates the audience on environmental issues. One respondent leads a recycling club that works to expand everyone's knowledge of recycling and reducing waste. The following are various clubs that respondents explained (n=5):

- Climbing club: where students climb in the woods and interact with nature
- Recycling club: works to expand everyone's knowledge of recycling and reducing waste
- Garden club: maintaining the Japanese garden
- Envirothon club and robotics club: discuss current environmental issues
- Outdoors Club: husky pride advisory team that meets twice a week

Integrating Environmental Education Not Possible (n=2)

Although respondents were asked to share how they incorporate Environmental Education in the classroom, two respondents shared the challenges they faced. One added that it is difficult to incorporate Environmental Education because of a lack of resources. S/he continued, "It has been a challenge to tell the students that they should use less paper towels, when there are not hand dryers in the bathrooms; recycle their milk cartons when there are no recycling bins in the cafeterias; and not to purchase Styrofoam when that is the only form of food transportation supplied at lunch."

Teaching Methodology

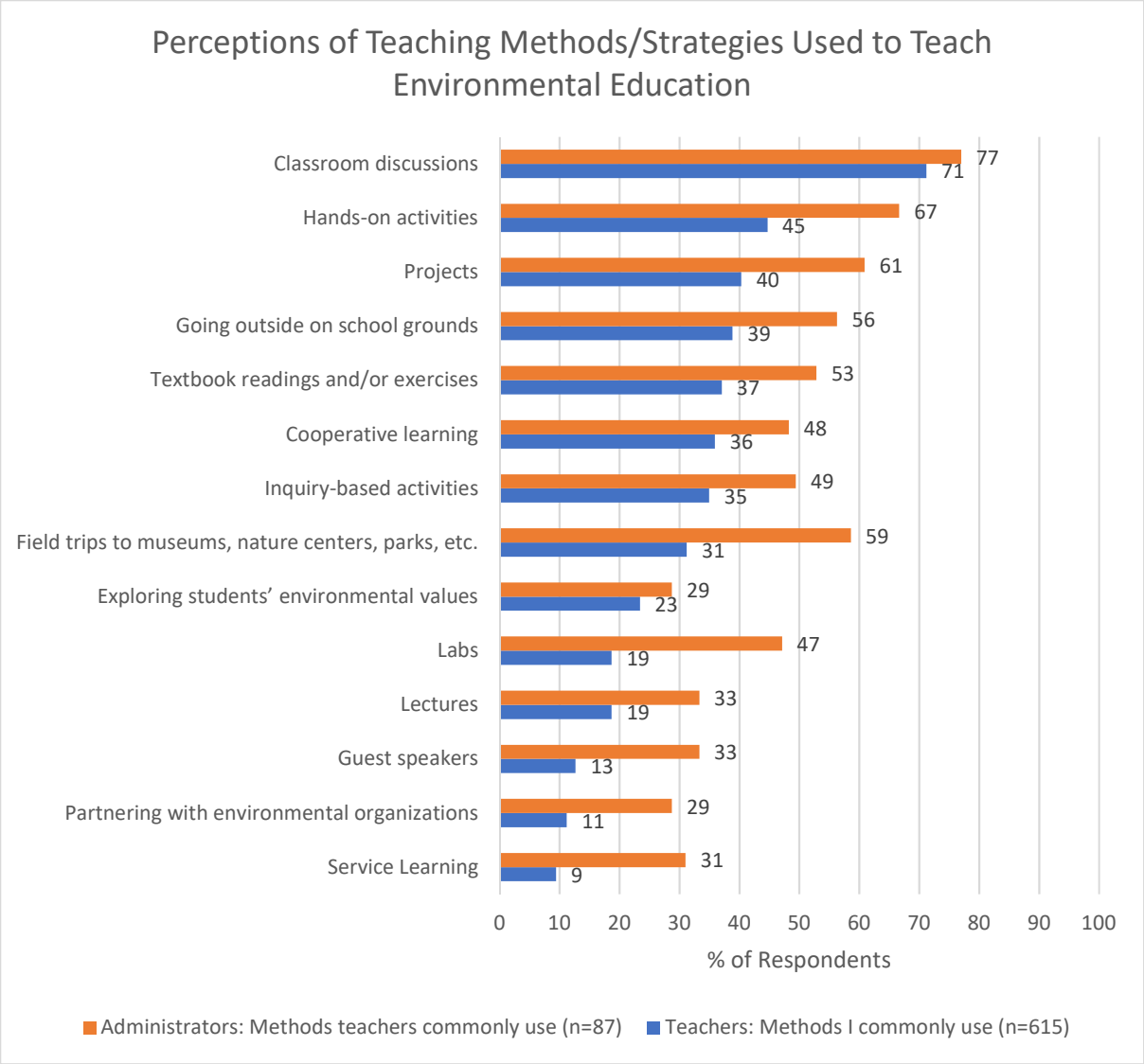
The Environmental Education: Inventory of Current Practices survey also asked respondents about the teaching methods and strategies that teachers commonly used to teach Environmental Education. Teachers were asked to respond regarding their own teaching, and administrators were asked for their input regarding the Environmental Education methods and strategies used by teachers at their schools. The figure below highlights the responses of both groups. Among teacher survey respondents, the most common method or strategy for teaching Environmental Education was via classroom discussions, with 71% of teacher respondents indicating that they utilized this strategy. The next highest percentage of teachers employing any particular method for teaching Environmental Education was endorsed by just 45% of teachers; in this case, they reported that they used hand-on activities to teach Environmental Education. This was followed by projects (40%), going outside on school grounds (39%), textbook readings/exercises (37%), cooperative learning (36%), and inquiry-based activities (35%). The remaining strategies on the list were endorsed by fewer than one-third of teacher respondents. The least common methods/strategies that teachers reported using to teach Environmental Education included service learning (9%), partnering with environmental organizations (11%), and guest speakers (13%).

Administrators perceived that teachers in their school were using classroom discussions, hands-on activities, projects, fieldtrips, going outside, and textbook readings/exercises to teach Environmental Education most frequently, with 50% or more of administrator respondents selecting these options. The strategies that they thought teachers were implementing the least were exploring students' environmental values, partnering with environmental organizations, and service learning. The only areas in which administrator perceptions strongly mirrored teacher responses were classroom discussions and exploring students' environmental values, with nearly equal proportions of administrators and teachers endorsing these two strategies for teaching Environmental Education. For all other Environmental

Education methods/strategies, the proportion of administrators indicating that teachers implemented them was considerably higher than the proportion of teachers who reported that they actually utilized these strategies to teach Environmental Education. The largest discrepancies between administrator perceptions and teacher report included in the use of the following strategies to teach Environmental Education:

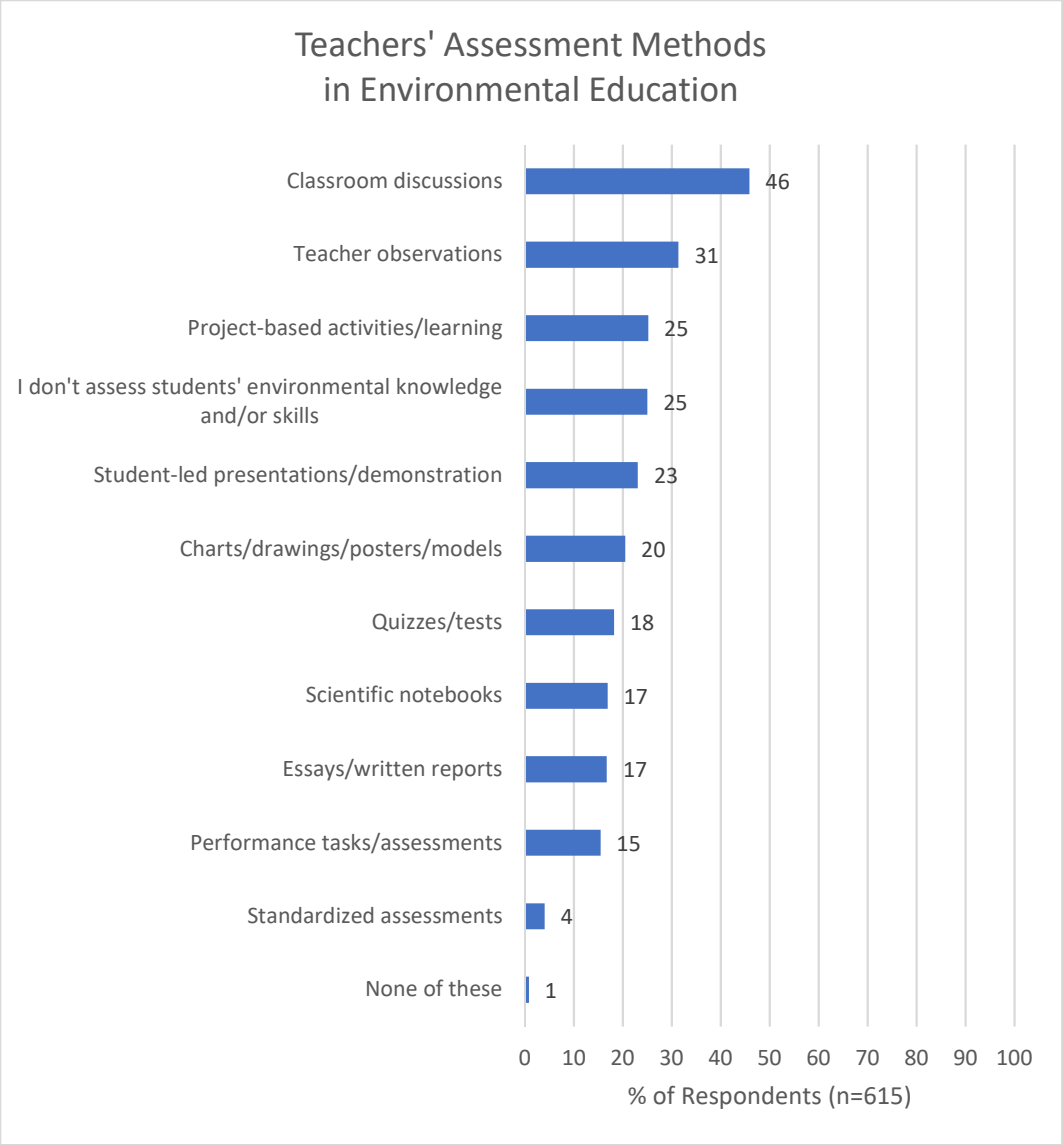
- Field trips to museums, nature centers, parks, etc. (47% of administrators; 19% of teachers; difference=28%)
- Service learning (31% of administrators; 9% of teachers; difference=22%)
- Hands-on learning (67% of administrators; 45% of teachers; difference=22%)
- Projects (61% of administrators; 40% of teachers; difference=21%)
- Guest speakers (33% of administrators; 13% of teachers; difference=20%)

When asked to indicate "other" methods/strategies they used to teach Environmental Education, almost all of the 44 teacher responses explained or duplicated the list of methods/strategies included in the survey question. However, one "method" that was mentioned by four respondents was teaching Environmental Education through the use of videos. Four administrators answered this question; the only method/strategy described, however, was "partnering with other schools in District."



