

Executive Summary

Survey of Formal Educators on Teaching about Environment/Nature and Related Educational Practices

The Iowa Department of Natural Resources Aquatic Education Program initiated a web-based survey of educators in the fall of 2008 to ascertain the current status of and perceptions about teaching related to environment/nature in Iowa classrooms, as well as barriers to and needs for increasing education about environment/nature. The link to the survey was sent through a variety of education contacts to solicit as many responses as possible. More than 1200 surveys were submitted. We focused our analysis on responses from classroom teachers (n = 844) and school administrators (n = 154).

Administrators and classroom teachers both noted funding (i.e., for field trips) and time (for collaboration, planning, and teaching) as barriers to improving or strengthening education about environment/nature. Teachers noted curriculum as a barrier; administrators noted relevance of education about environment/nature to the Iowa Core Curriculum and national standards. Both groups mentioned teacher education/training. Some administrators also noted staff buy-in, while some teachers noted administrative support.

According to respondents, top needs for improving or strengthening education about the environment/nature were overwhelmingly related to curriculum (about two-thirds of administrators and just under half of the classroom teachers). Teacher training and planning assistance was noted by about one-third of administrators; a quarter of teacher responses related to training as well. Almost one-third of administrators mentioned funding for field trips, outdoor classrooms, or other access to local natural areas. A significant number of teachers mentioned field trips. This is consistent with findings from our 2003 focus groups where participants suggested areas “within walking distance.”

Analysis of teacher responses reinforced suggested barriers and needs from the open-ended responses. Training, knowledge, and comfort level teaching were strongly correlated, supporting the need for teacher training and support. Fewer than one in 10 classroom teachers reported using natural areas on a regular basis throughout the year, supporting the need for natural areas that are more readily accessible. Thirty percent reported a desire to link curriculum to the outdoors or local community, but did not know how or lacked the resources to do so.

More than 90% of respondents indicated they link their curriculum to environment/nature to some degree, but most do not work with other teachers consistently to develop curriculum, reinforcing lack of time for collaboration and planning noted in open-ended responses. Teachers in Pre-K to Grade 8 estimated that more than half of the teachers and students at their teaching grade level were involved in environmental or nature studies, but the estimates for grades 9-12 were dramatically lower – 15% of students and 3% of teachers. More than half of all teachers reported using inquiry as a teaching strategy less than one-fourth of the time. Over half of the Pre-K to Grade 5 teachers and 4/10 teachers in the upper grades indicated their environment/nature programs were “presentation-based”

Findings support current initiatives to increase teacher knowledge and implement place-based approaches through training and on-line support, as well as national efforts to align conservation education with national education standards and initiatives. They also reinforce the need to support fully integrated approaches to education about environment/nature within formal education that helps educators address core educational objectives, rather than provide “add-on” activities or programs.



Iowa Department of Natural Resources
Aquatic Education Program
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Summary of a Survey of Formal Educators on Teaching about Environment/Nature and Related Educational Practices

March 2009



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Methods

The Iowa DNR Aquatic Education Program developed a survey based on the rubric used by the Washington Department of Fish and Wildlife to assess practices in schools participating in environmental education efforts. It was reviewed by education professionals including a retired educator involved in EE for more than 30 years, DNR education staff, and an assistant professor in education from the University of Iowa.

Emails explaining the survey and including a direct link to it were sent to Iowa school administrators, area education agency science consultants, college and university teaching methods instructors, professional teaching organizations, county conservation board educational personnel, and subscribers to our email updates. The survey was available online for about two months in the fall of 2008. Three follow-up emails were sent to encourage participation.

The survey on teaching about environment/nature was targeted to classroom teachers, but questions related to the barriers and resources needed to improve teaching about the environment/nature, the value of environment/nature studies, personal background in content/teaching strategies, and perceptions related to current classroom practice were analyzed for school administrators as well.

Results

Over 1,200 surveys were submitted. Of those, there were 844 classroom teachers, 154 administrators, 14 curriculum coordinators, and 172 classified themselves as “other.”

Dr. Tony Fedler (Human Dimensions Consulting, Gainesville, FL) did statistical analysis of the closed-ended questions for classroom teachers. He compared responses by grade cluster [grades Pre-K to 2 (n=178), grades 3 to 5 (n=186), grades 6 to 8 (n=167), and grades 9 to 12 (n=291)] and by respondents who teach science area subjects (n=383) with non-science teachers (n=461). Graduate student Meg Jacobs (under the direction of Dr. Christine Moroye, assistant professor of education at the University of Iowa) completed a qualitative analysis of classroom teachers’ open ended-responses to the top “barriers” to teaching more about environment/nature and their top “needs” for teaching more about environment/nature.

Barb Gigar, aquatic education coordinator, summarized administrator responses (154) for comparison with those of classroom teachers.

Overview of major findings – Classroom Teacher Responses

Use of Natural Areas

- Overall, 4/10 respondents indicated “a few learning activities involve taking the classroom to natural areas.”
- About 20% of classroom teachers responding use natural areas “seasonally” and fewer than 1/10 “use natural areas/outdoors for learning on a regular basis throughout the year.”
- Science teachers use natural areas or the outdoors only slightly more frequently than non-science teachers.
- Pre-K to 2nd Grade teachers used natural areas more frequently than teachers in other grade levels.
- More than 1/4 of middle and high school teachers did not use natural areas at all in their classes.

Inclusion of environment/nature in curriculum

- Three in 10 classroom teachers responding said they would like to link curriculum to outdoors or local community but do not know how/don't have the resources to do so.
- Few teachers link their curriculum to the outdoors, local natural area, and the community (place-based approach).
- Few teachers in each grade level adapted their curriculum based on student interests and involving contributions from the outdoors, natural environment or local community.
- About twice as many non-science teachers (12% vs. 6%) indicated their curriculum had no linkages to the outdoors or community.
- Teachers in Grades 6-8 and 9-12 were the least likely to teach environmental content – 95% of Pre-K to Grade 2 teachers include environment/nature in their curriculum while about 70% of the middle and high school teachers teach about the environment/nature.
- About 75% of non-science teachers include at least some environmental topics, 95% of the science teachers include environmental topics in their teaching.
- Pre-K to Grade 5 teachers estimated that about 55% of the teachers in their buildings were involved in teaching environmental/nature studies. Upper grade teachers estimated that between 3% and 11.5% were involved in environmental/nature studies.
- Teachers in Pre-K to Grade 8 estimated that more than half of the students at their teaching grade level were involved in environmental or nature studies. But, teachers at the high school level estimated only 15% of the students were involved in environmental or nature studies.

Teacher Practice

- High school teachers used didactic teaching methods more frequently than teachers in other grades.
- Over 50% of the Pre-K to Grade 5 teachers indicated their environment/nature programs were “presentation-based” compared to 41% of the upper grade teachers.
- Very few teachers used community-based environment/nature programs integrated throughout subject areas with a systematic approach designed to develop environmental literacy and that actively evaluates quality of curriculum and instruction.
- Teachers in Grades 3-5 were slightly more likely to work with other teachers to build an integrated environmental unit while only 9.3% of the high school teachers did so.
- Science teachers mentioned that they provided stand-alone activities and worked alone to design curriculum using the outdoors more frequently than non-science teachers.
- Few teachers work consistently and frequently to design and facilitate units/projects that focus on the environment or nature.
- Science teachers were more inclined to use environmental or nature units to supplement presentations or integrate them into other subject area.

Learning and Assessments

- The predominant learning style was group work followed by learning facts about course content.
- The most common assessment measure was through performance on projects, discussions and presentations by students. Well over half of the teachers used these techniques.

- About one-fourth of the teachers in each grade grouping used integrated activities to assess learning.
- Subject area tests were used by only 16% of the teachers overall. While the percentage ranged from 13% to 22%, the differences across grade levels were not statistically significant.
- Between 42% and 48% of the teachers in Grades 3-12 tested students on material covered in classroom lectures and discussions, assigned readings and homework. Only 11.8% of the teachers in the Pre-K to Grade 2 group tested in this manner.
- Between 40% and 48% of the teachers at all grade levels reported that inquiry-based instructional strategies were used less than one-fourth of the time.
- About 30% of the teachers indicated they used inquiry-based instructional strategies between one-fourth and one-half of the time.
- Group work and learning facts were the most common methods for science and non-science teachers.
- Performance on projects, discussions and presentations, and classroom reading and materials tests were the most common form of assessment used by both science and non-science teachers. A greater proportion of science teachers used these assessment methods.
- Science teachers also used subject area tests more frequently (20%) than non-science teachers (12%).

Value of Environment/Nature Studies

- Values of studies about environment/nature rated highest by all teachers were: improved awareness of environmental issues, improved critical thinking and problem solving skills, encouraging an appreciation of stewardship for natural resources, increased motivation to learn, and developing a sense of citizenship.
- Teachers in Grades 3-5 gave higher value ratings for environmental or nature studies to develop a sense of citizenship, improving critical thinking and problem solving skills, increasing motivation to learn, strengthening student cooperation and communication skills, and improving student achievement on standardized tests.

Knowledge, Comfort Level, and Training

- The knowledge level of non-science teachers with teaching life sciences or outdoor learning experiences was not significantly different from elementary science teachers, but differences in knowledge level between science and non-science teachers for middle and high school teachers were very dramatic. The same was true for comfort level teaching and level of training in these areas.
- 85% of the science teachers and 90% of the non-science teachers were either somewhat or moderately interested in environmental issues. Only a small percentage were “very interested” in environmental issues.
- Science teachers spent slightly more time on inquiry-based instructional strategies than non-science teachers. 46% of the science teachers and 35% of the non-science teachers devoted one-fourth to three-fourths of their instructional time to inquiry-based strategies.
- About 14% of the non-science teachers and 6% of the science teachers devoted no time to inquiry-based strategies.

Needs for Teaching about Environment/Nature

Survey respondents were asked about the top three barriers to and needs for increasing/enhancing teaching about environment/nature. Most respondents answered in general terms – resources, time, money – but several categories emerged that provide important information for EE service providers related to usability of materials and necessary support for success:

- Curriculum, including materials and ideas, as well as funds needed for curriculum was mentioned as a need by nearly half the respondents.
- Teacher education, including time for teacher education was mentioned by about one fourth of respondents.
- Field trips and community outreach were mentioned by 11-12 percent of respondents. This included money and time for both categories as well as transportation for field trips.
- Other categories that emerged with 6-7% of respondents listing them included space, time constraints for preparation (planning, collaboration, curriculum design, integration, implementation) and time constraints for teaching (time within the curriculum, time for instruction, and class time)
- Administrative support was mentioned by about 30 respondents (3-4%)

Clearly, curriculum and teacher training/support are integral to enhancing education about nature/environment. Administrator responses reinforce this and provide more direction in terms of making sure resources and practices are pedagogically sound and tied to existing educational directives. Several administrators also specifically noted relevance and connections to local communities/resources.

Recommendations

Efforts to increase/enhance education about environment/nature in formal education settings must:

- Include both professional development and follow-up assistance and support
- Be cognizant of limited time and funds for planning and teaching
- Increase teacher knowledge about environment/nature
- Address environment/nature in terms of the Iowa Core Curriculum constructs and national education standards
- Make environment/nature relevant at all grade levels – e.g., mapped concepts across grade levels and subjects; holistic
- Help educators connect students with their local environment and community; make it relevant to their lives

2008 Survey of Formal Educators on Teaching about Environment/Nature and Related Educational Practices

Summary of Administrator Responses

Barb Gigar
Iowa Department of Natural Resources

Response Rate

The response rate for administrators (received a direct email with a link to the survey) was 10.64% - 154 respondents. Typically, the respondents were experienced (9/10 had 10 or more years experience) and most had been at their current school 4 or more years (54%). Respondents represent grades Pre-K – 12 equally (range: 43 respondents worked with PreK and 52 worked with grade 10). Most are somewhat interested (48.8%) in environmental issues or “interested” (44.6%). Only 6.6% often seek out information about environmental issues.

Barriers to improving or strengthening education about environment/nature:

- Funding was the most mentioned by respondents (39), with another nine specifically mentioning the cost of field trips – total = 48. This also relates to access/proximity to natural resources, mentioned by five respondents.
- Time, in general was noted by 32 respondents with staff time constraints mentioned by another seven (specifically, time to plan, collaborate, and/or get trained) – total = 39.
- The need for staff development and/or assistance was noted by 20 respondents. Another 3 noted staff buy-in as a barrier.
- Resources are a significant barrier – nine respondents provided “resources” as a response, which could mean a host of things, but 11 specifically mentioned the need for curriculum models and resources. The relevance of education about nature/environment to Iowa’s core curriculum, national standards, and/or standardized tests was noted by 19 respondents.

Needs for improving or strengthening education about the environment/nature:

- Overwhelmingly, responses were linked to relevant curriculum and models - two-thirds (44/66) of respondents.
- About one-third (21/66) mentioned need for teacher training in this area.
- 20/66 also mentioned funding for field trips, outdoor classrooms, or access to local natural areas.

Responses related to relevant curriculum and models included:

- Resources and materials that are high in rigor
- Curriculum tied to state standards/ core curriculum
- Strategies and lesson plans to use with large classes with diverse learning needs
- Grade level educational materials on environment, conservation of nature
- Computer-based resources
- Opportunities for student involvement in improving environmental conditions in the community
- Developing appropriate assessments

- More hands-on activities
- Determining methods to integrate and infuse environment in our content areas
- Materials that are motivating and current
- Things that can be done out of the building in a community service format; include local stakeholders and businesses
- Study and appreciate our local environment.
- Collaborative cross-curricular applications already in use/mapped, etc.

Value of Environmental Nature Studies

When asked about the value of environment/nature studies, most administrators who responded considered them valuable or very valuable in increasing teacher enthusiasm and student motivation, strengthening student involvement in solving community issues, improving critical thinking skills, strengthening student cooperation and communication skills, and increasing community involvement. Most considered it valuable in improving student achievement on standardized tests. Table 1 includes respondents' rankings.

Table 1: Administrator rankings of the value of environmental/nature studies.

Based on your experience, rate the value of environmental/nature studies for the following:									
	No Value		Little Value		Valuable		Extremely Valuable		N
	n	% Total	n	% Total	n	% Total	n	% Total	n Total
Improve student achievement on standardized tests (e.g., ITBS)	2	2.50%	24	30.00%	48	60.00%	6	7.50%	80
Increase student motivation to learn	0	0.00%	1	1.30%	50	62.50%	29	36.30%	80
Increase teacher enthusiasm	0	0.00%	4	5.00%	53	66.30%	23	28.80%	80
Strengthen student involvement in solving community issues	0	0.00%	5	6.10%	47	57.30%	30	36.60%	82
Strengthen student cooperation and communication skills	0	0.00%	5	6.10%	53	64.60%	24	29.30%	82
Improve student critical thinking and problem solving skills	0	0.00%	2	2.50%	48	59.30%	31	38.30%	81
Reduce behavioral problems	1	1.30%	22	27.80%	41	51.90%	15	19.00%	79
Increase community involvement	0	0.00%	11	13.80%	46	57.50%	23	28.80%	80
Increase opportunities for family involvement	0	0.00%	26	31.70%	40	48.80%	16	19.50%	82
Encourage an appreciation/stewardship for natural world	0	0.00%	1	1.20%	49	59.80%	32	39.00%	82
Improve awareness of environmental issues	0	0.00%	1	1.30%	42	53.80%	35	44.90%	78
Improve skills to participate in environmental concerns or issues	0	0.00%	4	5.00%	56	70.00%	20	25.00%	80
Develop a sense of citizenship	0	0.00%	7	8.60%	54	66.70%	20	24.70%	81
Increase student attendance, lowers rates of truancy	1	1.30%	26	32.90%	41	51.90%	11	13.90%	79

Responses to Selected Questions on Use of Outdoors, Environment/Nature Studies, Teaching and Learning Styles, and Assessments

Note: Only about half the administrators who responded completed this portion of the survey, so results are not statistically valid. They are provided for informational purposes only.

Choose the statement that best describes how often you use natural areas/outdoors in the learning process in your teaching.		
Do not use natural areas/outdoors for learning.	12.50%	9
A few learning activities involve taking the classroom to natural areas.	34.70%	25
Students do outdoor nature studies for a concentrated few days (1-5 days).	15.30%	11
Use natural areas/outdoors for learning seasonally (at least 3-4 times a year).	23.60%	17
Use natural areas/outdoors for learning on a regular basis throughout the year.	13.90%	10
	n	72
How does your curriculum link to the outdoors, local natural areas, and the local community? (Choose all that apply.)		
No attempt to link curriculum to natural areas or community.	2.30%	2
Would like to link curriculum to outdoors or local community but do not know how/don't have the resources to do so.	21.80%	19
Provide stand-alone activities using natural areas/environments or community.	27.60%	24
Work alone to design curriculum for specific natural areas/environments or the community for limited time.	19.50%	17
Work with teams of teachers to design curriculum to link students to outdoors, local natural areas, and the community.	35.60%	31
Curriculum adapted based on students' interests and involves contributions from the outdoors/natural environment and local community.	13.80%	12
	n	87

How do you work with other teachers in your building to teach about the environment/nature? (Choose all that apply.)		
Teachers do not teach environment/nature content at all.	1.10%	1
Teachers primarily use didactic (teacher centered) instruction.	29.50%	26
Teachers work together for one integrated environment/nature unit or field trip each year.	29.50%	26
Teachers occasionally work together to design and facilitate units and projects that focus on environment/nature.	50.00%	44
Teachers work together consistently and frequently to design and facilitate units and projects that focus on environment/nature.	6.80%	6
	n	88

Describe the style of student learning that is most widely used in your classroom. (Choose one of the following.)		
Students learn using textbooks provided.	11.30%	8
Students focused on learning facts related to course content	23.90%	17
Students generally work by themselves on projects.	0.00%	0
Students have an opportunity to make oral presentations on what they have learned.	14.10%	10
Students work in groups on class projects that look at different ways to solve problems.	50.70%	36
	n	83

Describe the type(s) of assessment you use most frequently in your classroom. (Choose all that apply.)		
Students assessed through performances, projects, discussions and presentations.	62.30%	48
Students assess their own work, and self-reflect on their learning.	32.50%	25
Students assessed on what they learn in integrated activities.	42.90%	33
Students assessed through subject area tests only.	28.60%	22
Students tested on material covered in classroom lecture/discussion and assigned reading and homework.	42.90%	33

	n	77
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Which statement best describes the environment/nature programs or units you use in your classroom?		
Environment/nature program is not present.	8.00%	6
Environment/nature program presentation based, where activities are supplemental to existing curriculum, including outdoor school.	62.70%	47
Environment/nature program integrated into subject areas with a systematic approach to develop environmental literacy.	24.00%	18
Community based environment/nature program integrated throughout subject areas with a systematic approach designed to develop environmental literacy and that actively evaluates quality of curriculum and instruction.	5.30%	4
	n	75

Amount of school year spent teaching about the environment/nature studies in your classroom: (Choose one of the following:)		
No attempt to include environment/nature studies.	10.40%	7
Environment/nature studies used in parts of units throughout the year.	61.20%	41
One week in school year focuses on outdoor environment/nature studies.	10.40%	7
One instructional unit in school year reflects environment/nature studies.	9.00%	6
1/3 or more of the school year spent on environment/nature studies.	9.00%	6
	n	67

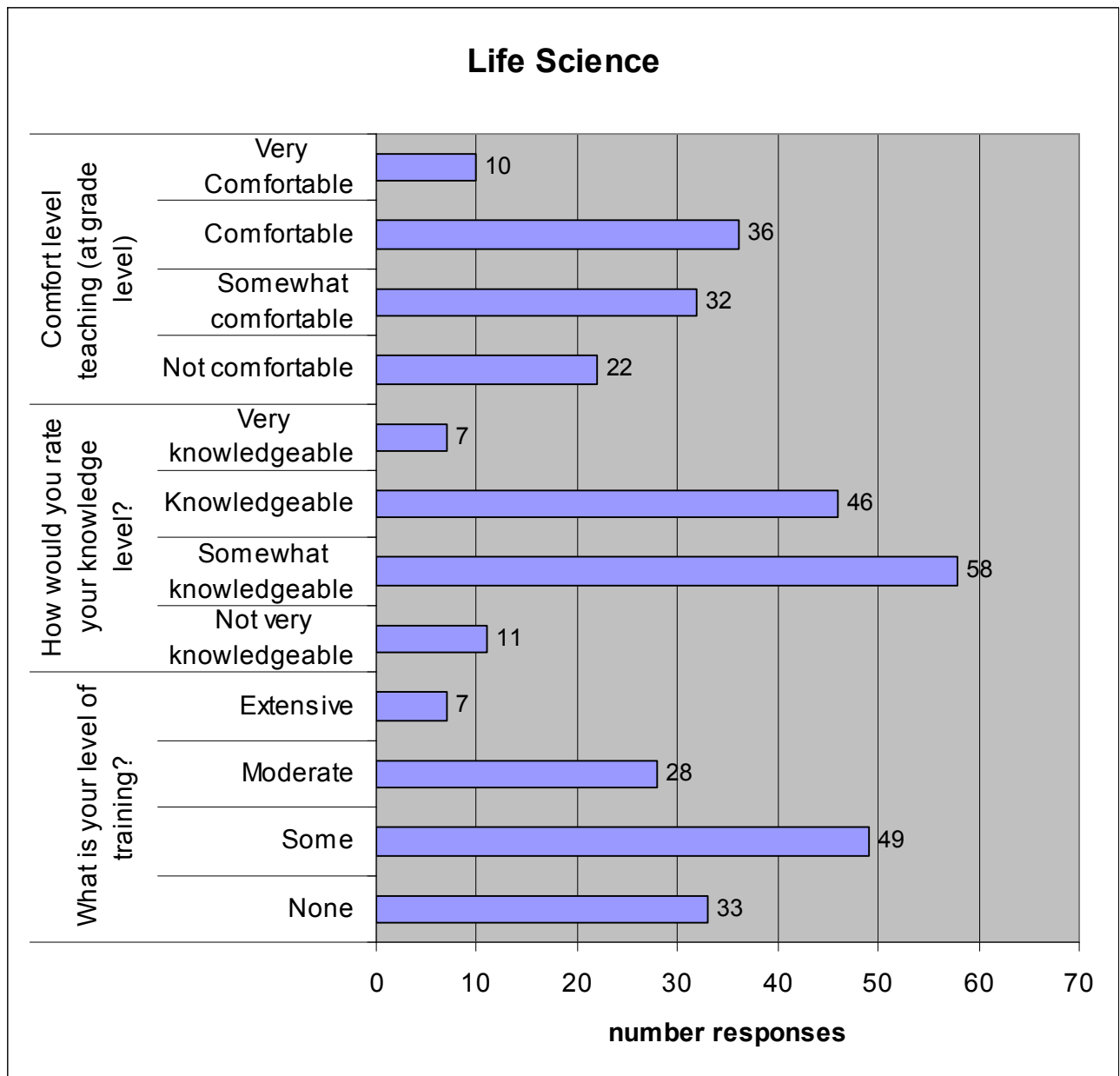
How many teachers/classrooms in your building are involved in teaching about environment/nature studies for your grade level? (Choose one of the following.)		
None	1.10%	1
Less than 1/4 of teachers/classrooms involved	31.00%	27
1/4 to 1/2 of teachers/classrooms involved	17.20%	15
About 1/2 are involved	5.70%	5
More than 1/2 are involved	36.80%	32
	n	80

How much instructional time is spent on inquiry based instructional strategies in your classroom? (Choose one of the following:)		
Do not used inquiry based teaching strategies.	0.00%	0
Inquiry used less than 1/4 of the time.	40.80%	31
Inquiry used 1/4 to 1/2 of the time.	32.90%	25
Inquiry used 1/2 to 3/4 of the time.	15.80%	12
Inquiry used 3/4 of the time or more.	10.50%	8
	n	76