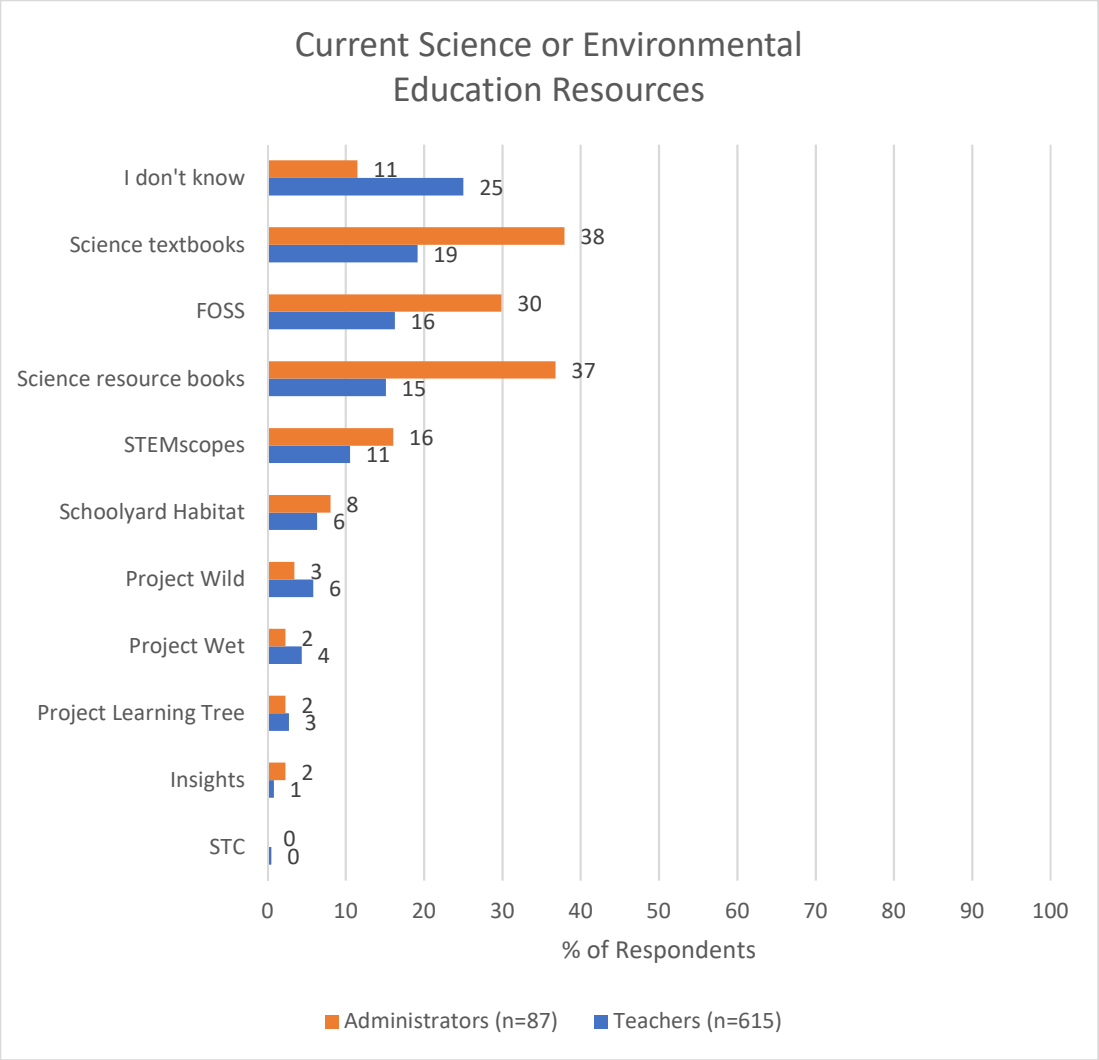
Assessment in Environmental Education

Teacher survey feedback regarding the methods they used to assess their students' environmental knowledge and/or skills is displayed in the figure below. Findings reveal teachers tended to use informal assessment methods (i.e., classroom discussions (46%) and teacher observation (31%)) more than any other assessment methods. Further, one quarter of teacher respondents indicated that they assessed students through project-based activities and one-quarter reported that they do not assess their students' environmental knowledge/skills at all. The assessment method utilized least in Environmental Education was standardized assessments, with only 4% of teacher respondents selecting this option. Twenty teachers identified "other" assessment methods they used in Environmental Education; however, only 2 of the open-ended responses did not correspond to methods listed in the survey question. These two "other" assessment methods included evaluating student effort and student participation.



Available Environmental Education Resources

Teachers and administrators who responded to the Environmental Education: Inventory of Current Practices survey were asked to indicate the science or Environmental Education curricula or resources, if any that they or their school had. Among teachers, the most common response to this question was "I don't know," which was indicated by 25% of teacher respondents. The next most common science and/or Environmental Education curricula or resources teachers said they had included science textbooks (19%), FOSS (16%), science resource books (15%), and STEMscopes (11%). Administrators were significantly less likely to reply that they did not know what science or Environmental Education resources their school had, with only 11% responding to this effect. On the other hand, the most common science or Environmental Education resources of which administrators were aware at their schools included science textbooks (38%) and science resource books (37%), followed by FOSS (30%), and STEMscopes (16%).



When asked to indicate "other" science or Environmental Education curricula they had, teachers' most frequent response was units or materials that they had developed on their own. They mentioned:

- *A plethora of units that I have designed on my own, or with colleagues over the past 30 years.*
- *Anything I would like - we write our own curricula according to NGSS.*
- *My material is strictly from my own research and contacts. I've taken groups on canoe trips, hiking, resources and materials that I supply.*
- *Self-generated material.*
- *What I find myself.*

Along the same lines, the next most frequent curricula or resource was the internet:

- *The entire internet*
- *The internet*
- *Web resources, online videos, and articles that I've found over time*
- *Websites*

Four teachers reported that outdoor space was another science or Environmental Education curriculum resource to which they had access. They commented:

- *A dedicated outdoor STEM space*
- *Access to nearby park, river, ponds; access to working farm, stream, pond*
- *We do have a recess/playground area with some woods and a walking path, if that counts as Schoolyard Habitat.*
- *School garden*

Other curricula/resources mentioned more than one individual included: The Need Project (n=3), community cleanups (n=3), GEMS-Net (n=2), Discovery Education (n=2), and teacher colleagues (n=2).

In terms of other science and/or Environmental Education curriculum and resources available at their schools, administrators also mentioned outside spaces (e.g., "Access to a local pond and an extensive property with many habitats that belongs to a staff member and is used for environmental education" and a "school garden"). Individual respondents also identified single curriculum/resources that their school used but were not common to any other administrator respondents.

When asked, "To what degree do/does the curriculum and/or resource(s) you indicated above support teaching or engagement in Environmental Education?", administrators were more positive than teachers. Using a scale of 1 (Not at all) to 4 (To a great extent), mean teacher ratings of the degree to which the aforementioned curriculum and/or resources supported teaching or engagement in Environmental Education was 2.46. The mean administrator rating was 2.89. One factor that affected this difference in mean ratings was the fact that over 21% of teachers indicated that the curriculum and/or resources they had identified did "not at all" support teaching or engagement in Environmental Education (see figure below). In contrast, fewer than 2% of administrators gave the same rating. Similarly, a higher proportion of administrators than teachers (56.3% as compared to 40.8%) rated their curriculum and/or resources as "somewhat" supportive of teaching or engagement in Environmental Education.

Teacher and Administrator Self-Reported Level of Preparation

One set of items in the Environmental Education: Inventory of Current Practices survey queried teachers and administrators about how prepared they felt regarding engaging students in Environmental Education practices that are aligned with the Next Generation Science Standards. The prompt for each group was as follows:

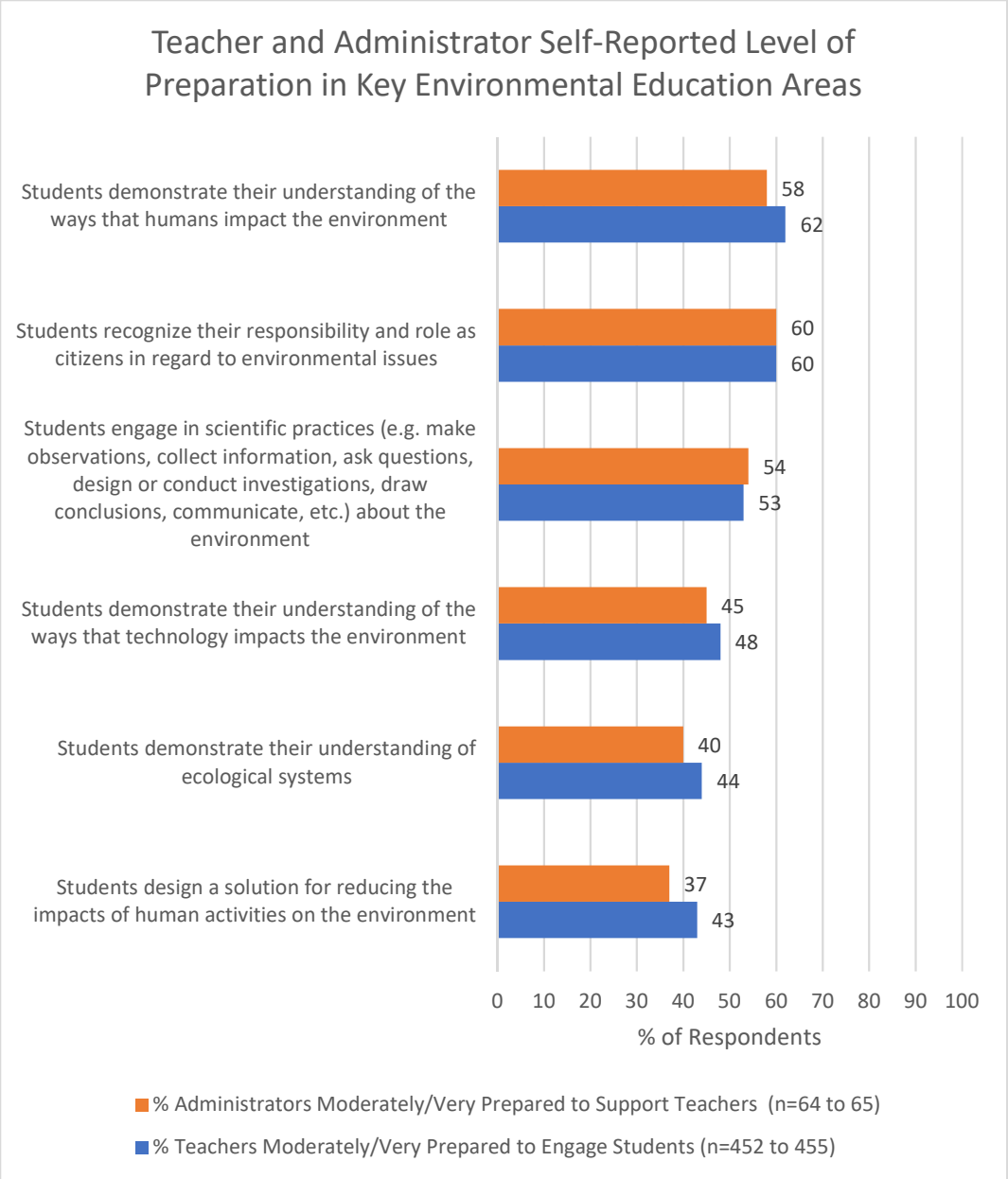
- Teachers: How prepared do you feel to engage your students in the following…
- Administrators: How prepared do you feel to support teachers in implementing these practices [with students]…