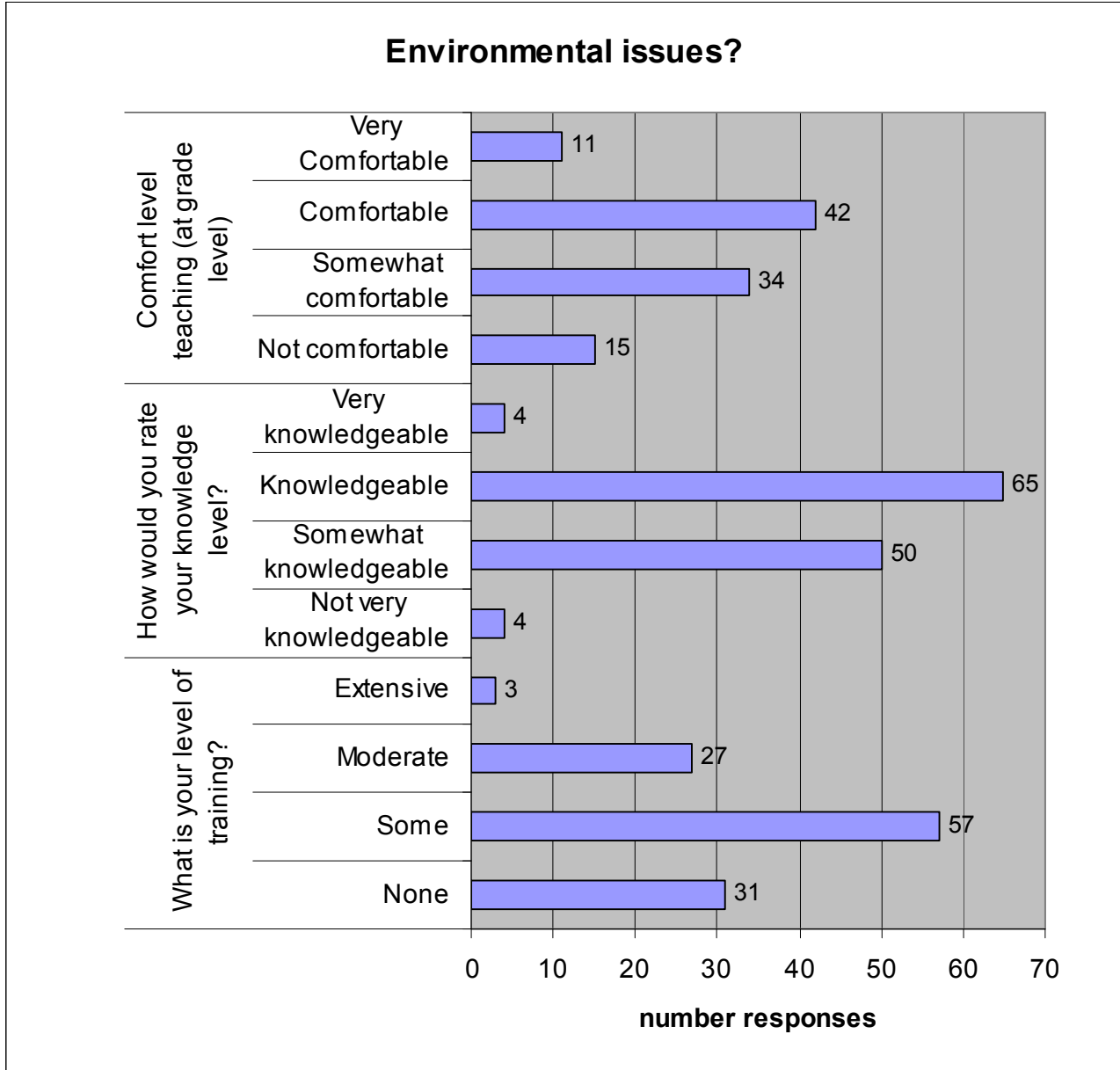
Training, Knowledge Level, & Comfort Teaching

Participants were asked about their training, knowledge level, and comfort teaching on topics or using teaching strategies. Results of administrators' responses follow.

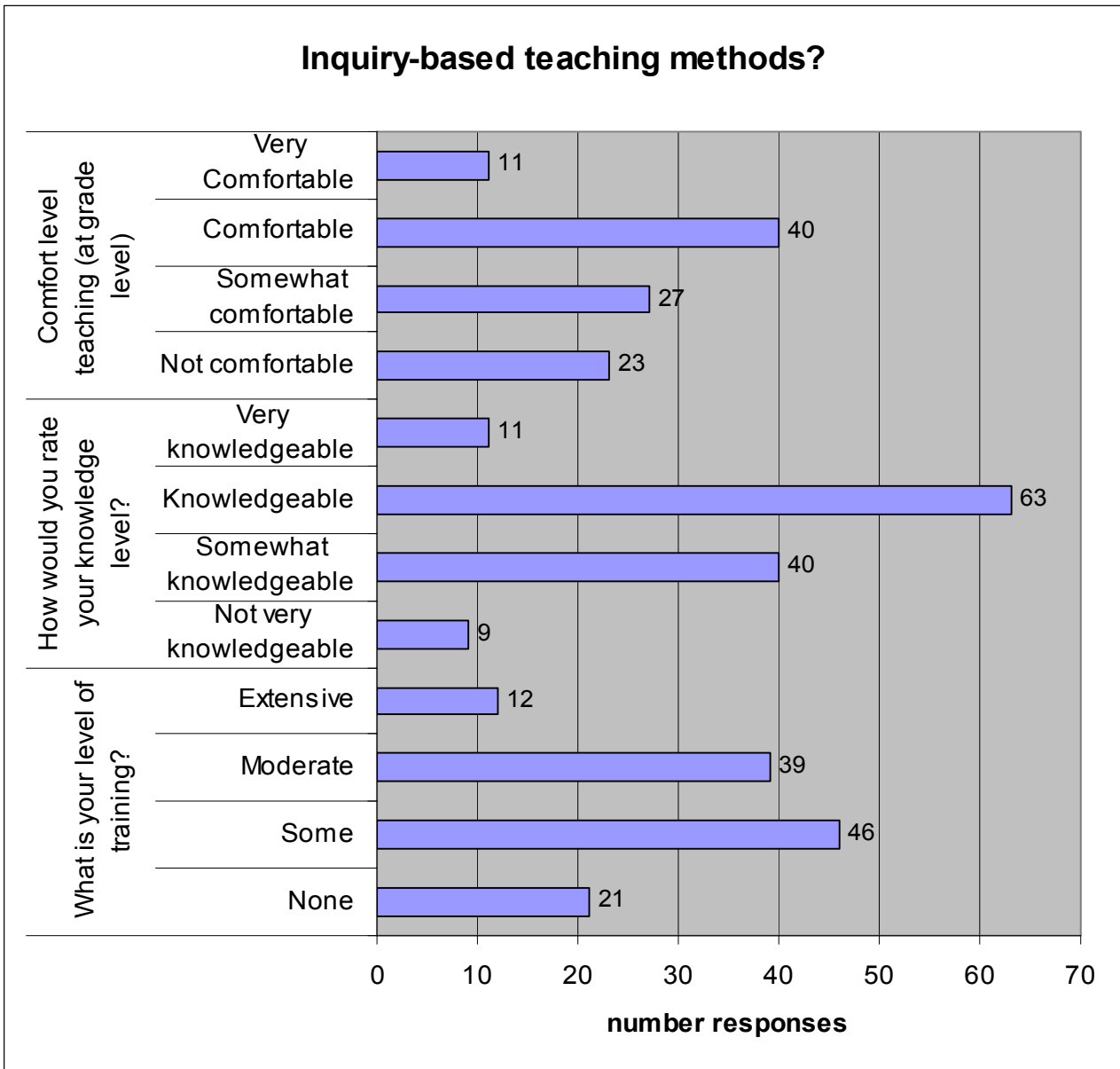
Life Science – most were comfortable/very comfortable teaching at their grade level and considered themselves knowledgeable or very knowledgeable, but most had no or some training.



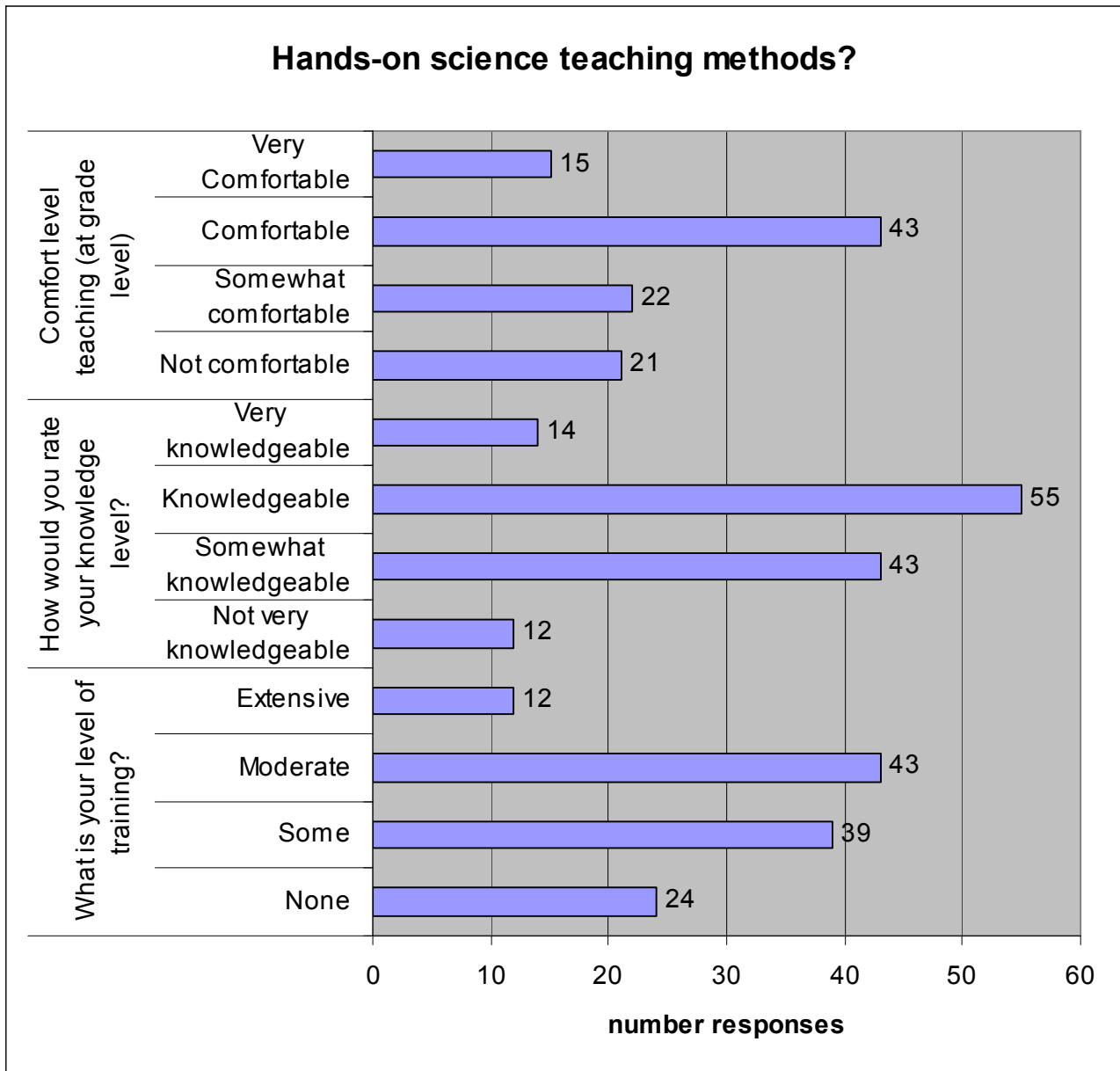
Environmental issues – most were somewhat comfortable or comfortable teaching at their grade level; overwhelmingly they considered themselves knowledgeable or somewhat knowledgeable; most had no or some training.



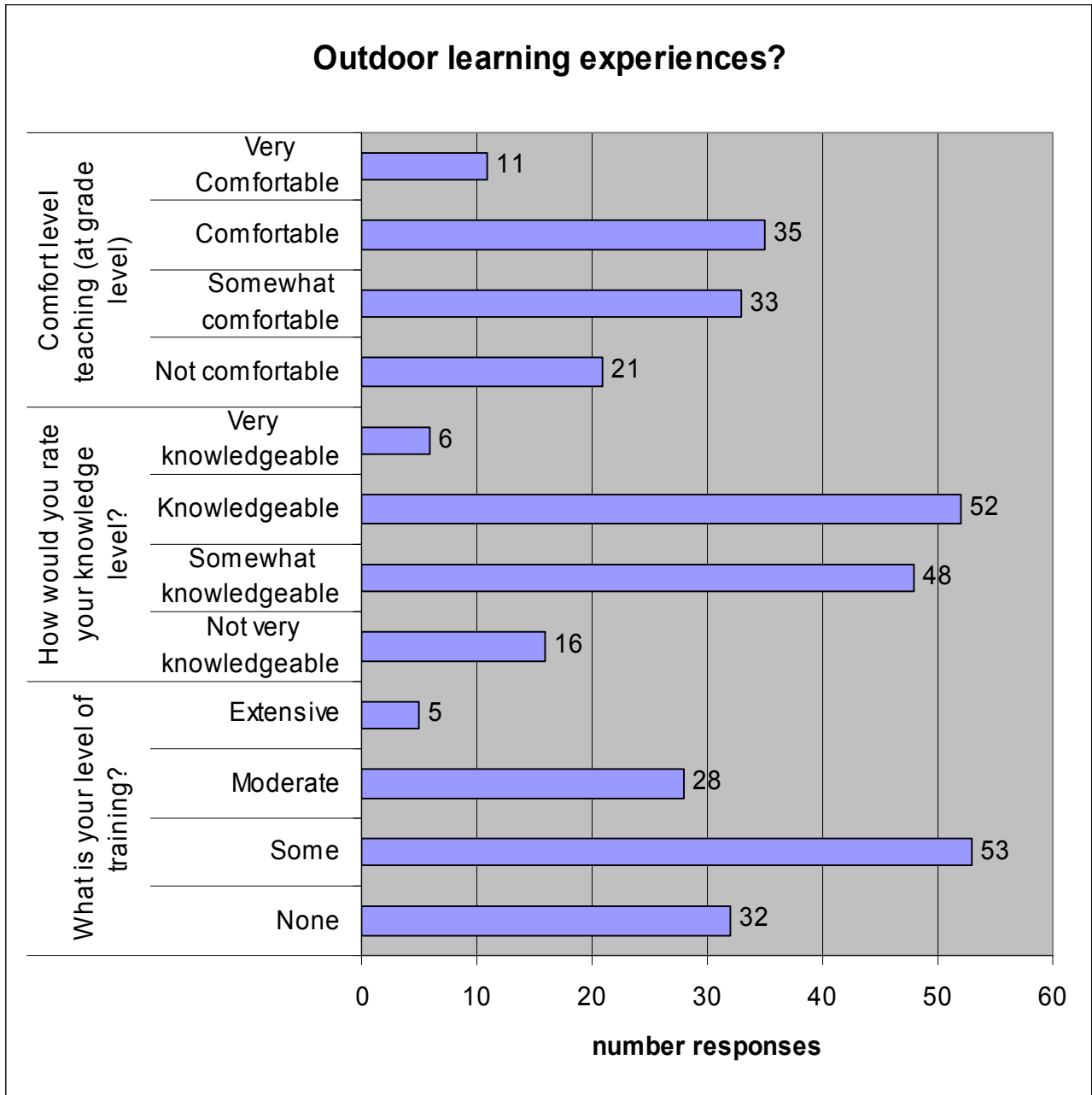
Inquiry-based teaching methods – Most respondents said they were comfortable using and considered themselves knowledgeable about inquiry-based teaching methods, but more than half indicated they had had “some” or no training.



Hands-on science teaching methods - The vast majority of respondents indicated they were comfortable or very comfortable teaching hands-on science and they were knowledgeable or very knowledgeable and they had at least some training – many had moderate or extensive training.



Outdoor learning experiences – The vast majority of respondents were comfortable or somewhat comfortable teaching outdoor learning experiences at their grade level and considered themselves knowledgeable or somewhat knowledgeable; most had some training.



2008 Iowa Educator Environmental Education Survey – Classroom Teacher Responses: Quantitative Analysis

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Background

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Emails explaining the survey and including a direct link to it were sent to Iowa school administrators, Area Education Agency Science Consultants, college and university teaching methods instructors, professional teaching organizations, county conservation board educational personnel, and subscribers to our email updates. The survey was available online for about two months in the fall of 2008. Three follow-up emails were sent to encourage participation.

Results

Survey results are presented in two sections. The first section examines survey responses by teachers in four grade level groupings: Grades Pre-K to 2 (n=178), Grades 3 to 5 (n=186), Grades 6 to 8 (n=167), and Grades 9 to 12 (n=291). The second section compares survey responses of science teachers (n=383) with non-science teachers (n=461). Differences in teacher responses to individual questions was determined by using the Chi-Square test for differences in nominal and ordinal level data and Analysis of Variance (ANOVA) for rating scale data.

The results of each question are summarized and important points and differences are pointed out. However, due to the large number of tables, all 82 tables were placed in Appendix A for reference purposes.

Differences by Grade Level

This analysis starts with the responses to the questions in the EE Educator Survey's second section dealing with teacher knowledge, comfort level, training and interest in teaching about environmental issues. Responses to the survey questions are shown in the tables listed in Appendix A.

EE Survey Section 2

Question #1 in this section asks teachers to rate their content knowledge in five areas. Tables 1 through 5 show the responses to the five content knowledge areas by grade level taught. The primary findings were:

- Teachers in grades 6-12 were more knowledgeable about life sciences and environmental issues than teachers in lower grades.
- High school teachers were less knowledgeable than other teachers about hands-on science teaching methods.

- Pre-K to 5th grade teachers were less knowledgeable about inquiry-based teaching methods and outdoor learning experiences than upper grade teachers.

Question #2 asked teachers to rate their comfort level in teaching five environmental science content areas (Tables 6-10). The primary findings were:

- Middle and high school teachers were more comfortable teaching life science and ecology, environmental issues, and hands-on science teaching methods than teachers in the lower grades.
- There were no differences in teaching comfort level by teachers across all grade levels with regard to teaching outdoor learning experiences and inquiry-based learning approaches.

Question #3 asked teachers to rate the level of formal training they had received in five environmental teaching areas (Tables 11-15). The primary findings were:

- High school and middle school teachers indicated they had received more extensive training in life science and ecology, environmental issues and hands-on science teaching methods than teachers in the lower grades.
- Teachers from different grade levels all rated their training for inquiry-based teaching methods and outdoor learning experiences the same.

Question #4 asked teachers to indicate which of four statements was representative of their interest in environmental issues (Table 16). The primary findings were:

- A large majority of teachers from all grade levels indicated they were “somewhat” or “interested” in environmental issues.
- Very few teachers reported they were “not interested” in environmental issues while 11% or less indicated they were “very interested” in environmental issues.
- Overall, pre-K to 5th Grade teachers were less interested in environmental issues than were middle and high school teachers.

EE Survey Section 3

There were 11 questions in this section of the survey which probed the extent of teaching involving nature and the outdoors, student learning styles, types of assessments used in the classroom.

Question #1 asked teachers to indicate which statement described how often they used natural areas and the outdoors in the learning process during their classes (Table 17). The primary findings were:

- Pre-K to 2nd Grade teachers used natural areas more frequently than teachers in other grade levels.
- Over one-fourth of middle and high school teachers did not use natural areas at all in their classes.
- Teachers in Grades 3-5 have a greater propensity to use natural areas in their teaching seasonally more often than middle and high school teachers.

Question #2 asked teachers to indicate how their curriculum linked to the outdoors, natural areas, and the local community (Tables 18-23). The primary findings were:

- Few teachers link their curriculum to the outdoors, local natural area, and the community.
- Middle and high school teachers tended to link their curriculum more frequently.
- About one-third of the teachers in all grade levels would like to link their curriculum to the outdoors but did not have the resources to do so.
- One-fourth of the teachers in all grade levels indicated they provided stand-alone activities using natural resources or the community for limited time.
- High school teachers were twice as likely as teachers in lower grades to work alone to design curriculum for specific natural areas while Pre-K to 5th Grade teachers were more apt to work in teams.
- Few teachers in each grade level adapted their curriculum based on student interests and involving contributions from the outdoors, natural environment or local community.

Question #3 asked teachers to identify the methods they used to work with other teachers to teach about the environment and nature (Tables 24-28). The primary findings were:

- Few teachers reported the absence of teaching anything about the environment or nature.
- Teachers in Grades 6-8 and 9-12 were the least likely to teach environmental content.
- High school teachers used didactic teaching methods more frequently than teachers in other grades.
- Teachers in Grades 3-5 were slightly more likely to work with other teachers to build an integrated environmental unit while only 9.3% of the high school teachers did so.
- Few teachers work consistently and frequently to design and facilitate units/projects that focus on the environment or nature.

Question #4 asked teachers to describe the style of teaching most widely used in their classroom (Table 29). The primary findings were:

- There were no differences in responses to the five learning modalities across the four grade level groupings.
- The predominant learning style was group work followed by learning facts about course content.
- Having students work alone on projects was not widely used by teachers in any grade level.

Question #5 shows the assessment techniques used most frequently in classrooms by teachers (Tables 30-34). The primary findings were:

- The most common assessment measure was through performance on projects, discussions and presentations by students. Well over half of the teachers used these techniques.
- Teachers in Grades 3 and up used these techniques with greater regularity than Pre-K-Grade 2 teachers.

- As would be expected, students in Grades 3-12 assessed their own work and used self-reflection with more frequency than Pre-K to Grade 2 students.
- About one-fourth of the teachers in each grade grouping used integrated activities to assess learning.
- Surprisingly, subject area tests were used by only 16% of the teachers overall. While the percentage ranged from 13% to 22%, the differences across grade levels were not statistically significant.
- Between 42% and 48% of the teachers in Grades 3-12 tested students on material covered in classroom lectures and discussions, assigned readings and homework. Only 11.8% of the teachers in the Pre-K to Grade 2 group tested in this manner.

Question #6 asks teachers about the environment and nature programs or units they use in their classroom (Table 35). The primary findings were:

- About one-third of the middle and high school teachers indicated they did not have programs or units that involved the environment or nature in their curriculum compared to an average of 20% by lower elementary and Pre-K teachers.
- Over 50% of the Pre-K to Grade 5 teachers indicated their environment/nature programs were “presentation-based” compared to 41% of the upper grade teachers.
- Very few teachers used community-based environment/nature programs integrated throughout subject areas with a systematic approach designed to develop environmental literacy and that actively evaluates quality of curriculum and instruction.

Question #7 asked teachers to indicate how many years they had taught about the environment in their classrooms (Table 36). The primary findings were:

- The majority of teachers in all grades had been teaching about the environment for three years or more.
- Nearly 80% of Pre-K to Grade 2 teachers had been teaching environmental topics three years or more compared to two-thirds of Grades 3-5 teachers and half of the middle and high school teachers.
- Only 5% of the Pre-K to Grade 2 teachers did not teach about the environment/nature while nearly 30% of the middle and high school teachers did not teach about the environment/nature.

Question #8 queried teachers about the amount of the school year spent teaching about the environment or undertaking nature studies in their classrooms (Table 37). The primary findings were:

- The percentage of teachers including environmental topics declined steadily across the grade levels from a high of 67% by Pre-K to Grade 2 teachers to a low of 48% by high school teachers.
- More than twice as many teachers in the middle and high school grades made no attempt to use environmental topics in their curriculum compared to teachers in the lower elementary grades.
- Few teachers in all grade levels spent one-third or more of the school year teaching environmental topics.

Question #9 asked teachers to estimate the proportion of teachers in their building that were involved in teaching nature studies or about the environment (Table 38). The primary findings were:

- Pre-K to Grade 5 teachers estimated that about 55% of the teachers in their buildings were involved in teaching environmental/nature studies. Upper grade teachers estimated that between 3% and 11.5% were involved in environmental/nature studies.
- 80% of the teachers in Grades 9-12 estimated that less than one-fourth of the teachers in their building were involved in environmental/nature studies.
- Very few teachers in all grade levels believed no teachers in their buildings were involved in environmental/nature studies.