The prompt was followed by statements describing six NGSS-aligned student practices that relate to Environmental Education. Teachers and administrators rated their self-perceived preparation using the following scale: 1=Not at all prepared; 2=Somewhat prepared; 3=Moderately prepared; 4=Very prepared. Data were subsequently analyzed in order to compare the proportions of teachers and administrators who rated themselves as "moderately" to "very" prepared compared to those who felt

"somewhat" to "not at all" prepared (see figure below). Findings revealed that at least half of teacher respondents (54-58%) saw themselves as moderately to very prepared to instruct students to: demonstrate their understanding of the ways humans impact the environment; recognize their responsibility and role as citizens in regard to environmental issues; and engage in scientific practices about the environment. Similarly, 53-62% of administrators felt prepared to support teachers to help students master these practices. On the other hand, more than half of teacher and administrator respondents rated themselves as only somewhat or not at all prepared to teach or support teachers in the following NGSS-aligned student practices:

- Students demonstrate their understanding of the ways that technology impacts the environment
- Students demonstrate their understanding of ecological systems
- Students design a solution for reducing the impacts of human activities on the environment

Overall, teacher and administrator survey respondents felt equally prepared to carry out their respective responsibilities related to the Environmental Education-aligned NGSS standards. The mean teacher self-reported rating was 2.55 on a scale of 1 (Not at all prepared) to 4 (Very prepared). The mean administrator self-reported rating was 2.59 on the same scale. Both average ratings correspond roughly to a self-perceived preparation level of "somewhat" prepared, leaving considerable room for growth in their capacity in teachers' and administrators' skills and comfort levels.



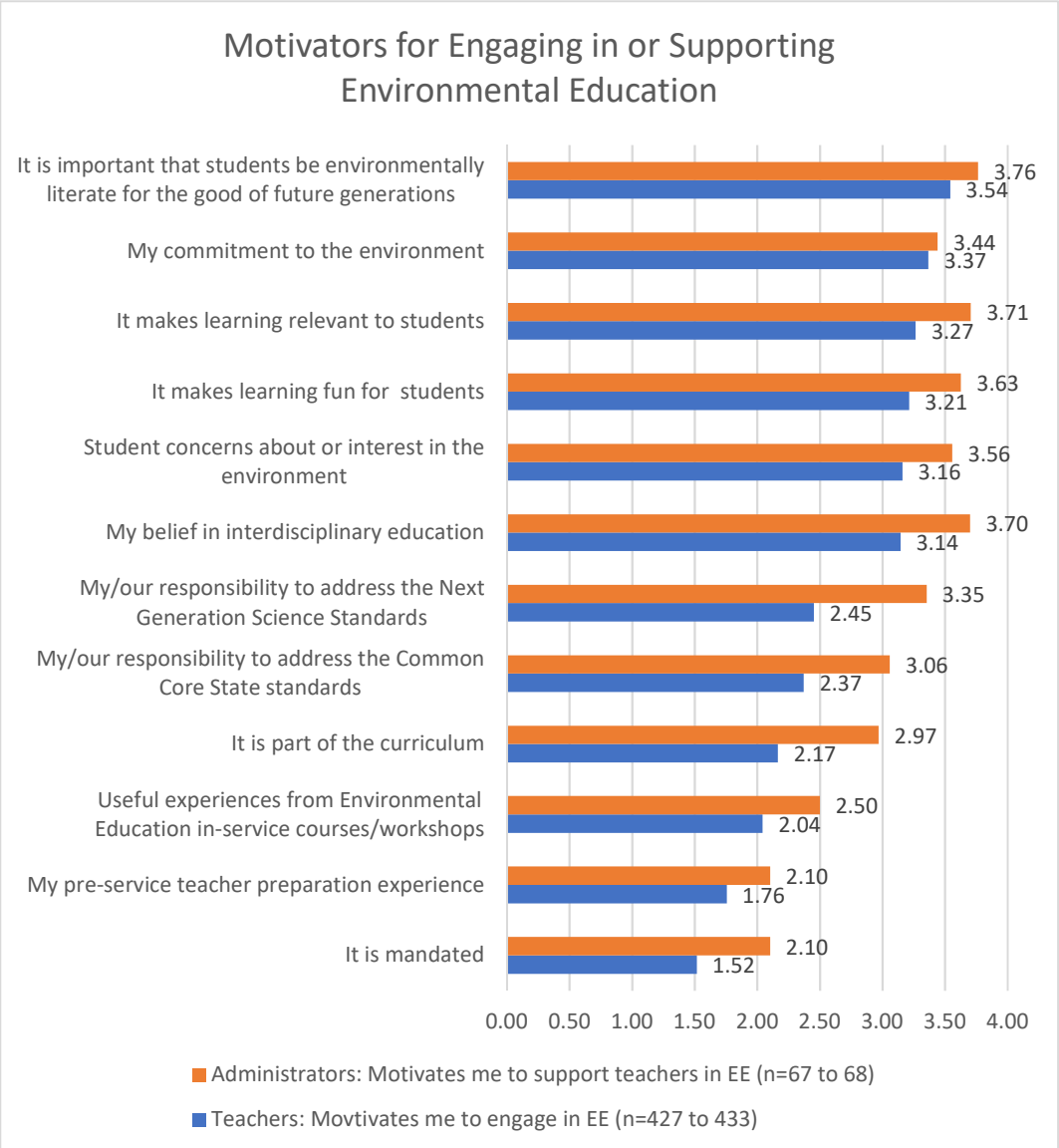
Motivators, Barriers, and Support Needs

Factors Motivating Teachers to Engage in Environmental Education

The Environmental Education: Inventory of Current Practices survey solicited feedback from respondents about the extent to which various factors that motivated them to engage in Environmental Education (teachers) or motivated them to support teachers' engagement in Environmental Education (administrators). Teacher and administrator respondents rated how motivating these factors were on the following scale: 1=Not at all; 2=Very little; 3=Somewhat; 4=To a great extent. As displayed in the figure below, teachers reported being "somewhat" motivated by factors related to their own belief systems or student concerns/learning. With mean ratings between 3.14 and 3.54, these motivating factors included: their belief that it is important for students to be environmentally literate, teacher

commitment to the environment, the fact that Environmental Education makes learning relevant and fun for students, student concerns/interest in the environment, and teacher belief in interdisciplinary education. External factors and past experiences were not instrumental in motivating teachers to engage in Environmental Education and included: their responsibility to address standards, the fact that Environmental Education is mandated or part of the curriculum, and previous pre-service or in-service professional development experiences. In fact, mean teacher ratings for items related to these factors ranged from 1.52 to 2.45.

Administrator motivators followed the same general pattern. However, on average, administrators rated all factors as at least 2 or higher, signifying that all factors were more motivating to them than to teachers. Additionally, administrators' beliefs in interdisciplinary education were much more motivating to them (in terms of supporting teachers to engage in Environmental Education) than were teacher beliefs in interdisciplinary education. In general, administrators were also much more motivated by their responsibility to address standards than were teachers.



Scale: 1=Not at all; 2=Very little; 3=Somewhat; 4=To a great extent

Four teachers identified "other" factors that motivated them to engage in Environmental Education. These included:

- *Being able to engage students in the language by engaging them in the places they could go and better communicate with people there, or better welcome and communicate with Spanish speaking people they encounter in their communities.*
- *My concern for the students' future; my interest and love for our environment; my experiences with national park excursions.*
- *My fear of allowing young people to become voting citizens in ignorance of vital environmental issues or their own impact on the environment.*
- *We live in RI and the rise of the ocean is a real concern. In other parts of the country we see other concerns...such as hotter climate in the South, trash in the oceans, and drought conditions in California. All of these concerns are directly related to the environment and how we take care of it.*

Additionally, two teachers wrote that they were motivated to engage in Environmental Education but could not due to lack of time or district directives. One administrator described an "other" motivation for supporting teachers to engage in Environmental Education: the fact that it was applicable to all students and an area where all students can excel and lead. S/he wrote:

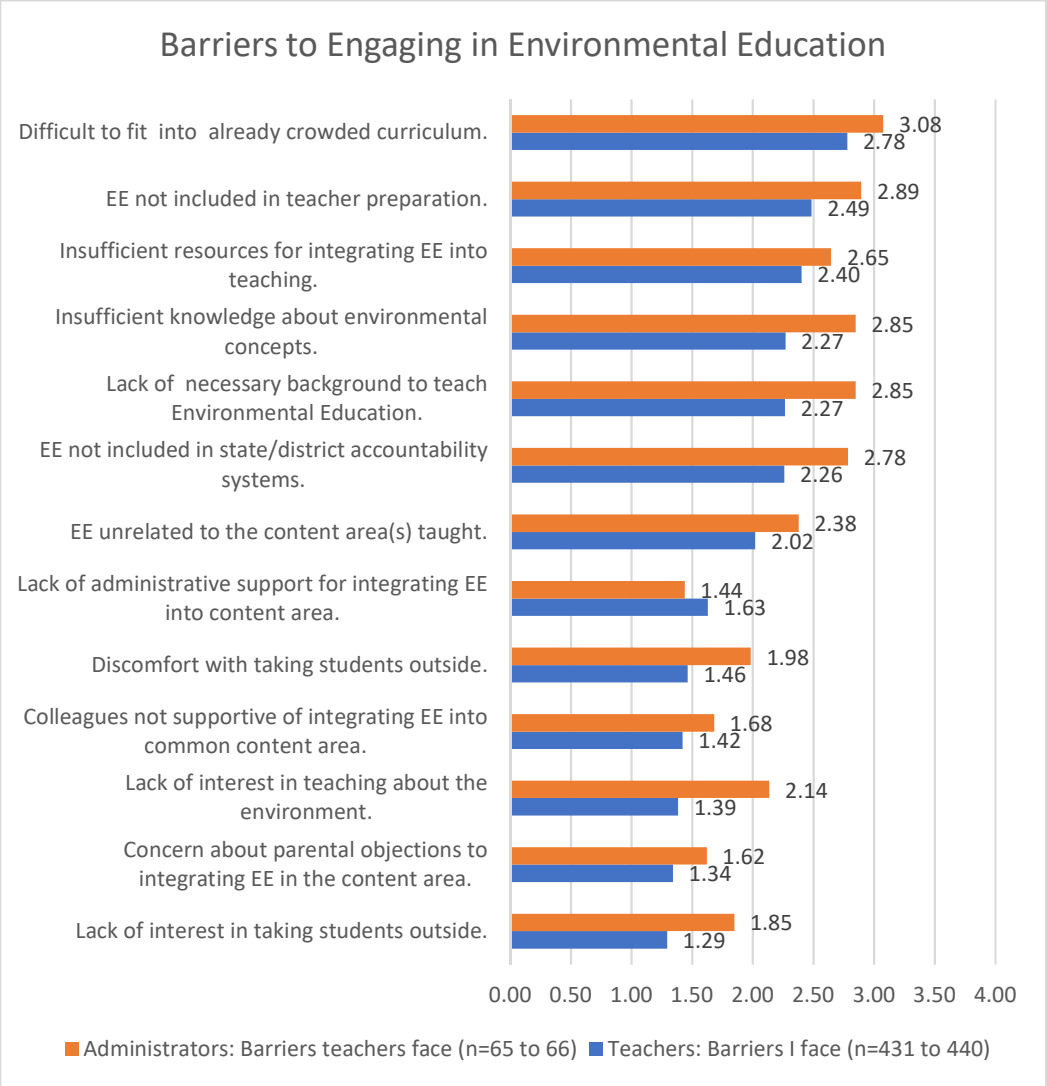
> *Environmental education builds leadership and problem solving skills in young adults and is relatively free of hierarchies beyond the fundamentals of science and mathematics. Anyone can be a leader, advocate or expert in ways to promote environmental literacy skills and knowledge. It's education for and by all--no matter age, gender, race or heritage, geography or class. Env. educ. is bundle of issues that creates a shared sense of purpose/consequence. Leaders are constantly in the making. Solutions can be both non-political and geo-political as well.*

Barriers to Engaging in Environmental Education

Teachers were asked about barriers they faced in engaging in Environmental Education, and administrators were asked for their input on barriers faced by teachers. Both sets of respondents were presented with a series of potential barriers and asked to rate the extent to which each made it difficult for teachers to engage in Environmental Education. The following scale was used: 1=Not at all; 2=Very little; 3=Somewhat; 4=To a great extent. As displayed in the figure below, the principle barrier identified by teachers and administrators alike was that it was difficult to fit Environmental Education into a curriculum that was already very crowded. In fact, the main barriers perceived by both groups had to do with the fact that Environmental Education was not included or occupied a position outside other, standard educational resources or supports: curriculum, teacher preparation, teaching resources, teaching knowledge and background, and state/district accountability systems.

On a positive note, teachers and administrators were not very likely to view Environmental Education as unrelated to other content teachers taught. Additionally, teachers were unlikely to view a lack of administrator or parental support, personal interest, or desire to teach outside as barriers to their engaging in Environmental Education. Alternatively, administrators were more likely to view teacher

lack of interest in teaching about the environment and not wanting or feeling comfortable taking students outside as a barrier to Environmental Education than did teachers themselves.



Scale: 1=Not at all; 2=Very little; 3=Somewhat; 4=To a great extent

Fifteen teacher respondents identified "other" barriers to their engagement in Environmental Education. As with other open-ended survey questions, these responses tended to reinforce ratings they had given for other barriers. However, three teachers did identify a *political* barrier to their engaging in Environmental Education. They remarked:

- *Scientific concepts are easy to teach, however they are deeply integrated with politics and government and these discussions become more difficult as to why we aren't for example 100% using renewable energy? Kids feel it should be easy based on the science and global warming. Politics is much more complicated than the science.*
- *The "science" on causes of environmental impacts is largely developed by people who have a stake in proving a human connection- and therefore is not good science with which to base teaching our youth- this seems political in nature.*

- *The polarizing nature of our current political climate over issues like climate change.*

The single administrator who identified an "other" barrier wrote: "We have vans but transportation can limit some of our outdoor work."

Supports Needed

After they provided feedback about barriers to Environmental Education, teachers and administrators were asked to rank support that would help them engage in or support teacher engagement in Environmental Education from 1 (most helpful) to 5 (least helpful). The options they ranked included administrative support, funding, materials, professional development, and resources.

The table below displays teacher respondents' feedback on the helpfulness of the six options presented. The table shows the number of teachers who responded to each question, the mean (or average) ranking for each option, and the most frequent ranking assigned to each option. Looking at the average ranking assigned to each option, materials, followed by professional development, resources, funding, and administrative support would be most helpful. Considering the most frequent ranking assigned to each option, professional development seems that it would be most helpful to teachers for including more Environmental Education in their teaching. The next most helpful items would be materials & resources (both most frequently ranked second most helpful), followed by funding and administrative support.

After examining these results, it is clear that teachers consider funding and administrative support would be least helpful in terms of helping them include more Environmental Education in their teaching. Materials and professional development would be most helpful in this regard. Additional teacher resources would be the next most helpful.

Teachers: What would be most helpful to you in including more Environmental Education in your teaching? Please rank the following options from 1 (most helpful) to 5 (least helpful).					
	Administrative Support	Funding	Materials	Professional Development	Resources
N	377	373	378	384	398
Mean Ranking	3.68	2.85	2.77	2.78	2.81
Most Frequent Ranking	5	4	2	1	2

Scale: 1 (Most helpful) to 5 (Least helpful)

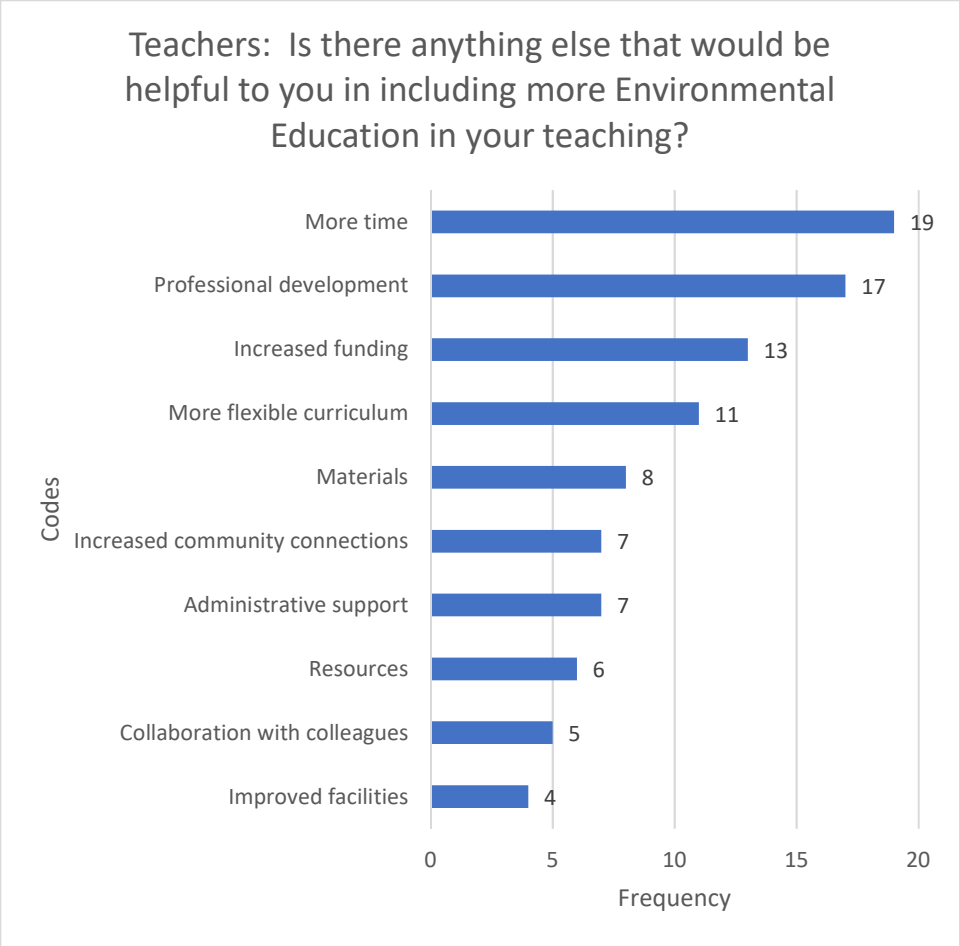
Administrators' opinions of what would be most helpful in supporting teachers to engage in Environmental Education in their teaching are slightly different (see table below). In terms of the average ranking per option, assistance that would be most helpful to administrators in supporting teachers include (in order of most to least helpful): funding, professional development, materials, resources, and administrative support. Looking at frequency of rankings per option, it is clear that funding and professional development were selected as most helpful most often by administrators.

Interestingly, administrators appeared to be divided about the helpfulness of additional resources for supporting teachers to engage in Environmental Education. In fact, 26% of administrators rated it second most helpful, and the same amount rated it fourth most helpful. In general, materials seem to be third most helpful in the opinion of administrators. As with teachers, administrators considered additional administrative support to be least needed in terms of helping them support teachers to include more Environmental Education in their teaching. Taken as a whole, the data do suggest that administrators would like more funding and more professional development in order to support teacher Environmental Education practices.

Administrators: What would be most helpful to you in supporting teachers to engage in Environmental Education in their teaching? Please rank the following options from 1 (most helpful) to 5 (least helpful).					
	Administrative Support	Funding	Materials	Professional Development	Resources
N	54	52	53	58	58
Mean	3.70	2.31	3.08	2.60	3.17
Mode	5	1	3	1	2 & 4

Scale: 1 (Most helpful) to 5 (Least helpful)

When asked to describe "anything else that would be helpful to you in including more Environmental Education in your teaching," 101 teachers provided open-ended comments. These comments were coded for themes; the most frequently occurring themes are displayed in the figure below. Clearly, many of the themes correspond to options teachers were already asked to rank in order of helpfulness, such as professional development, funding, materials, administrative support, and resources. Others were new and included: more time, a more flexible curriculum, increased community connections, collaboration with colleagues, and facilities.



The most frequent theme discussed in teachers' open-ended comments was that having more time would be helpful to them to include more Environmental Education in their teaching. Typical comments included:

- *Extended time in our day/year - a lot to cover.*
- *Lol-- longer school day...time!!*
- *More hours in the day!*
- *More money and time for field trips*
- *More time.*
- *More time to plan and plan with other teachers.*
- *Time set aside or built into school curricula to properly teach this important subject.*
- *Time to collaborate with others and find places where it connects with our current curriculum and can be implemented naturally. Also, time to find good resources or create them for students. Time, time, time.*
- *Time to plan integration.*
- *Time, or lack thereof, is the reason why many topics, including E.E., are not taught to a great extent.*

In terms of professional development, a support that teachers had already ranked highly, teachers commented:

- *Educating teachers on the environment.*
- *Education other departments about the importance of going out into the environment*
- *Learning about it in my content area.*
- *Learning how to integrate it into what I am already doing.*
- *Mandated Environmental Education professional development for ALL RI teachers so Environmental Education is viewed as important not just for science teachers!*
- *More professional development on how to simplify some big ideas for elementary age students.*
- *Need guidance on where to begin.*
- *Possible techniques on how to deliver cross-curriculum lessons.*
- *Seeing examples of how other art teachers have incorporated it.*
- *Someone to give me examples on how I could incorporate it into my subject area.*
- *Workshops where other teachers share how they are doing this.*
- *Yes, I would love PD in this area!*

When teachers mentioned needing funding to help them include more Environmental Education in their teaching, they most often specified funding for transportation (i.e., buses), field trips, and guest speakers. Typical comments included:

- *Break on bus costs to take students to a variety of outdoor experiences.*
- *Buses!*
- *Having a bus or van for transporting students at low/no cost to off-campus sites for field studies.*
- *Transportation.*
- *it is difficult to take students on field trips as it needs to be standards based and it is expensive.*
- *More money and time for field trips.*
- *funds built in for guest speakers: environmental educators, activists, scientists, etc...*

An additional frequent theme in teachers' open-ended responses was a request for a more flexible curriculum in order to engage in more Environmental Education. Some of the comments were as follows:

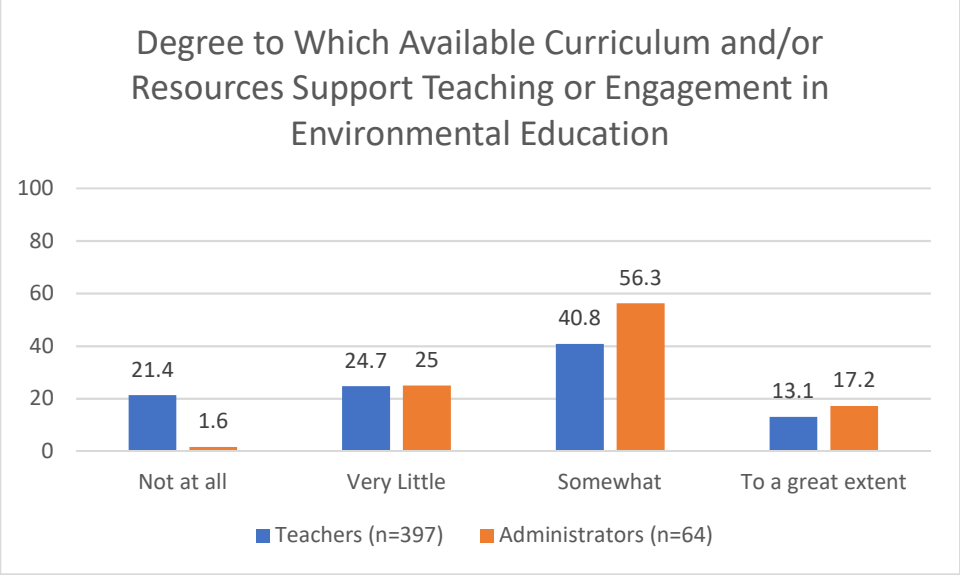
- *As an ELA teacher, I am not at all prepared to integrate Environmental Education into my classroom. It is an interesting concept, but one that I don't know is supported by Common Core, which runs my curriculum.*
- *A smaller (lighter) curriculum.*
- *Curricular flexibility.*
- *Due to mandates of common core and administration, there is literally no time for anything other than exactly what is required in my curriculum.*
- *Included in the curriculum.*
- *Less emphasis on standardized testing and "covering" the massive list of NGS standards for our grade level.*
- *More freedom in curriculum to take kids outside.*
- *The constraints teachers feel around curriculum and time in the day to do what they're pressured to do, has reduced teacher's willingness to be flexible and literally think "outside" anymore. I feel for my colleagues, but I also know there are many of us that if given flexibility and creative license, would focus on Environmental Literacy as a critical area of need.*

Other themes that were mentioned ten time or less in teachers' open-ended comments included:

- Materials—e.g., videos and digital resources, equipment, live specimens and experiment supplies, student reading materials.
- Increased community connections—e.g., guest speakers, access to local resources, community partners, community-at-large.
- Administrative support—e.g., political support from state-wide and federal leaders in government and education, district support for interdisciplinary coursework.
- Resources—e.g., materials/guides with vertical articulation, NGSS-aligned exemplar lessons with resources, premade packaged units with all necessary materials.
- Collaboration with colleagues—e.g., planning time to make meaningful cross-connections.
- Improved facilities—e.g., school building that facilitates environmentally literate behaviors, outdoor space in urban settings, outdoor classroom.

Eighteen administrator respondents answered the parallel question, "Is there anything else that would be helpful to you in supporting teachers to engage in Environmental Education?" Their responses largely mirrored those of teachers and included (in order of frequency) professional development, model classrooms to visit, time to collaborate and "figure out how to do this," and ready-made Environmental Education resources.

Additionally, teachers and administrators were asked to indicate the degree to which available curriculum and/or resources supported teaching or student engagement in Environmental Education (see figure below). On this topic, administrators in the sample were more positive than their teacher counterparts, with almost three-quarters of them (74%) replying that these items were supportive "somewhat" or "to a great extent," compared to 53% of teachers who had the same opinion. Likewise, 21% of teachers in the sample indicated that available curriculum and/or resources were "not at all" supportive, compared to just 1.6% of administrators who thought the same.



Selected Group Differences and Correlations

Variables

The following sections present select findings relating to explorations of possible group differences and correlations in teacher respondent data generated from the Environmental Education: Inventory of Current Practices survey. Teacher data were selected for these additional analyses due to the number and diversity of teacher respondents in the survey sample. Correlations and differences in findings were explored in terms of:

- Teacher grade level: early childhood/elementary, middle, high
- Intensity of positive beliefs about Environmental Education
- Intensity of negative beliefs about Environmental Education
- Level of commitment to Environmental Education
- Level of knowledge of impact of Environmental Education
- Average level of preparation to engage students in Environmental Education practices aligned with the Next Generation Science Standards
- Intensity of barriers to engaging in Environmental Education
- Strength of motivators to engage in Environmental Education
- Number of years teaching
- Whether or not Environmental Education was included in preservice preparation
- Participation of professional development in Environmental Education

For the purposes of these analyses, each of the above characteristics was defined as follows:

Teacher respondents who reported that they taught any or all of grades prek-5 were coded as early childhood/elementary teachers. Alternatively, respondents who taught grades 6, 7, and/or 8 were coded as middle school teachers, while respondents who taught grades 9, 10, 11, and/or 12 were coded as high school teachers. The resulting subsample of 432 respondents consisted of 159 early childhood/elementary teachers, 110 middle school teachers, and 163 high school teachers.

A new variable, Intensity of Positive Beliefs about Environmental Education (tbeliefs_POS), was created from a subset of items making up the Beliefs about Environmental Education scale described earlier in this report. A mean score was calculated for each teacher based on their responses to the following items:

Environmental education:

1. Can be used to enhance curriculum and instruction in ALL subjects
2. Weaves real world experiences and environmental issues into students' learning
3. Supports other disciplines
4. Is a way to enhance the curriculum and instruction of multiple subjects
5. Provides meaningful, authentic, and applied learning experiences

Given that each item was answered using a 1 (Strongly disagree) to 4 (Strongly agree) scale, the range of possible points for each respondent on the tbeliefs_POS variable ranged from 1 to 4. Low scores indicated low intensity of positive beliefs about Environmental Education, while higher scores reflected higher levels of intensity.

A new variable, Intensity of Negative Beliefs about Environmental Education (tbeliefs_NEG), was also created from a subset of items making up the Beliefs about Environmental Education scale. A mean score was calculated for each teacher based on their responses to the following items:

Environmental education:

1. Is an "add on" to current classroom curricula
2. Takes time away from mandatory classroom curricula
3. Is used to enhance curriculum and instruction only in science and social studies
4. Attempts to indoctrinate students to a certain point of view about the environment
5. Is successfully taught only by science teachers
6. Is NOT my responsibility

Given that each item was answered using a 1 (Strongly disagree) to 4 (Strongly agree) scale, the range of possible points for each respondent on the tbeliefs_NEG variable ranged from 1 to 4. Low scores indicated low intensity of negative beliefs about Environmental Education, while higher scores reflected higher levels of intensity.

The new variable, Level of Commitment to Environmental Education (t_COMMIT), was created by summing the scores to all of the items in the Attitudes toward Environmental Education scale described earlier in this report. The range of possible scores per respondent was 8 to 32, with low scores indicating low commitment to Environmental Education and high scores indicating higher levels of commitment.

The new variable, Level of Knowledge of Impact of Environmental Education (t_KNOW), was created by summing the scores to the 11 items in the Knowledge of Impact of Environmental Education scale described earlier in this report. The range of possible scores per respondent was 11 to 44, with low scores indicating low levels of knowledge of the impact of Environmental Education and high scores indicating higher levels of knowledge.

A new variable, t_PREP, was created to reflect the average level of preparation teachers reported to engage students in the previously described six NGSS-aligned student practices that relate to Environmental Education. 1=Not at all prepared; 2=Somewhat prepared; 3=Moderately prepared; 4=Very prepared. Teacher ratings of 1 (Not at all prepared) to 4 (Very prepared) on the six items were averaged; consequently, the range of points for any individual on the new variable was 6 to 24.

The new variable, Intensity of Barriers to Engaging in Environmental Education (t_BARR), was created by summing the scores to all of the items in the Barriers to Engaging in Environmental Education scale described earlier in this report. The range of possible scores per respondent was 13 to 52, with low scores indicating low/few barriers to engaging in Environmental Education and high scores indicating high/many barriers to engaging in Environmental Education.

The new variable, Strength of Motivators to Engage in Environmental Education t (t_MOT), was created by summing the scores to all of the items in the Factors Motivating Teachers to Engage in Environmental Education scale described earlier in this report. The range of possible scores per respondent was 12 to 48, with low scores indicating low/weak motivation to engage in Environmental Education and high scores indicating high/strong motivation to engage in Environmental Education.