Question #10 wanted teachers to estimate the number of students in their buildings that were involved in environmental or nature studies at the grade level they taught (Table 39). The primary findings were:

- Teachers in Pre-K to Grade 8 estimated that more than half of the students at their teaching grade level were involved in environmental or nature studies. But, teachers at the high school level estimated only 15% of the students were involved in environmental or nature studies.
- Most high school teachers believed less than one-fourth of the students were involved in environmental or nature studies.

Question #11 asked teachers to estimate the amount of instructional time spent on inquiry-based instructional strategies in their classroom (Table 40). The primary findings were:

- Between 40% and 48% of the teachers at all grade levels reported that inquiry-based instructional strategies were used less than one-fourth of the time.
- About 30% of the teachers indicated they used inquiry-based instructional strategies between one-fourth and one-half of the time.
- Relatively few teachers reported that they did not use inquiry-based instructional strategies.
- There were no significant differences in the proportion of using inquiry-based strategies across the four grade levels.

Question #12 was designed to have teachers rate the value of environmental or nature studies for improving or increasing various aspects of learning and social responsibility. The 14 statements were rated on a 4-point scale that included the following responses: no value, little value, valuable, and extremely valuable. Mean responses, based on the 4-point scale were calculated for teachers in each of the four grade levels. An F-test was used to determine if the ratings differed across grade level groups. Ratings for each statement are found in Table 41. The primary findings were:

- Nearly all teachers were in agreement that environmental or nature studies improved awareness of environmental issues. This sentiment was universal across teachers in all grade levels.
- There was also high value placed on environmental or nature studies improving student critical thinking skills and encouraging appreciation of stewardship for the natural world.

- Other statements receiving high value ratings included: increasing student motivation to learn, developing a sense of citizenship, improving skills to participate in environmental issues, and strengthening student involvement in solving community issues.
- Significant differences among teacher responses were found for six of the 14 statements.
- Teachers in Grades 3-5 rated the values expressed in five of these six statements higher than teachers in other grade levels.
- Teachers in Grades 3-5 gave higher value ratings for environmental or nature studies to develop a sense of citizenship, improving critical thinking and problem solving skills, increasing motivation to learn, strengthening student cooperation and communication skills, and improving student achievement on standardized tests.
- High school teachers gave lower value to increasing opportunities for involvement by families than the other three grade level groups.

Differences by Subject Taught

This analysis starts with the responses to the questions in the EE Educator Survey's second section dealing with teacher knowledge, comfort level, training and interest in teaching about environmental issues. Responses to the survey questions are compared by subject taught. Two groups were constructed for this analysis: teachers involved in Science-related courses and those involved in Non-Science courses. Results are shown in the tables presented in Appendix A.

EE Survey Section 2

Question #1 in this section asks teachers to rate their content knowledge in five areas. Tables 42 through 46 show the responses to the five content knowledge areas by subject area taught. The primary findings were:

- As would be expected, Science teachers were much more knowledgeable than Non-Science teachers about each of the environment-related content areas.
- The greatest differences were related to knowledge about life sciences and ecology, and hands-on science teaching methods.
- Smaller differences were seen between teaching groups with regard to knowledge about environmental issues, inquiry-based teaching methods and outdoor learning experiences.
- Few teachers in either group indicated they were “not very knowledgeable” about any of the five content areas.
- The differences between Science and Non-Science teachers were related to grade level. Elementary school teachers generally teach all subjects to their classes. Thus, the knowledge level of Non-Science teachers with teaching life sciences or outdoor learning experiences was not significantly different from elementary Science teachers. Middle and high school teachers generally teach classes in their specific specialty area and do not cross into other disciplines. As a result, the differences in knowledge level between Science and Non-Science teachers were very dramatic and accounted for the significant differences in Tables 46-50.

Question #2 asked teachers to rate their comfort level in teaching five environmental science content areas (Tables 47-51). The primary findings were:

- Science teachers were much more comfortable than Non-Science teachers when teaching all environmental and nature topics as would be expected.
- However, this finding, similar to that above, is somewhat misleading. The differences between Science and Non-Science teachers are related to grade level. Elementary school teachers generally teach all subjects to their classes. Thus, the comfort level of Non-Science teachers with teaching life sciences or outdoor learning experiences is not significantly different than elementary Science teachers. Middle and high school teachers generally teach classes in their specific specialty area and do not cross into other disciplines. As a result, the differences in comfort level between Science and Non-Science teachers were very dramatic and again accounted for the significant differences in Tables 46-50.

Question #3 asked teachers to rate the level of formal training they had received in five environmental teaching areas (Tables 52-56). The primary findings were:

- In all five tables, Science teachers rated their level of training in science-related topics in the “some” to “moderate” range as did Non-Science teachers, however, more Science teachers rated their training as “extensive” while more Non-Science teachers reported they had no training.
- These differences were also grade level specific as noted above. Subsequent analysis (not shown here) revealed that there were no differences in the training levels of elementary teachers where the majority of responses fell into the “some” and “moderate” categories. There were large differences between middle and high school Science and Non-Science teachers in their level of training in science teaching. A large majority of the upper grade Science teachers indicated they had “moderate” to “extensive” training in all areas, while Non-Science teachers reported “none” to “some” training.

Question #4 asked teachers to indicate which of four statements was representative of their interest in environmental issues (Table 57). The primary findings were:

- There was a small difference between Science and Non-Science teachers with regard to their interest in environmental issues.
- 85% of the Science teachers and 90% of the Non-Science teachers were either somewhat or moderately interested in environmental issues.
- Twice as many Science teachers reported being very interested in environmental issues compared to Non-Science teachers.

EE Survey Section 3

There were 11 questions in this section of the survey which probed the extent of teaching involving nature and the outdoors, student learning styles, types of assessments used in the classroom.

Question #1 asked teachers to indicate which statement described how often they used natural areas and the outdoors in the learning process during their classes (Table 58). The primary findings were:

- The main difference between Science and Non-Science teachers with regard to the use of natural resources is that about 10% more of the Non-Science teachers (25% vs. 14%) do not use natural areas in their teaching.
- Otherwise, Science teachers use natural areas or the outdoors only slightly more frequently than Non-Science teachers.

Question #2 asked teachers to indicate how their curriculum linked to the outdoors, natural areas, and the local community (Tables 59-64). The primary findings were:

- About twice as many Non-Science teachers (12% vs. 6%) indicated their curriculum had no linkages to the outdoors or community.
- Science teachers mentioned that they provided stand-alone activities and worked alone to design curriculum using the outdoors more frequently than Non-Science teachers.
- There were no differences in the percentage of Science and Non-Science teachers that reported would like to link their curriculum to the outdoors, natural areas and local community; work with teachers to design curriculum; and use curriculum adapted to student interest in the outdoors and environment.

Question #3 asked teachers to identify the methods they used to work with other teachers to teach about the environment and nature (Tables 65-69). The primary findings were:

- There were no differences between Science and Non-Science teachers regarding the methods they used to work with other teachers concerning the environment and nature.

Question #4 asked teachers to describe the style of teaching most widely used in their classroom (Table 70). The primary findings were:

- There were no differences between Science and Non-Science teachers in the student leaning methods used in their classroom.
- Group work and learning facts were the most common methods for both teaching groups.

Question #5 shows the assessment techniques used most frequently in classrooms by teachers (Tables 71-75). The primary findings were:

- Performance on projects, discussions and presentations, and classroom reading and materials tests were the most common form of assessment used by both Science and Non-Science teachers. A greater proportion of Science teachers used these assessment methods.
- Science teachers also used subject area tests more frequently (20%) than Non-Science teachers (12%).
- There were no differences in the use of self-assessments by students or what they learned in integrated studies.

Question #6 asks teachers about the environment and nature programs or units they use in their classroom (Table 76). The primary findings were:

- Nearly 40% of the Non-Science teachers did not use environmental or nature units in their classrooms compared to 16% of the Science teachers.
- Science teachers were more inclined to use environmental or nature units to supplement presentations or integrate them into other subject area.

Question #7 asked teachers to indicate how many years they had taught about the environment in their classrooms (Table 77). The primary findings were:

- Science teachers had been teaching much longer about the environment than Non-Science teachers as 71% of the Science teachers had been teaching three or more years.
- Half of the Non-Science teachers had taught about the environment three or more years, but 34% did not teach about the environment at all, compared to 8% of the Science teachers.

Question #8 queried teachers about the amount of the school year spent teaching about the environment or undertaking nature studies in their classrooms (Table 78). The primary findings were:

- Science teachers environmental topics most frequently in parts of different units (58%) or as a single instructional unit (23%), whereas 52% of Non-Science teachers integrated environmental topics into parts of their units or into a single instructional unit (14%).
- About one-fourth of the Non-Science teachers made no attempt to teach environmental topics, while only 5% of the Science teachers did not teach environmental topics.

Question #9 asked teachers to estimate the proportion of teachers in their building that were involved in teaching nature studies or about the environment (Table 79). The primary findings were:

- More than half of both Science and Non-Science teachers thought that less than one-fourth of the teachers in their buildings were involved with studies involving nature and the environment.
- There was not a difference in the amount of time devoted to teaching about the environment between Science and Non-Science teachers.

Question #10 wanted teachers to estimate the number of students in their buildings that were involved in environmental or nature studies at the grade level they taught (Table 80). The primary findings were:

- There were no differences between Science and Non-Science teacher estimates of students involved environmental or nature studies.
- Slightly more than 40% of the teachers in each subject area estimated that one-half of the students were involved in environmental or nature studies.

Question #11 asked teachers to estimate the amount of instructional time spent on inquiry-based instructional strategies in their classroom (Table 81). The primary findings were:

- Science teachers spent slightly more time on inquiry-based instructional strategies than Non-Science teachers. 46% of the Science teachers and 35% of the Non-Science teachers devoted one-fourth to three-fourths of their instructional time to inquiry-based strategies.
- About 14% of the Non-Science teachers and 6% of the Science teachers devoted no time to inquiry-based strategies.

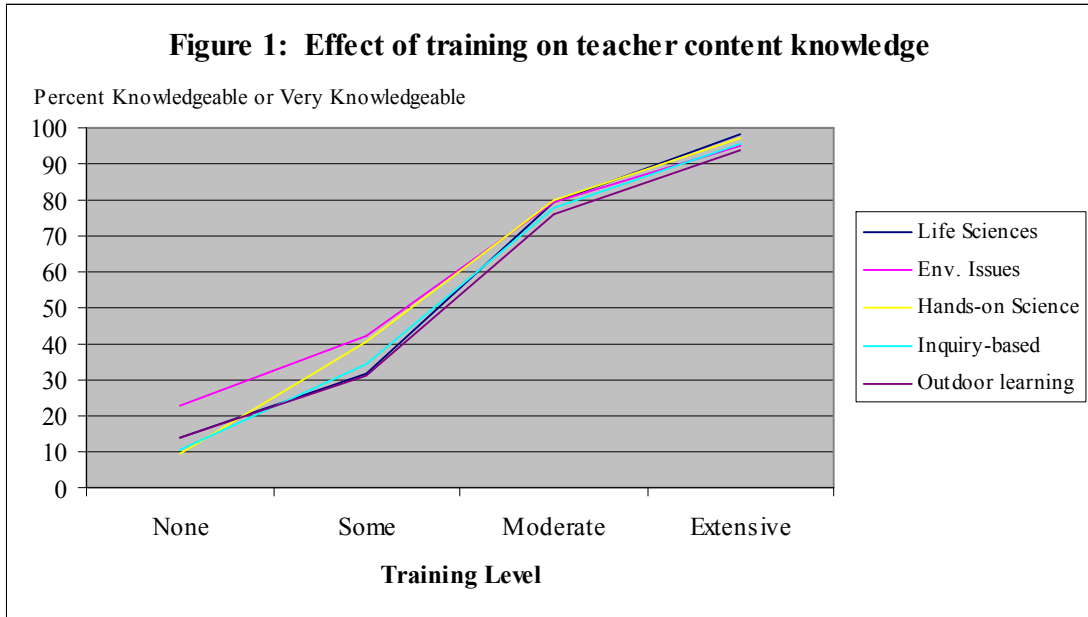
Question #12 was designed to have teachers rate the value of environmental or nature studies for improving or increasing various aspects of learning and social responsibility. The 14 statements were rated on a 4-point scale that included the following responses: no value, little value, valuable, and extremely valuable. Mean responses, based on the 4-point scale were calculated for teachers in each of the four grade levels. An F-test was used to determine if the ratings differed across grade level groups. Ratings for each statement are found in Table 82. The primary findings were:

- The lowest rated value of environmental and nature studies, increased student attendance and lowered truancy, was the only value rated differently by Science and Non-Science teachers. Non-Science teachers rated this value slightly higher (2.55 vs. 2.41) than Science teachers.
- Values rated highest by all teachers were: improved awareness of environmental issues, improved critical thinking and problem solving skills, encouraging an appreciation of stewardship for natural resources, increased motivation to learn, and developing a sense of citizenship.