As presented earlier in this report, 67.6% of teacher survey respondents indicated that they had not been exposed to Environmental Education in their teacher preparation, either as a standalone course or infused into methods or content courses. In contrast, 14.3% reported that Environmental Education had been infused into one or more content courses. Further, almost 10.1% indicated that it had been infused into one or more methods courses. Finally, 7.9% of respondents (n=37) revealed that they had taken a standalone course in Environmental Education as part of their teacher preparation. For the purpose of the present analyses, these data were recoded into a new variable, t_PRESERVICE, with values of 0 and 1. Respondents who indicated that they had no exposure to Environmental Education in teacher preparation were coded 0, while respondents who indicated that they had some exposure to Environmental Education (through a standalone course or infusion) were coded 1.

Findings presented previously revealed that 75.8% and 60.6% of teacher respondents had not engaged in any professional development in Environmental Education in the last 12 months and 3 years, respectively. The remaining percentages of respondents reported having participated in intervals of professional development of 1-5 hours, 6-15 hours, 16-35 hours, or more than 35 hours. For the present analyses, these data were recoded, and two new variables were created:

- t_PD12MOS: Whether or not respondents participated in professional development in Environmental Education in the last 12 months
- t_PD3YRS: Whether or not respondents participated in professional development in Environmental Education in the last 12 months

Possible values for t_PD12MOS and t_PD3YRS were 0 (none) and 1 (1 or more hours).

The variable, Number of years teaching (t_YRS), did not need to be created or recoded and consisted of teachers' responses to the survey question, "By the end of this school year, how many years will you have been teaching altogether? Please round to the nearest whole number."

Group Differences

Grade Level

ANOVA tests were conducted to determine whether there were any statistically significant differences between the means of early childhood/elementary, middle, and high school teacher respondents on the following variables: Intensity of Positive Beliefs about Environmental Education (tbeliefs_POS), Intensity of Negative Beliefs about Environmental Education (tbeliefs_NEG), Level of Commitment to Environmental Education (t_COMMIT), Level of Knowledge of Impact of Environmental Education (t_KNOW), Level of Preparation to Engage Students in NGSS-Aligned Student Practices (t_PREP), Intensity of Barriers to Engaging in Environmental Education (t_BARR), and Strength of Motivators to Engage in Environmental Education t (t_MOT). The table below reveals that statistically significant grade level differences ($p<.05$) were found for only three variables: Intensity of Negative Beliefs about Environmental Education (tbeliefs_NEG), Intensity of Barriers to Engaging in Environmental Education (t_BARR), and Strength of Motivators to Engage in Environmental Education t (t_MOT). On the other hand, any differences in grade level means in the other areas are likely due to chance and not due to true differences between grade levels on the characteristics of interest. In other words, early childhood/elementary, middle, and high school teachers' mean intensity of positive beliefs about Environmental Education, level of commitment to Environmental Education, and level of preparation to engage students in NGSS-aligned student practices were the same.

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
tbeliefs_NEG	Between Groups	1.415	2	.708	3.733	.025
	Within Groups	81.147	428	.190		
	Total	82.562	430			
tbeliefs_POS	Between Groups	.417	2	.209	1.098	.334
	Within Groups	81.324	428	.190		
	Total	81.741	430			
t_COMMIT	Between Groups	1.891	2	.946	.060	.942
	Within Groups	6768.981	428	15.815		
	Total	6770.872	430			
t_KNOW	Between Groups	326.655	2	163.328	2.395	.092
	Within Groups	29054.883	426	68.204		
	Total	29381.538	428			
t_BARR	Between Groups	399.282	2	199.641	3.438	.033
	Within Groups	24444.734	421	58.064		
	Total	24844.017	423			
t_MOT	Between Groups	898.919	2	449.459	9.974	.000
	Within Groups	17664.230	392	45.062		
	Total	18563.149	394			
t_PREP	Between Groups	.754	2	.377	.555	.575
	Within Groups	251.654	370	.680		
	Total	252.408	372			

Post-hoc tests revealed the nature of these statistically significant group differences (see table below). The three grade levels did not differ significantly in all areas. Rather, the difference between the means of early childhood/elementary and middle school teachers' Intensity of Negative Beliefs about Environmental Education (tbeliefs_NEG), was statistically significantly different, with middle school teachers exhibiting more negative beliefs about Environmental Education than their early childhood/elementary education counterparts. Similarly, the table reveals that middle school teachers reported a statistically significantly higher level of barriers to engaging in Environmental Education (t_BARR) than did high school teachers. Finally, early childhood/elementary teachers reported a statistically significantly stronger level of motivators to engage in Environmental Education (t_MOT) than did middle and high school teachers.

Multiple Comparisons: Bonferroni			
Dependent Variable	(I) Teacher Grade Level (Mean)	(J) Teacher Grade Level (Mean)	Mean Difference (I-J)
tbeliefs_NEG	EC/Elementary (1.92)	Middle (2.06)	-.15*
		High (1.96)	-.04
	Middle (2.06)	EC/Elementary (1.92)	.15*
		High (1.96)	.11
	High (1.96)	EC/Elementary (1.92)	.04
		Middle (2.06)	-.11
t_BARR	EC/Elementary (24.38)	Middle (26.15)	-1.77
		High (23.69)	.69
	Middle (26.15)	EC/Elementary (24.38)	1.77
		High (23.69)	2.46*
	High (23.69)	EC/Elementary (24.38)	-.69
		Middle (26.15)	-2.46*
t_MOT	EC/Elementary (33.61)	Middle (30.58)	3.02*
		High (30.46)	3.15*
	Middle (30.58)	EC/Elementary (33.61)	-3.03*
		High (30.46)	.12
	High (30.46)	EC/Elementary (33.61)	-3.15*
		Middle (30.58)	-.12

The data below sheds some light on the nature of the statistically significant differences in means between early childhood/elementary and middle school teachers in terms of their negative beliefs about Environmental Education. While respondents at both levels were equally likely to disagree that Environmental Education takes time away from mandatory classroom curricula, middle school teacher respondents agreed more strongly with all other negative statements about Environmental Education—that it was an add on, that it applied only to science and/or social studies, that it sought to indoctrinate students, and that it was NOT their responsibility.

Negative Beliefs about Environmental Education	Mean Ratings		Difference
Environmental Education:	EC/Elem Teachers (n=152-159)	Middle School Teachers (n=108-110)	
Is an "add on" to current classroom curricula	2.23	2.47	0.24
Takes time away from mandatory classroom curricula	1.88	1.88	0.00
Is used to enhance curriculum and instruction only in science and social studies	2.04	2.19	0.15
Attempts to indoctrinate students to a certain point of view about the environment	2.17	2.31	0.14*
Is successfully taught only by science teachers	1.69	1.91	0.22
Is NOT my responsibility	1.46	1.60	0.14

Scale: 1=Strongly disagree; 2=Disagree; 3=Agree; 4=Strongly agree

* Differences in means is statistically significant, $p<.05$

Likewise, the information in the table below illustrates differences in middle and high school teacher feedback on barriers to engaging in Environmental Education in their classrooms. In all areas, middle school teachers express greater difficulty implementing Environmental Education. However, the greatest difference between teachers at these two grade levels has to do with resources, with middle school teachers more likely to report that they do not have any/sufficient resources for integrating Environmental Education into their teaching. The next largest differences between middle and high school teachers in terms of barriers to engaging in Environmental Education are that middle school teachers are less comfortable taking students outside, feel they don't have the necessary background to teach Environmental Education, and tend to view Environmental Education as unrelated to their content area.

Barriers	Mean Ratings		Difference
Extent to Which Each Makes It Difficult to Engage in Environmental Education	Middle School Teachers (n=105-108)	High School Teachers (n=154-159)	
My teacher preparation did not include Environmental Education.	2.53	2.42	-0.11
I don't know enough about environmental concepts to engage in Environmental Education.	2.34	2.18	-0.15
It is difficult to fit Environmental Education into an already crowded curriculum.	2.90	2.68	-0.21
Environmental Education is unrelated to the content area(s) I teach.	2.26	1.97	-0.29*
I don't have the necessary background to teach Environmental Education.	2.47	2.18	-0.29*
Environmental Education is not included in state or district accountability systems.	2.38	2.18	-0.20

Barriers	Mean Ratings		Difference
Extent to Which Each Makes It Difficult to Engage in Environmental Education	Middle School Teachers (n=105-108)	High School Teachers (n=154-159)	
I am not interested in teaching about the environment.	1.53	1.32	-0.21*
I am not comfortable with taking students outside.	1.68	1.38	-0.30*
I am not interested in taking students outside.	1.42	1.30	-0.12*
I am concerned about parental objections to integrating Environmental Education in my content area.	1.43	1.29	-0.14
My colleagues do not support the integration of Environmental Education into our common content area.	1.46	1.39	-0.07
I do not have any/sufficient resources for integrating Environmental Education into my teaching.	2.67	2.23	-0.44*
The administration does not support the integration of Environmental Education into my content area.	1.70	1.55	-0.16

Scale: 1=Not at all; 2=Very little; 3=Somewhat; 4=To a great extent

* Differences in means is statistically significant, p<.05

Finally, the following table illustrates mean teacher ratings at the three grade levels on items making up the Factors Motivating Teachers to Engage in Environmental Education scale. Keeping in mind that statistically significant mean differences exist only between early childhood/elementary teacher ratings and middle school teacher ratings, as well as between early childhood/elementary teacher ratings and high school teacher ratings[5], it is immediately obvious that teachers of younger children expressed more motivation by all of the factors listed. Some of the greatest differences between early childhood/elementary teachers and other teachers, however, were as follows: They expressed much more motivation to engage in Environmental Education out of their responsibility to express the Next Generation Science and Common Core State Standards than did middle and high school teachers. They were also more likely to be motivated by the fact that Environmental Education makes learning fun for their students.

[5] The differences between middle and high school teachers' mean ratings on this variable were not found to be statistically significant.

Motivators	Mean Ratings		
Extent to Which Each of the Following Motivates You to Engage in Environmental Education	EC/Elem Teachers (n=151-152)	Middle School Teachers (n=91-95)	High School Teachers (n=145-147)
My commitment to the environment	3.39	3.31	3.40
My pre-service teacher preparation experience	1.84	1.79	1.67
Useful experiences from Environmental Education in-service courses/workshops	2.15	1.99	1.92
It is mandated	1.66	1.41	1.44
It is part of my curriculum	2.20	1.97	2.26
It makes learning relevant to my students	3.37	3.25	3.20
It makes learning fun for my students	3.45	3.15	3.02
My responsibility to address the Next Generation Science Standards	2.81	2.32	2.21
My responsibility to address the Common Core State standards	2.76	2.43	1.93
My belief in interdisciplinary education	3.26	3.03	3.10
It is important that students be environmentally literate for the good of future generations	3.61	3.43	3.54
Student concerns about or interest in the environment	3.23	3.09	3.16

Scale: 1=Not at all; 2=Very little; 3=Somewhat; 4=To a great extent

A Chi Square test was performed to determine if the proportion of teachers who had had exposure to Environmental Education during their teacher preparation differed statistically significantly according to grade level. While 67% of early childhood/elementary education teachers, 74% of middle school teachers, and 74% of high school teacher respondents reported taking a standalone course in Environmental Education or having Environmental Education infused in other courses, the difference in proportions was not statistically significant, χ^2 (2, N = 425) = 2.42, p =.299.

Chi Square tests were also performed to investigate whether statistically significant differences existed in the amount of professional development in Environmental Education by teacher respondent grade level. As displayed in the table below, 33.1% of early childhood/elementary teachers had participated in professional development in Environmental Education during the last 12 months, compared to 16.5% of middle school respondents and 22.6% of high school teacher respondents. The difference in proportions was significant, χ^2 (2, N = 422) = 10.10, p = 0.006.

Total amount of time you spent on professional development in Environmental Education - In the last 12 months? * Teacher Grade Level Crosstabulation						
			Teacher Grade Level			Total
			EC/Elementary	Middle	High	
t_PD12MOS	0	Count	103	91	123	317
		% within Teacher Grade Level	66.9%	83.5%	77.4%	75.1%
	1	Count	51	18	36	105
		% within Teacher Grade Level	33.1%	16.5%	22.6%	24.9%
Total		Count	154	109	159	422
		% within Teacher Grade Level	100.0%	100.0%	100.0%	100.0%

Similarly, 52.7% of early childhood/elementary teachers had participated in professional development in Environmental Education during the last 3 years, compared to 30.8% of middle school respondents and 34.5% of high school teacher respondents. Again, the difference in proportions was significant, χ^2 (2, N = 362) = 13.70, p = 0.001.

Total amount of time you spent on professional development in Environmental Education - In the last 3 years? * Teacher Grade Level Crosstabulation						
			Teacher Grade Level			Total
			EC/Elementary	Middle	High	
T_PD3YRS	0	Count	61	63	93	217
		% within Teacher Grade Level	47.3%	69.2%	65.5%	59.9%
	1	Count	68	28	49	145
		% within Teacher Grade Level	52.7%	30.8%	34.5%	40.1%
Total		Count	129	91	142	362
		% within Teacher Grade Level	100.0%	100.0%	100.0%	100.0%

Correlations

Correlations among quantitative variables were also generated to explore the strength and direction of the relationships between various constructs that were measured in the Environmental Education: Inventory of Current Practices survey. For example, it would be useful to know whether certain teacher beliefs or attitudes occur or vary together or perhaps move in opposite directions—or perhaps the presence of a certain attitude or characteristic has no relationship with another teacher feature. While correlational data does not prove cause and effect, it was thought that this information could be useful for understanding teachers better and for planning future professional development offerings centered around Environmental Education.

Bivariate correlations were conducted on the following variables:

- Intensity of positive beliefs about Environmental Education: tbeliefs_POS
- Intensity of negative beliefs about Environmental Education: tbeliefs_NEG
- Level of commitment to Environmental Education t_COMMIT
- Level of knowledge of impact of Environmental Education: t_KNOW

- Average level of preparation to engage students in Environmental Education practices aligned with the Next Generation Science Standards: t_PREP
- Intensity of barriers to engaging in Environmental Education: t_BARR
- Strength of motivators to engage in Environmental Education: t_MOT
- Number of years teaching: t_YRS

Criteria that were used to judge the strength of correlational relationships revealed by the analysis were as follows: .10 Small; .30 Moderate; .50 Large (Cohen, 1992).

The correlation table below displays the correlations among the survey variables listed above. One of the first, most striking findings in the table is that the number of years a teacher teaches has no relationship at all with his/her beliefs about, level of commitment to, knowledge of, preparation to engage in, motivation to engage in, or perception of barriers to engage in Environmental Education. In fact, correlations between t_YRS and all other variables are virtually zero and not statistically significant. (See correlations highlighted in blue in the table below.) This is good news, as common wisdom often dictates that "older" teachers are more resistant to educational innovations or changes in practice.

	tbeliefs_NEG	tbeliefs_POS	t_COMMIT	t_KNOW	t_BARR	t_MOT	t_PREP	t_YRS
tbeliefs_NEG	1	-.481**	-.472**	-.376**	.304**	-.318**	-.236**	-0.006
tbeliefs_POS	-.481**	1	.565**	.510**	-.214**	.324**	.307**	-0.048
t_COMMIT	-.472**	.565**	1	.495**	-.247**	.378**	.281**	0.018
t_KNOW	-.376**	.510**	.495**	1	-.351**	.375**	.483**	0.004
t_BARR	.304**	-.214**	-.247**	-.351**	1	-.397**	-.506**	-0.052
t_MOT	-.318**	.324**	.378**	.375**	-.397**	1	.488**	-0.095
t_PREP	-.236**	.307**	.281**	.483**	-.506**	.488**	1	0.026
t_YRS	-0.006	-0.048	0.018	0.004	-0.052	-0.095	0.026	1
** Correlation is significant at the 0.01 level (2-tailed).								

It is notable that all other correlations in the table are statistically significant at the p=0.01 level, indicating that they are likely attributable to real relationships and not due to chance. The largest correlations are between tbeliefs_POS and t_COMMIT (r=.565**), tbeliefs_POS and t_KNOW (r=.510**), t_PREP and t_BARR (r=-.506**), t_KNOW and t_COMMIT (r=.495**), t_MOT and t_PREP (R=.488**), t_KNOW and t_PREP (r=.483**), tbeliefs_NEG and tbeliefs_POS (r=-.481**), and tbeliefs_NEG and t_COMMIT (r=-.472**). (See correlations highlighted in red in the table below.) According to Cohen, these are large correlations or relationships. In this particular context, they signify the following:

- As teachers' positive beliefs in Environmental Education increase, so does their commitment to Environmental Education (and vice versa).
- As teachers become more knowledgeable of the impacts of Environmental Education, their positive beliefs about Environmental Education increase (and vice versa).
- As teachers feel more prepared to implement/engage students in Environmental Education practices aligned with the Next Generation Science Standards, their perceptions of barriers to engaging in Environmental Education decrease (and vice versa).
- As teachers become more knowledgeable of the impacts of Environmental Education, their commitment to Environmental Education increases (and vice versa).
- As teachers feel more prepared to implement/engage students in Environmental Education practices aligned with the Next Generation Science Standards, their perceptions of motivators to engaging in Environmental Education increase (and vice versa).
- As teachers become more knowledgeable of the impact of Environmental Education, they feel more prepared to implement/engage students in Environmental Education practices aligned with the Next Generation Science Standards (and vice versa).
- As teachers' negative beliefs about Environmental Education decrease, their positive beliefs about Environmental Education increase (and vice versa).
- As teachers' negative beliefs about Environmental Education decrease, their commitment to Environmental Education increases (and vice versa).

The remaining correlations in the table range from -.397** to .378**. Those with an absolute value at or close to .300 are considered moderately strong and can still be considered useful for understanding the relationships among teacher respondents' beliefs and attitudes.

Conclusions

Current State of Environmental Education in RI schools

Survey findings revealed that the majority (51%) of teachers and 67.7% of administrators in the survey sample had not been exposed to Environmental Education at all during their teacher preparation. Likewise, 75.8% of teachers and 64.2% of administrators had not participated in professional development in Environmental Education during the last 12 months; similarly, 60.6% and 55.9% of teachers and administrators had not participated in any Environmental Education-related training in the in the previous 3 years. For both time frames, it was revealed that early childhood/elementary teachers had participated in statistically significantly more professional development in Environmental Education than their middle and high school counterparts.

Teachers and administrators tended to define Environmental Education as teaching students or student learning about or in the environment; related to impacts on the environment; and about environmental issues. Teacher and administrator respondents tended to agree that Environmental Education takes place in the community, provides meaningful learning experiences, enhances learning and supports other subjects, integrates real world experiences into student learning, and provides information/facts about specific environmental problems. Both groups also disagreed that Environmental Education is successfully taught only by science teachers or appropriate mainly for science/social studies, is an "add on," takes time away from mandatory subjects, and attempts to indoctrinate students. Interestingly, further analyses also revealed that middle school teachers exhibited statistically significantly more negative beliefs about Environmental Education than their early childhood/elementary education counterparts.

When asked to indicate how often they believed their own or teachers' classroom instruction included environmental topics, nearly equal, very small proportions of teachers and administrators reported that this was happening in all or almost all lessons or never. Likewise, similar proportions of both groups indicated that instruction included environmental topics once or twice a week (17.6% for administrators and 20.6% for teachers). However, a larger proportion of administrators than teachers (50% versus 38.9%) indicated that environmental topics were sometimes addressed (e.g., once or twice per month). Finally, more teachers than administrators reported that instruction rarely included environmental topics, with 35.8% of teachers indicating so, in comparison to just 27% of administrators.

Among teacher and administrator survey respondents, approximately 11% of each group reported that their own or teachers' instruction took place in the natural world often or in all or almost all lessons. Further, nearly equal proportions of each group (just over 40%) reported that this was a rare event, occurring just a few times per year. In contrast, 43.8% of administrators thought that instruction at their school sometimes took place in the natural world (e.g., once or twice a month), while only 24.8% of teachers agreed. Finally, almost one-quarter (22.2%) of teacher respondents responded that their instruction never took place in the natural world. Very few administrators thought the same (2.7%).

Teacher and administrator respondents also professed similar attitudes about Environmental Education and the Environment. They agreed that Environmental Education should be considered a K-12 priority, it is important for teachers to integrate environmental issues into their teaching, and that districts should develop/implement Environmental Education curriculum. Likewise, the two groups reported very similar levels of uncertainty about whether pre-service teachers should be required to take an Environmental Education content and methods class. The areas of greatest difference between teachers and administrator attitudes concerned their personal conviction about and involvement in environmental issues. Teachers were more likely to agree that Environmental Education was important to them personally, as compared to administrators. However, administrators indicated greater awareness of the impact of Environmental Education on students and teachers than did teachers themselves.

Administrator survey respondents tended to think that Environmental Education was included in teachers' instruction more than teachers reported. For example, almost 4% of administrators reported that it was included in all or almost all lessons, as opposed to 0% of teachers. Similarly, 6.5% of teachers reported that they never included Environmental Education in their teaching, while only 2.5% of administrators thought that this was the case. Likewise, 54.3% of administrators estimated that Environmental Education was included in instruction once or twice a month, as compared to 36.3% of teachers who indicated that this was actually the case. Similarly, 33.5% of teachers reported including Environmental Education in their instruction a few times per year (i.e., rarely), while administrators thought this was less rare. In contrast, teachers and administrators were nearly in agreement in one respect, with approximately 20% of each group reporting that Environmental Education was included in instruction often (e.g., once or twice a week).