Effects of Training

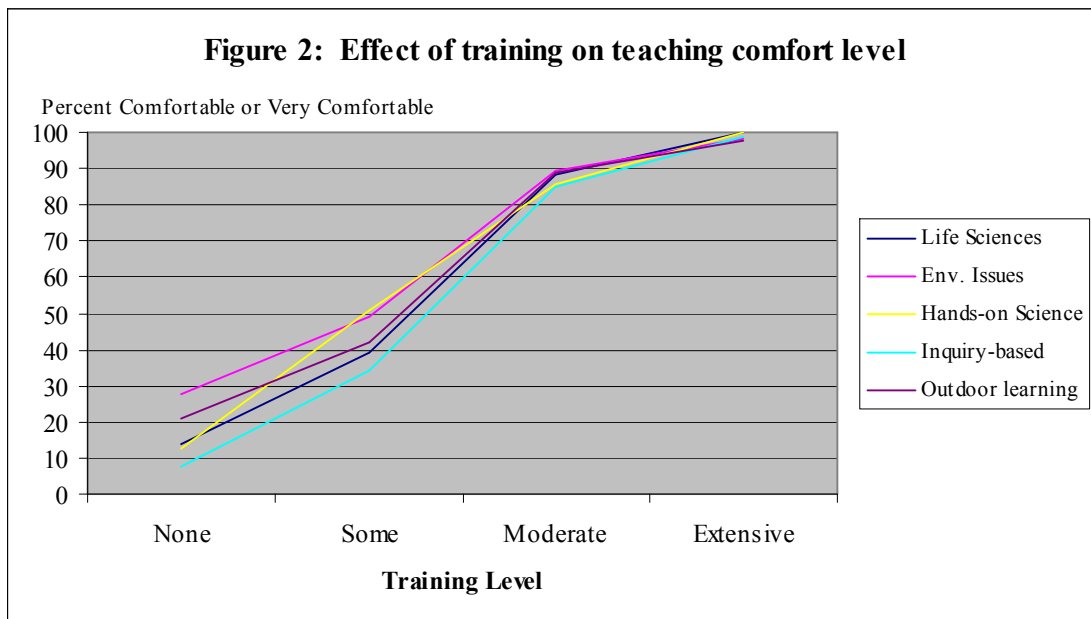
To assess the effects of training on teacher knowledge about the environment and comfort in teaching environmental or nature topics, an analysis of the relationship between teacher content knowledge about the five areas listed in Section 2, Question #1 was cross-tabulated with level of training in the same five areas (Section 2, Question 3). The knowledge level variable was constructed by combining the responses of teachers reporting they were either “knowledgeable” or “very knowledgeable”.

As seen in Figure 1, there was a very strong relationship between training and knowledge for all four content areas. That is, as teacher training increases from none to extensive, the percentage of teachers reporting they were knowledgeable or very knowledgeable went from around 20% to over 90% for all five content areas.



The same analysis was performed for teacher comfort in teaching the five content areas (Figure 2). Again, as training went from none to extensive, teaching comfort level increased from an average of 20% to well over 90% being comfortable or very comfortable.

The data in both figures underscores the value and importance of teacher training for improving the environmental knowledge and teaching comfort level of environmental topics. This was apparent for both Science and Non-Science teachers.



Conclusions

Many conclusions can be drawn from the 82 tables and two figures in this report. However, a few general conclusions are in order. First, there is a difference between teachers in the middle and high school grades and those in the lower elementary grades (Pre-K to Grade 5). Teachers in the upper grades are specialists and the extent of knowledge and comfort level associated with involving nature and the environment in classroom instruction is clearly related to teaching science-related courses. But, all lower elementary teachers must have a good general science background because they generally teach science units along with reading, math, and social studies along with other subjects. Thus, they must have some knowledge of the environment and nature. The point is that the needs of the two groups, in terms of training and support, may be much different.

Second, Science and Non-Science teachers both involve nature, the environment and the outdoors in their curriculum. This is particularly apparent with lower elementary teachers. The important factor in having nature and the environment integrated more widely into both science and non-science teachers' curriculum is training. The more extensive the training, the greater the probability that environmental and nature related topics and settings will become part of the teaching process.

Appendix A: Environmental Education Teacher Survey Data Tables

Grade Level Data Tables

Table 1: Teacher rating of knowledge of life sciences and ecology by grade level

Grade Level	Not Very Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable	Chi Square	P
Pre-K to 2	9.8	56.1	31.1	3.0	74.49	<.001
Grades 3 to 5	8.7	45.1	39.3	6.9		
Grades 6 to 8	12.3	31.5	40.1	16.0		
Grades 9 to 12	8.2	27.2	39.4	25.1		
Total	9.5	38.2	37.8	14.5		

Table 2: Teacher rating of knowledge of environmental issues by grade level

Grade Level	Not Very Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable	Chi Square	P
Pre-K to 2	7.3	57.9	31.7	3.0	63.64	<.001
Grades 3 to 5	5.2	44.8	46.0	4.0		
Grades 6 to 8	5.0	42.9	39.8	12.4		
Grades 9 to 12	4.0	28.4	50.0	17.6		
Total	5.1	41.3	43.1	10.4		

Table 3: Teacher rating of knowledge of hands-on science teaching methods by grade level

Grade Level	Not Very Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable	Chi Square	P
Pre-K to 2	3.0	36.4	49.7	10.9	34.79	<.001
Grades 3 to 5	9.2	28.3	50.3	12.1		
Grades 6 to 8	15.5	23.0	42.2	19.3		
Grades 9 to 12	14.9	31.2	35.9	18.1		
Total	11.2	29.9	43.4	15.5		

Table 4: Teacher rating of knowledge of inquiry-based teaching methods by grade level

Grade Level	Not Very Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable	Chi Square	P
Pre-K to 2	12.1	48.5	33.3	6.1	23.12	<.001
Grades 3 to 5	10.4	39.9	42.8	6.9		
Grades 6 to 8	11.9	30.0	42.5	15.6		
Grades 9 to 12	10.4	34.4	41.2	14.0		
Total	11.1	37.7	40.2	11.1		

Table 5: Teacher rating of knowledge of outdoor learning experiences by grade level

Grade Level	Not Very Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable	Chi Square	P
Pre-K to 2	7.9	53.9	33.3	4.8	29.68	<.001
Grades 3 to 5	14.5	43.6	34.9	7.0		
Grades 6 to 8	21.0	37.7	32.7	8.6		
Grades 9 to 12	17.6	33.7	36.2	12.5		
Total	15.6	41.0	34.6	8.9		

Table 6: Teacher rating of comfort level in teaching life sciences and ecology by grade level

Grade Level	Not Comfortable	Somewhat Comfortable	Comfortable	Very Comfortable	Chi Square	P
Pre-K to 2	5.5	38.7	42.9	12.9	44.90	<.001
Grades 3 to 5	11.0	29.1	46.5	13.4		
Grades 6 to 8	16.1	23.6	34.8	25.5		
Grades 9 to 12	16.3	24.6	31.5	27.5		
Total	12.8	28.4	38.0	20.9		

Table 7: Teacher rating of comfort level teaching environmental issues by grade level

Grade Level	Not Comfortable	Somewhat Comfortable	Comfortable	Very Comfortable	Chi Square	P
Pre-K to 2	5.5	36.4	46.1	12.1	19.60	.021
Grades 3 to 5	9.9	29.7	48.3	12.2		
Grades 6 to 8	9.3	28.6	40.4	21.7		
Grades 9 to 12	9.7	27.8	39.4	23.1		
Total	8.8	30.2	43.0	18.1		

Table 8: Teacher rating of comfort level in teaching hands-on science teaching methods by grade level

Grade Level	Not Comfortable	Somewhat Comfortable	Comfortable	Very Comfortable	Chi Square	P
Pre-K to 2	1.8	27.3	47.9	23.0	41.10	<.001
Grades 3 to 5	10.4	17.9	52.6	19.1		
Grades 6 to 8	15.0	19.4	35.0	30.6		
Grades 9 to 12	17.1	24.0	36.4	22.5		
Total	11.9	22.4	42.2	23.5		

Table 9: Teacher rating of comfort level in teaching inquiry-based learning approaches by grade level

Grade Level	Not Comfortable	Somewhat Comfortable	Comfortable	Very Comfortable	Chi Square	P
Pre-K to 2	11.6	38.4	39.6	10.4	9.13	.425
Grades 3 to 5	13.9	30.6	43.4	12.1		
Grades 6 to 8	13.1	29.4	38.1	19.4		
Grades 9 to 12	13.8	33.7	37.7	14.9		
Total	13.2	33.1	39.5	14.2		

Table 10: Teacher rating of comfort level in teaching outdoor learning experiences by grade level

Grade Level	Not Comfortable	Somewhat Comfortable	Comfortable	Very Comfortable	Chi Square	P
Pre-K to 2	6.1	36.4	44.2	13.3	16.58	.056
Grades 3 to 5	12.4	33.1	36.7	17.8		
Grades 6 to 8	16.1	33.5	34.2	16.1		
Grades 9 to 12	17.4	29.7	35.1	17.8		
Total	13.6	32.7	37.2	16.5		

Table 11: Teacher rating of level of training in life sciences and ecology by grade level

Grade Level	None	Some	Moderate	Extensive	Chi Square	P
Pre-K to 2	12.7	57.6	27.9	1.8	89.55	<.001
Grades 3 to 5	12.3	46.8	37.4	3.5		
Grades 6 to 8	11.1	42.6	29.6	16.7		
Grades 9 to 12	18.6	29.7	26.2	25.4		
Total	14.4	42.1	29.7	13.8		

Table 12: Teacher rating of level of training in environmental issues by grade level

Grade Level	None	Some	Moderate	Extensive	Chi Square	P
Pre-K to 2	20.1	58.5	20.7	0.6	43.87	<.001
Grades 3 to 5	22.2	40.9	33.9	2.9		
Grades 6 to 8	14.8	43.8	30.9	10.5		
Grades 9 to 12	16.5	38.7	33.3	11.5		
Total	18.2	44.5	30.3	7.1		

Table 13: Teacher rating of level of training in hands-on science teaching methods by grade level

Grade Level	None	Some	Moderate	Extensive	Chi Square	P
Pre-K to 2	4.2	46.1	38.2	11.5	47.80	<.001
Grades 3 to 5	7.6	35.5	48.8	8.1		
Grades 6 to 8	14.8	31.5	35.8	17.9		
Grades 9 to 12	19.9	35.9	29.3	14.9		
Total	12.8	37.0	36.9	13.3		

Table 14: Teacher rating of level of training in inquiry-based teaching methods by grade level

Grade Level	None	Some	Moderate	Extensive	Chi Square	P
Pre-K to 2	11.6	50.0	29.9	8.5	9.675	.378
Grades 3 to 5	15.1	42.4	33.7	8.7		
Grades 6 to 8	10.5	42.0	32.7	14.8		
Grades 9 to 12	15.5	45.3	27.7	11.5		
Total	13.5	45.0	30.5	11.0		

Table 15: Teacher rating of level of training in outdoor learning experiences by grade level

Grade Level	None	Some	Moderate	Extensive	Chi Square	P
Pre-K to 2	23.6	46.1	28.5	1.8	13.18	.155
Grades 3 to 5	27.9	37.2	30.2	4.7		
Grades 6 to 8	23.6	39.1	30.4	6.8		
Grades 9 to 12	27.2	38.7	25.4	8.6		
Total	25.9	40.0	28.2	5.9		