In all areas, administrators were more likely to indicate that an Environmental Education topic was being addressed than were teachers. Administrators indicated that their teachers were addressing the human impact on the natural world, climate change, and renewable energy more than any other Environmental Education topics. Teachers, on the other hand, reported that the most frequent Environmental Education topics that they addressed in their teaching were human impact on the natural world, climate change, and quality of life. Both groups agreed that civic engagement, sustainable agriculture/forestry,

and environmental justice were Environmental Education topics that were being addressed least in classrooms.

Teachers indicated that "infusion" (blending environmental concepts into existing lessons when the opportunity arises) was the most common way in which they integrated Environmental Education into their instruction, followed by teaching one or more Environmental Education units during the school year, intentionally designing lessons to incorporate Environmental Education concepts, and inserting separate Environmental Education activities into their curriculum. Alternatively, the Environmental Education integration approaches that teachers clearly did not endorse as accurate of their instruction were teaching Environmental Education through an After-School program, teaching a separate course about the environment, and inviting guest speakers to present on Environmental Education issues.

In terms of administrator feedback on how Environmental Education *should be* integrated into teachers' instruction, the results were quite different. For example, the integration strategy most endorsed by administrators was inviting guest speakers to present on Environmental Education issues, followed by infusion, and "integration" (intentionally designing lessons to incorporate environmental concepts). Additionally, 5% to 10% of administrator respondents indicated uncertainty about the best approach to integrate Environmental Education. For example, 9% were unsure about whether Environmental Education should be integrated into separate Environmental Education units or a separate course about the environment. Further, 6% expressed uncertainty about whether Environmental Education should be integrated into district resources or addressed in an integrated, interdisciplinary course.

When asked to provide examples of how they integrated Environmental Education into their school day, the most common method described by teachers was through class discussion, followed by using existing curriculum that already had Environmental Education embedded in it; employing Supplemental Class Materials related to Environmental Education; designing/implementing standalone units, lessons, and projects in Environmental Education; applying Environmental Education to the "real world" (e.g., guest speakers, field trips); encouraging positive habits and awareness; and carrying out outdoor and extracurricular activities. Few teachers reported using service learning or partnering with environmental organizations to engage in Environmental Education. Teachers reported using informal assessment methods (i.e., classroom discussions and teacher observation) more than any other assessment methods. Further, one quarter of teacher respondents indicated that they assessed students through project-based activities and one-quarter reported that they did not assess their students' environmental knowledge/skills at all.

When asked to indicate the science or Environmental Education curricula or resources, if any that they or their school had, the most common teacher response to this question was "I don't know" (25%). The next most common science and/or Environmental Education curricula or resources teachers said they had included science textbooks (19%), FOSS (16%), science resource books (15%), and STEMscopes (11%). Administrators were significantly less likely to reply that they did not know what science or Environmental Education resources their school had, with only 11% responding to this effect. On the other hand, the most common science or Environmental Education resources of which administrators were aware of at their schools included science textbooks (38%) and science resource books (37%), followed by FOSS (30%) and STEMscopes (16%). When asked, "To what degree do/does the curriculum and/or resource(s) you indicated above support teaching or engagement in Environmental Education?" over 21% of teachers indicated that the curriculum and/or resources they had identified did "not at all" support teaching or engagement in Environmental Education, while fewer than 2% of administrators gave the same rating.

Overall, teacher and administrator survey respondents felt equally prepared to carry out their respective responsibilities related to the Environmental Education-aligned NGSS standards. More than half of teacher and administrator respondents rated themselves as only somewhat or not at all prepared to teach or support teachers in the student following practices:

- Students demonstrate their understanding of the ways that technology impacts the environment
- Students demonstrate their understanding of ecological systems
- Students design a solution for reducing the impacts of human activities on the environment

Average ratings for both groups corresponded roughly to a self-perceived preparation level of "somewhat" prepared, leaving considerable room for growth in their capacity in teachers' and administrators' skills and comfort levels.

Teachers reported being "somewhat" motivated to engage in Environmental Education by factors related to their own belief systems or student concerns/learning. These motivating factors included: their belief that it is important for students to be environmentally literate, teacher commitment to the environment, the fact that Environmental Education makes learning relevant and fun for students, student concerns/interest in the environment, and teacher belief in interdisciplinary education. External factors and past experiences were not instrumental in motivating teachers to engage in Environmental Education. Finally, early childhood/elementary teachers reported a statistically significantly stronger level of motivators to engage in Environmental Education (t_MOT) than did middle and high school teachers. Additionally, administrators' beliefs in interdisciplinary education were much more motivating to them (in terms of supporting teachers to engage in Environmental Education) than were teacher beliefs in interdisciplinary education. In general, administrators were also much more motivated by their responsibility to address standards than were teachers.

The principle barrier identified by teachers and administrators alike was that it was difficult to fit Environmental Education into a curriculum that was already very crowded. In fact, the main barriers perceived by both groups had to do with the fact that Environmental Education was not included or occupied a position outside other, standard educational resources or supports: curriculum, teacher preparation, teaching resources, teaching knowledge and background, and state/district accountability systems. Further, it was found middle school teachers reported a statistically significantly higher level of barriers to engaging in Environmental Education than did high school teachers.

On a positive note, teachers and administrators were not very likely to view Environmental Education as unrelated to other content teachers taught. Additionally, teachers were unlikely to view a lack of administrator or parental support, personal interest, or desire to teach outside as barriers to their engaging in Environmental Education. Alternatively, administrators were more likely to view teacher lack of interest in teaching about the environment and not wanting or feeling comfortable taking students outside as a barrier to Environmental Education than did teachers themselves.

The following statistically significant correlational findings were also discovered:

- As teachers' positive beliefs in Environmental Education increase, so does their commitment to Environmental Education (and vice versa).

- As teachers become more knowledgeable of the impacts of Environmental Education, their positive beliefs about Environmental Education increase (and vice versa).
- As teachers feel more prepared to implement/engage students in Environmental Education practices aligned with the Next Generation Science Standards, their perceptions of barriers to engaging in Environmental Education decrease (and vice versa).
- As teachers become more knowledgeable of the impacts of Environmental Education, their commitment to Environmental Education increases (and vice versa).
- As teachers feel more prepared to implement/engage students in Environmental Education practices aligned with the Next Generation Science Standards, their perceptions of motivators to engaging in Environmental Education increase (and vice versa).
- As teachers become more knowledgeable of the impact of Environmental Education, they feel more prepared to implement/engage students in Environmental Education practices aligned with the Next Generation Science Standards (and vice versa).
- As teachers' negative beliefs about Environmental Education decrease, their positive beliefs about Environmental Education increase (and vice versa).
- As teachers' negative beliefs about Environmental Education decrease, their commitment to Environmental Education increases (and vice versa).

What RI Teachers and Administrators Say They Need to Successfully Implement Environmental Education

When asked to rank items that would help them engage more successfully in Environmental Education, teacher ranking averages suggest that materials, followed by professional development, resources, funding, and administrative support would be most helpful. Alternatively, considering the most frequent ranking assigned to each option, professional development seems that it would be most helpful to teachers for including more Environmental Education in their teaching. The next most helpful items would be materials and resources (both most frequently ranked second most helpful), followed by funding and administrative support.

After examining these results, it is clear that teachers consider funding and administrative support would be least helpful in terms of helping them include more Environmental Education in their teaching. Materials and professional development would be most helpful in this regard. Additional teacher resources would be the next most helpful. "Other" types of support that teachers mentioned in open-ended comments included: more time, a more flexible curriculum, increased community connections, collaboration with colleagues, and facilities.

Administrators' opinions of what would be most helpful in supporting teachers to engage in Environmental Education in their teaching are slightly different. In terms of the average ranking per option, supports that would be most helpful to administrators in supporting teachers include (in order of most to least helpful): funding, professional development, materials, resources, and administrative support. Looking at frequency of rankings per option, it is clear that funding and professional development were selected as most helpful most often by administrators. Interestingly, administrators appeared to be divided about the helpfulness of additional resources for supporting teachers to engage in Environmental Education. In fact, 26% of administrators rated it second most helpful, and the same amount rated it fourth most helpful. In general, materials seem to be third most helpful in the opinion of administrators. As with teachers, administrators considered additional administrative support to be

least needed in terms of helping them support teachers to include more Environmental Education in their teaching. Taken as a whole, the data do suggest that administrators would like more funding and more professional development in order to support teacher Environmental Education practices. "Other" helpful support identified by administrators included professional development, model classrooms to visit, time to collaborate and "figure out how to do this," and ready-made Environmental Education resources.

Recommendations

Based on the findings and conclusions presented in this report, the following recommendations are offered to RIEEA:

- Expand opportunities for professional development in Environmental Education for ALL teachers, but particularly at the middle and high school level. Themes to include in professional development include:
  - Best practices for integrating Environmental Education into the curriculum
  - Tips and tools for helping teachers use the natural world for Environmental Education
  - How to integrate Environmental Education in non-science subjects
  - Research on the impact of Environmental Education and how to counter myths/negative beliefs about Environmental Education
  - Assessment strategies in Environmental Education
  - How to teach students the following NGSS-aligned practices:
    - Students demonstrate their understanding of the ways that technology impacts the environment
    - Students demonstrate their understanding of ecological systems
    - Students design a solution for reducing the impacts of human activities on the environment
  - How to locate and access school-level curriculum and resources that are helpful to engaging in Environmental Education
- Expand opportunities for professional development in Environmental Education for administrators. Themes to address include:
  - How to keep a pulse on what is happening in Environmental Education at the school level
  - Best practices for integrating Environmental Education into the curriculum
  - Best practices and methods for supporting teachers to engage in Environmental Education
  - How to support teachers to teach students the following NGSS-aligned practices:
    - Students demonstrate their understanding of the ways that technology impacts the environment
    - Students demonstrate their understanding of ecological systems
    - Students design a solution for reducing the impacts of human activities on the environment
  - How to support teachers in using school-level curriculum and resources to engage in Environmental Education
  - Tips and tools for helping teachers use the natural world for Environmental Education
  - How to integrate Environmental Education in non-science subjects
  - Research on the impact of Environmental Education and how to counter myths/negative beliefs about Environmental Education

- Provide teachers and/or administrators with the following supports to decrease barriers and increase opportunities to engage in Environmental Education:
    - Advocacy (at the district/state level) for a more flexible curriculum in which to implement Environmental Education
    - Increased funds for transportation (i.e., buses), field trips, and guest speakers
    - Increased connections to the environmental community
    - More frequent opportunities to collaborate with colleagues and visit "model" Environmental Education classrooms
    - Access to "ready-made" Environmental Education resources

References

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