Table 16: Teacher interest in environmental issues by grade level

Grade Level	Not interested in environmental issues	Somewhat interested in environmental issues	Interested in environmental issues	Very interested in environmental issues	Chi Square	P
Pre-K to 2	2.5	62.0	30.7	4.9	31.48	<.001
Grades 3 to 5	5.3	50.9	33.9	9.9		
Grades 6 to 8	1.3	44.0	45.9	8.8		
Grades 9 to 12	2.6	39.1	46.9	11.4		
Total	2.9	47.6	40.3	9.2		

Table 17: Frequency of use of natural resources in teaching by grade level

Grade Level	Do not use natural areas	A few activities in natural areas	Use outdoor areas 1 - 5 days	Use natural areas seasonally	Use natural areas regularly	Chi Square	P
Pre-K to 2	6.2	48.6	8.2	24.7	12.3	56.82	<.001
Grades 3 to 5	12.6	49.1	12.6	23.3	2.5		
Grades 6 to 8	26.0	41.8	10.3	15.8	6.2		
Grades 9 to 12	28.6	33.6	11.8	16.4	9.5		
Total	19.9	41.8	10.9	19.5	7.9		

Table 18: Curriculum makes no link to outdoors, natural areas and community by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	96.1	3.9	10.37	.016
Grades 3 to 5	91.4	8.6		
Grades 6 to 8	86.8	13.2		
Grades 9 to 12	88.7	11.3		
Total	90.5	9.5		

Table 19: Would like to link curriculum to outdoors or local community... by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	76.4	23.6	7.24	.065
Grades 3 to 5	71.0	29.0		
Grades 6 to 8	65.3	34.7		
Grades 9 to 12	66.0	34.0		
Total	69.2	30.8		

Table 20: Provide stand-alone activities using natural resource areas by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	74.2	25.8	1.31	.726
Grades 3 to 5	71.0	29.0		
Grades 6 to 8	75.4	24.6		
Grades 9 to 12	75.3	24.7		
Total	74.1	25.9		

Table 21: Work alone to design curriculum for specific natural areas by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	87.6	12.4	17.76	<.001
Grades 3 to 5	87.6	12.4		
Grades 6 to 8	86.8	13.2		
Grades 9 to 12	75.9	24.1		
Total	83.3	16.7		

Table 22: Work with teams of teachers to design curriculum by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	85.4	14.6	10.92	.012
Grades 3 to 5	84.4	15.6		
Grades 6 to 8	88.6	11.4		
Grades 9 to 12	93.1	6.9		
Total	88.6	11.4		

Table 23: Curriculum adapted based on student interest and involves outdoors by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	88.8	11.2	4.36	.225
Grades 3 to 5	93.5	6.5		
Grades 6 to 8	92.2	7.8		
Grades 9 to 12	88.7	11.3		
Total	90.5	9.5		

Table 24: Teachers do not teach environmental content at all by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	98.9	1.1	21.60	<.001
Grades 3 to 5	96.2	3.8		
Grades 6 to 8	88.0	12.0		
Grades 9 to 12	90.7	9.3		
Total	93.2	6.8		

Table 25: Teachers primarily use didactic instruction by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	74.2	25.8	14.56	.002
Grades 3 to 5	69.4	30.6		
Grades 6 to 8	69.5	30.5		
Grades 9 to 12	58.4	41.6		
Total	66.5	33.5		

Table 26: Teachers work together for one integrated environmental unit by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	75.3	24.7	34.89	<.001
Grades 3 to 5	70.4	29.6		
Grades 6 to 8	77.2	22.8		
Grades 9 to 12	90.7	9.3		
Total	80.0	20.0		

Table 27: Teachers occasionally work together to design & facilitate units by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	68.5	31.5	4.32	.229
Grades 3 to 5	78.0	22.0		
Grades 6 to 8	74.3	25.7		
Grades 9 to 12	74.6	25.4		
Total	74.0	26.0		

Table 28: Teachers work together consistently & frequently to design units by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	97.8	2.2	4.54	.209
Grades 3 to 5	95.2	4.8		
Grades 6 to 8	97.6	2.4		
Grades 9 to 12	98.3	1.7		
Total	97.3	2.7		

Table 29: Style of learning used most widely in classroom by grade level

Grade Level	Learn using textbooks	Learn facts from course	Work alone on projects	Make oral presentations	Work in groups	Chi Square	P
Pre-K to 2	12.7	28.6	4.0	6.3	48.4	20.60	.057
Grades 3 to 5	17.0	32.0	4.8	12.2	34.0		
Grades 6 to 8	19.3	20.0	4.3	13.6	42.9		
Grades 9 to 12	17.0	31.5	7.2	12.8	31.5		
Total	16.7	28.5	5.4	11.6	37.8		

Table 30: Students assessed through performance on projects, discussions and presentations by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	47.8	52.2	13.40	.004
Grades 3 to 5	34.9	65.1		
Grades 6 to 8	29.9	70.1		
Grades 9 to 12	34.7	65.3		
Total	36.6	63.4		

Table 31: Students assess their own work by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	88.2	11.8	17.16	.001
Grades 3 to 5	78.0	22.0		
Grades 6 to 8	70.1	29.9		
Grades 9 to 12	78.7	21.3		
Total	78.8	21.2		

Table 32: Students assessed on what they learn in integrated activities by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	75.3	24.7	1.13	.771
Grades 3 to 5	73.1	26.9		
Grades 6 to 8	73.7	26.3		
Grades 9 to 12	77.0	23.0		
Total	75.1	24.9		

Table 33: Students assessed through subject area tests by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	86.0	14.0	7.49	.059
Grades 3 to 5	78.0	22.0		
Grades 6 to 8	83.8	16.2		
Grades 9 to 12	86.9	13.1		
Total	84.1	15.9		

Table 34: Students tested on material covered in classroom, reading and homework by grade level

Grade Level	No	Yes	Chi Square	P
Pre-K to 2	88.2	11.8	69.71	<.001
Grades 3 to 5	58.1	41.9		
Grades 6 to 8	55.1	44.9		
Grades 9 to 12	51.5	48.5		
Total	61.7	38.3		

Table 35: Describe the environmental/nature programs or units you use in your classroom by grade level

Grade Level	Not present	Presentation based	Integrated into subject areas	Community based integrated throughout subject areas	Chi Square	P
Pre-K to 2	17.9	58.2	20.1	3.7	18.32	.032
Grades 3 to 5	23.8	52.3	19.9	4.0		
Grades 6 to 8	36.8	41.2	19.1	2.9		
Grades 9 to 12	31.8	41.8	22.6	3.8		
Total	28.2	47.4	20.8	3.6		

Table 36: How many years have you taught about the environment in your classroom by grade level

Grade Level	Do not teach	Less than 1 year	1 year	2 years	3+ years	Chi Square	P
Pre-K to 2	5.0	6.4	2.9	6.4	79.3	49.90	<.001
Grades 3 to 5	16.4	7.2	3.9	4.6	67.8		
Grades 6 to 8	29.2	6.6	4.4	8.0	51.8		
Grades 9 to 12	29.9	7.4	2.9	7.0	52.9		
Total	21.5	7.0	3.4	6.5	61.5		

Table 37: Amount of school year spent teaching about the environment in classroom by grade level

Grade Level	No attempt	Used in parts of units	One week	One instructional unit	One-third of school year	Chi Square	P
Pre-K to 2	2.9	67.1	2.9	17.9	9.3	47.74	<.001
Grades 3 to 5	9.4	61.1	2.7	22.8	4.0		
Grades 6 to 8	20.0	51.4	4.3	20.0	4.3		
Grades 9 to 12	23.1	48.8	2.5	15.3	10.3		
Total	15.2	55.9	3.0	18.5	7.5		

Table 38: How many teachers in your building are involved in environmental/nature studies by grade level

Grade Level	None	Less than one-fourth	One-fourth to one-half	About one-half	More than one-half	Chi Square	P
Pre-K to 2	8.2	21.3	14.8	4.9	50.8	139.96	<.001
Grades 3 to 5	7.6	24.1	12.7	17.6	38.0		
Grades 6 to 8	8.0	51.7	20.7	8.0	11.5		
Grades 9 to 12	3.6	80.1	9.0	4.2	3.0		
Total	6.1	53.4	13.2	7.9	19.3		

Table 39: How many students in your building are involved in environmental/nature studies by grade level

Grade Level	None	Less than one-fourth	One-fourth to one-half	About one-half	More than one-half	Chi Square	P
Pre-K to 2	6.9	15.3	8.3	4.2	65.3	125.35	<.001
Grades 3 to 5	7.1	15.3	4.7	7.1	65.9		
Grades 6 to 8	13.2	16.5	6.6	5.5	58.2		
Grades 9 to 12	4.0	44.6	27.1	9.0	15.3		
Total	4.4	17.3	9.4	4.4	26.8		

Table 40: Amount of instructional time is spent on inquiry-based instructional strategies by grade level

Grade Level	Not used	Less than one-fourth	One-fourth to one-half	One-half to three-fourths	More than three-fourths	Chi Square	P
Pre-K to 2	9.5	40.9	33.6	10.2	5.8	17.00	.150
Grades 3 to 5	15.4	39.7	28.8	8.3	7.7		
Grades 6 to 8	5.7	40.7	31.4	15.7	6.4		
Grades 9 to 12	10.8	48.0	27.6	9.6	4.0		
Total	10.5	43.2	29.9	10.7	5.7		

Table 41: Rating the value of environmental/nature studies for the following: by grade level

Value	Pre-K to 2	Grades 3 to 5	Grades 6 to 8	Grades 9 to 12	Total	F	P
Develop a sense of citizenship	3.26	3.40	3.25	3.16	3.25	4.91	.002
Increase opportunities for family involvement	3.07	3.05	2.95	2.82	2.95	4.70	.003
Improve student critical thinking and problem solving skills	3.25	3.47	3.31	3.30	3.33	4.26	.005
Increase student motivation to learn	3.30	3.42	3.30	3.22	3.30	3.38	.018
Strengthen student cooperation and communication skills	3.17	3.30	3.17	3.11	3.17	3.24	.022
Improve student achievement on standardized tests	2.65	2.81	2.74	2.63	2.70	2.82	.038
Reduce behavioral problems	2.80	3.00	2.80	2.80	2.85	2.52	.057
Increase teacher enthusiasm	3.21	3.27	3.18	3.12	3.18	2.07	.103
Increase student attendance, lower truancy	2.45	2.57	2.50	2.41	2.47	1.46	.225
Improve skills to participate in environmental concerns or issues	3.16	3.27	3.21	3.22	3.22	0.92	.433
Encourage an appreciation of stewardship for natural world	3.28	3.37	3.38	3.30	3.33	0.89	.448
Increase community involvement	3.13	3.17	3.06	3.11	3.12	0.72	.539
Strengthen student involvement in solving community issues	3.15	3.24	3.22	3.23	3.21	0.64	.587
Improve awareness of environmental issues	3.34	3.39	3.38	3.39	3.38	0.23	.877

Subject Taught

Table 42: Teacher rating of knowledge of life sciences and ecology by subject area

Subject Area	Not Very Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable	Chi Square	P
Science	5.5	24.7	44.4	25.5	99.15	<.001
Non-Science	12.4	49.7	31.5	6.4		
Total	9.3	38.3	37.4	15.1		

Table 43: Teacher rating of knowledge of environmental issues by subject area

Subject Area	Not Very Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable	Chi Square	P
Science	4.4	33.0	46.4	16.2	29.88	<.001
Non-Science	5.5	48.0	39.8	6.7		
Total	5.0	41.2	42.8	11.0		

Table 44: Teacher rating of knowledge of hands-on science teaching methods by subject area

Subject Area	Not Very Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable	Chi Square	P
Science	2.7	22.5	50.5	24.2	93.00	<.001
Non-Science	18.5	36.3	36.0	9.2		
Total	11.3	30.0	42.7	16.1		

Table 45: Teacher rating of knowledge of inquiry-based teaching methods by subject area

Subject Area	Not Very Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable	Chi Square	P
Science	4.7	32.5	46.6	16.3	49.68	<.001
Non-Science	16.1	42.0	34.9	7.1		
Total	10.9	37.7	40.2	11.3		

Table 46: Teacher rating of knowledge of outdoor learning experiences by subject area

Subject Area	Not Very Knowledgeable	Somewhat Knowledgeable	Knowledgeable	Very Knowledgeable	Chi Square	P
Science	10.4	42.3	36.3	11.0	13.95	.003
Non-Science	19.7	40.1	31.9	8.3		
Total	15.5	41.1	33.9	9.5		

Table 47: Teacher rating of comfort level in teaching life sciences and ecology by subject area

Subject Area	Not Comfortable	Somewhat Comfortable	Comfortable	Very Comfortable	Chi Square	P
Science	3.3	18.0	43.4	35.4	140.51	<.001
Non-Science	21.3	36.8	32.2	9.7		
Total	13.1	28.2	37.3	21.4		

Table 48: Teacher rating of comfort level in teaching environmental issues by subject area

Subject Area	Not Comfortable	Somewhat Comfortable	Comfortable	Very Comfortable	Chi Square	P
Science	3.6	23.9	45.1	27.5	60.61	<.001
Non-Science	13.6	34.9	40.6	10.9		
Total	9.0	29.9	42.7	18.4		

Table 49: Teacher rating of comfort level in teaching hands-on science teaching methods by subject area

Subject Area	Not Comfortable	Somewhat Comfortable	Comfortable	Very Comfortable	Chi Square	P
Science	1.9	14.6	50.0	33.5	113.34	<.001
Non-Science	20.9	29.0	33.9	16.2		
Total	12.2	22.4	41.3	24.2		

Table 50: Teacher rating of comfort level in teaching inquiry-based learning approaches by subject area

Subject Area	Not Comfortable	Somewhat Comfortable	Comfortable	Very Comfortable	Chi Square	P
Science	5.2	28.0	45.9	20.9	65.76	<.001
Non-Science	20.4	37.1	33.4	9.0		
Total	13.5	33.0	39.1	14.5		

Table 51: Teacher rating of comfort level in teaching outdoor learning experiences by subject area

Subject Area	Not Comfortable	Somewhat Comfortable	Comfortable	Very Comfortable	Chi Square	P
Science	6.9	32.8	39.1	21.2	30.32	<.001
Non-Science	19.3	33.3	33.7	13.7		
Total	13.6	33.0	36.2	17.2		

Table 52: Teacher level of formal training in life sciences and ecology by subject area

Subject Area	None	Some	Moderate	Extensive	Chi Square	P
Science	6.3	32.2	34.7	26.7	127.88	<.001
Non-Science	21.1	50.2	25.2	3.4		
Total	14.4	42.1	29.5	14.0		

Table 53: Teacher level of formal training in environmental issues by subject area

Subject Area	None	Some	Moderate	Extensive	Chi Square	P
Science	11.3	37.0	38.1	13.5	72.30	<.001
Non-Science	24.3	49.5	23.9	2.3		
Total	18.4	43.9	30.3	7.4		

Table 54: Teacher level of formal training in hands-on science teaching methods by subject area

Subject Area	None	Some	Moderate	Extensive	Chi Square	P
Science	2.5	34.2	41.6	21.8	93.61	<.001
Non-Science	22.4	38.0	32.3	7.4		
Total	13.3	36.3	36.5	13.9		

Table 55: Teacher level of formal training in inquiry-based teaching methods by subject area

Subject Area	None	Some	Moderate	Extensive	Chi Square	P
Science	6.1	40.2	37.7	16.0	54.50	<.001
Non-Science	19.5	48.5	24.8	7.1		
Total	13.4	44.7	30.7	11.2		

Table 56: Teacher level of formal training in outdoor learning experiences by subject area

Subject Area	None	Some	Moderate	Extensive	Chi Square	P
Science	16.3	44.6	30.0	9.1	37.26	<.001
Non-Science	34.2	35.6	26.1	4.1		
Total	26.0	39.7	27.9	6.4		

Table 57: Teacher interest in environmental issues by subject area

Subject Area	Not interested in environmental issues	Somewhat interested in environmental issues	Interested in environmental issues	Very interested in environmental issues	Chi Square	P
Science	2.0	44.4	40.7	12.9	11.36	.010
Non-Science	3.5	50.1	39.8	6.6		
Total	2.8	47.5	40.2	9.5		

Table 58: Teacher frequency of use of natural resources in teaching by subject area

Subject Area	Do not use natural areas	A few activities in natural areas	Use outdoor areas 1 - 5 days	Use natural areas seasonally	Use natural areas regularly	Chi Square	P
Science	14.4	43.4	14.1	19.9	8.2	16.86	.002
Non-Science	25.1	40.3	8.2	18.5	7.9		
Total	20.1	41.7	10.9	19.2	8.1		

Table 59: Teacher make no link curriculum to outdoors by subject area

Subject Area	No	Yes	Chi Square	P
Science	94.0	6.0	9.86	.002
Non-Science	87.6	12.4		
Total	90.5	9.5		

Table 60: Teacher would like to link curriculum to outdoors or local community by subject area

Subject Area	No	Yes	Chi Square	P
Science	70.2	29.8	3.56	.551
Non-Science	68.3	31.7		
Total	69.2	30.8		

Table 61: Teachers provide stand-alone activities using natural resource areas by subject area

Subject Area	No	Yes	Chi Square	P
Science	69.2	30.8	9.08	.003
Non-Science	78.3	21.7		
Total	74.2	25.8		

Table 62: Teachers work alone to design curriculum for specific natural areas by subject area

Subject Area	No	Yes	Chi Square	P
Science	77.8	22.2	13.73	<.001
Non-Science	87.4	12.6		
Total	83.1	16.9		

Table 63: Teachers work with teams of teachers to design curriculum by subject area

Subject Area	No	Yes	Chi Square	P
Science	87.2	12.8	1.66	.198
Non-Science	90.0	10.0		
Total	88.7	11.3		

Table 64: Teachers use curriculum based on student interest and involves outdoors by subject area

Subject Area	No	Yes	Chi Square	P
Science	89.3	10.7	0.99	.319
Non-Science	91.3	8.7		
Total	90.4	9.6		

Table 65: Teachers do not teach environmental content at all by subject area

Subject Area	No	Yes	Chi Square	P
Science	91.4	8.6	3.33	.068
Non-Science	94.6	5.4		
Total	93.1	6.9		

Table 66: Teachers primarily use didactic instruction by subject area

Subject Area	No	Yes	Chi Square	P
Science	64.0	36.0	1.97	.161
Non-Science	68.5	31.5		
Total	66.5	33.5		

Table 67: Teachers work together for one integrated environmental unit by subject area

Subject Area	No	Yes	Chi Square	P
Science	81.5	18.5	0.57	.451
Non-Science	79.4	20.6		
Total	80.3	19.7		

Table 68: Teachers occasionally work together to design and facilitate units by subject area

Subject Area	No	Yes	Chi Square	P
Science	72.1	27.9	1.27	.259
Non-Science	75.5	24.5		
Total	73.9	26.1		

Table 69: Teachers work together consistently and frequently to design units by subject area

Subject Area	No	Yes	Chi Square	P
Science	97.1	2.9	0.02	.964
Non-Science	97.2	2.8		
Total	97.2	2.8		

Table 70: Teacher style of learning used most widely in classroom by subject area

Subject Area	Learn using textbooks	Learn facts from course	Work alone on projects	Make oral presentations	Work in groups	Chi Square	P
Science	17.1	29.7	4.2	10.3	38.7	4.2	0.383
Non-Science	15.7	27.2	7.0	13.2	36.8		
Total	16.4	28.4	5.7	11.9	37.7		

Table 71: Students assessed through performance on projects, discussions and presentations by subject area

Subject Area	No	Yes	Chi Square	P
Science	32.1	67.9	6.11	.013
Non-Science	40.3	59.7		
Total	36.6	63.4		

Table 72: Students assess their own work by subject area

Subject Area	No	Yes	Chi Square	P
Science	77.8	22.2	0.63	.427
Non-Science	80.0	20.0		
Total	79.0	21.0		

Table 73: Students assessed on what they learn in integrated activities by subject area

Subject Area	No	Yes	Chi Square	P
Science	72.1	27.9	3.79	.051
Non-Science	77.9	22.1		
Total	75.2	24.8		

Table 74: Students assessed through subject area tests by subject area

Subject Area	No	Yes	Chi Square	P
Science	79.6	20.4	9.38	.002
Non-Science	87.4	12.6		
Total	83.9	16.1		

Table 75: Students tested on material covered in classroom, reading and homework by subject area

Subject Area	No	Yes	Chi Square	P
Science	53.8	46.2	17.03	<.001
Non-Science	67.7	32.3		
Total	61.4	38.6		

Table 76: Describe the environmental/nature programs or units you use in your classroom by subject area

Subject Area	Not present	Presentation based	Integrated into subject areas	Community based integrated throughout subject areas	Chi Square	P
Science	16.4	55.8	24.0	3.8	43.45	<.001
Non-Science	39.0	39.2	17.7	4.1		
Total	28.4	47.0	20.6	4.0		

Table 77: How many years have you taught about the environment in your classroom by subject area

Subject Area	Do not teach	Less than 1 year	1 year	2 years	3+ years	Chi Square	P
Science	8.0	8.0	4.0	8.6	71.3	72.17	<.001
Non-Science	34.7	6.0	2.7	4.4	52.2		
Total	22.2	7.0	3.3	6.4	61.2		

Table 78: Amount of school year spent teaching about the environment in classroom by subject area

Subject Area	No attempt	Used in parts of units	One week	One instructional unit	One-third of school year	Chi Square	P
Science	5.6	58.9	2.2	23.5	9.7	51.54	<.001
Non-Science	24.0	52.8	3.5	14.0	5.7		
Total	15.5	55.7	2.9	18.4	7.5		

Table 79: How many teachers in your building are involved in environmental/nature studies by subject area

Subject Area	None	Less than one-fourth	One-fourth to one-half	About one-half	More than one-half	Chi Square	P
Science	5.6	57.9	9.1	7.6	19.8	6.41	.170
Non-Science	6.2	50.0	17.1	8.6	18.1		
Total	5.9	53.8	13.3	8.1	18.9		

Table 80: How many students in your building are involved in environmental/nature studies by subject area

Subject Area	None	Less than one-fourth	One-fourth to one-half	About one-half	More than one-half	Chi Square	P
Science	5.9	30.8	13.6	5.9	43.9	3.37	.497
Non-Science	7.8	26.3	17.5	7.8	40.6		
Total	6.8	28.5	15.5	6.8	42.2		

Table 81: Amount of instructional time is spent on inquiry-based instructional strategies by subject area

Subject Area	Not used	Less than one-fourth	One-fourth to one-half	One-half to three-fourths	More than three-fourths	Chi Square	P
Science	6.6	41.1	32.4	13.8	6.0	17.39	.002
Non-Science	13.8	45.5	27.9	7.6	5.1		
Total	10.4	43.4	30.1	10.5	5.6		

Table 82: Rate the value of environmental/nature studies for the following by subject area

Value	Science	Non-Science	F	P
Increase student attendance, lower truancy	2.41	2.55	5.97	.015
Improve awareness of environmental issues	3.42	3.35	2.74	.098
Improve skills to participate in environmental concerns or issues	3.26	3.20	1.94	.164
Encourage an appreciation of stewardship for natural world	3.37	3.31	1.31	.252
Reduce behavioral problems	2.81	2.88	1.30	.254
Increase opportunities for family involvement	2.92	2.98	1.28	.258
Increase community involvement	3.10	3.15	1.02	.312
Improve student critical thinking and problem solving skills	3.36	3.32	0.72	.395
Improve student achievement on standardized tests	2.72	2.67	0.63	.427
Develop a sense of citizenship	3.24	3.27	0.59	.442
Increase teacher enthusiasm	3.21	3.17	0.56	.453
Strengthen student cooperation and communication skills	3.17	3.18	0.07	.790
Increase student motivation to learn	3.29	3.30	0.03	.854
Strengthen student involvement in solving community issues	3.22	3.21	0.03	.873