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Teacher Perspectives on Environmental Education Programs Provided By Eastern Kentucky University Division of Natural Areas

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TEACHER PERSPECTIVES ON ENVIRONMENTAL EDUCATION PROGRAMS PROVIDED BY EASTERN KENTUCKY UNIVERSITY DIVISION OF NATURAL AREAS

BY

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MAHALA WATTS

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ABSTRACT

A goal of environmental education (EE) is to help instill environmental stewardship in students for the future. Hungerford and Volk (1990) believe environmental stewardship is changing behaviors, values, or beliefs related to human-environment interaction. It is important for people to learn about environmental concepts at a young age, so they will care about them in the future. Eastern Kentucky University's (EKU) Division of Natural Areas has been conducting EE programming for students K-12 for the past 13 years. The areas utilized for EE programming include Maywoods Environmental and Educational Laboratory in Garrard County, KY or Lilley Cornett Woods Appalachian Ecological Research Station in Letcher County, KY. Over the years, the curriculum has been updated to improve student engagement and meet the Next Generation Science Standards. The current facilitation of EE programs does not include an assessment of teachers' perceptions. The purpose of this project is to assess the perceptions of teachers whose classes participate in the EE programs at EKU's Natural Areas. After students visited and participated in EE programs, their teachers were emailed a survey to assess their perceptions of the EE programs. For instance, if the teachers believe the programs fit into school curriculum, if the teachers feel as if the station leaders were prepared and knowledgeable of the material taught, and if the teachers have any suggestions on changes or improvements to the programs. The results from the survey were positive, but some results suggest EE programming could be improved in some areas. For instance, providing interdisciplinary EE lessons or having more dates for teachers to choose from could be improvements made. The next steps in this research

project could be to continue surveying teachers over several semesters and years, and to evaluate the effect of programming on the students.

Keywords: Environmental Education, Teacher Evaluation, Next Generation Science Standards

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Introduction

Since 2006, Eastern Kentucky University (EKU) Division of Natural Areas (DNA) has worked with various schools and organizations to provide environmental education (EE) lessons and activities for students and participants at various events. In the beginning, programs included DNA faculty and staff going into schools and provide EE lessons and activities for students. The purpose was to show teachers how to teach current curriculum in the outdoors. An example of this might be teaching math outside. Scheduling was at the convenience of the teachers. DNA then created an Activities Menu with set activities they could provide to the classes. This scheduling was still at the teachers' convenience. Eventually, schools began going out to the natural areas for the programming rather than DNA going into schools. When the Next Generation Science Standards (NGSS) came about and Kentucky adopted them into their science standards in 2013 (Next Generation Science Standards, 2018), DNAs' program content began to align with those standards in order to be appealing to teachers. The content was developed to have an overall theme and phenomenon questions specific to each grade level instead of teachers picking activities from an Activities Menu. Scheduling changed to dates only on Tuesdays and Thursday during the week. DNA schedules the dates and sends them out to the teachers to choose from. The teacher perspectives of the current EE school group programming provided by EKU Division of Natural Areas has not been systematically evaluated or incorporated into programmatic decisions.

With the increased technology use and other societal changes, Richard Louv (2005) believes kids are suffering from a Nature-Deficit Disorder. In his book *Last Child in the Woods: Saving Our Children from Nature Deficit Disorder* (2005), Louv talks about how nature play is becoming criminalized and how children need nature in their lives to be healthier and happier. Environmental education programs are a way to help alleviate the problem outlines by Louv.

Parks, schools, zoos, non-formal learning centers, youth-serving organizations, nature centers, camps, and museums are the usual places that implement EE programming. These programs seek to change the learners' participatory, cognitive, and affective skills, knowledge, and behavior (Carleton-Hug and Hug, 2010). However, a majority of these EE programs have not incorporated systemic, high-quality, evaluation into their programming even though there is potential to do so (Jacobson and McDuff, 1997; Norris and Jacobson, 1998). Evaluation can provide valuable insights in order to improve EE programming. Improved EE programming can then potentially influence human impacts on the environment (Carleton-Hug and Hug, 2010).

The questions this study seeks to answer are:

1. What are teacher perceptions of the environmental education programs provided by EKU Division of Natural Areas?
2. What suggestions do the teachers have in order to improve the programs?
3. What barriers might the teachers have that could prevent them from coming to the programs in the future?

The aimed audience of this study is for people working within environmental education who are seeking to improve their programs.

Research

Literature Review

Some definitions are needed to clarify and focus this study. The following definitions are used throughout the study.

Environmental Education: A process that creates awareness and understanding of the relationship between humans and their many environments – natural, man-made, cultural, and technological. It is concerned with knowledge, values, and attitudes, and has as its aim responsible environmental behavior (NEEAC, 1996).

Environmental Educator: any world citizen who uses information and educational processes to help people analyze the merits of the many varied points of view usually present on a given environmental issue (CSMEE, 1977).

Evaluation: the systematic assessment of the operation and/or the outcomes of a program or policy, compared to a set of explicit or implicit standards, as a means of contributing to the improvement of the program or policy (Weiss, 1998).

Next Generation Science Standards (NGSS): K-12 science content standards. The NGSS is a set of up-to-date, research-based science standards that give local educators the flexibility to plan classroom learning experiences that arouse students' interests in science and prepares them for college, careers, and citizenship (NGSS Lead States, 2013).

Crosscutting Concepts: These concepts are a dimension of the NGSS and they help to make connections across four sections of science: Physical Science, Life, Science, Earth and Space Science, and Engineering Design (NGSS Lead States, 2013).

Science and Engineering Practices: These practices are a dimension of the NGSS and they describe what scientists do in order to investigate the natural world and what engineers do to create and build systems. Students use these practices to aid in their knowledge of core ideas and the crosscutting concepts (NGSS Lead States, 2013).

Disciplinary Core Ideas: These core ideas are a dimension of the NGSS and they are the ideas in science that have broad importance within or across multiple science or engineering disciplines (NGSS Lead States, 2013).

The research questions were created to identify teacher perceptions of environmental education school group programming at DNA. Therefore, the review of the related literature is best presented in four themes: environmental education history, incorporating environmental education into content, environmental education barriers including teacher attitudes, and evaluating environmental education based programs.

Environmental Education History

Environmental education began in the 1700's, when Jean-Jacques Rousseau believed education should focus on the environment, and that EE goals should incorporate into school curriculum (McCrea, 2006). In his novel Emile, published in 1762, he called for everyone to return to nature and instead of memorizing science facts, they should discover information themselves (North American Association for

Environmental Education, 2019). In the 1800's, many writings were published discussing the human relationship with nature. Some of these writings include *Nature* (1836) by Ralph Waldo Emerson, *Walden* (1854) by Henry David Thoreau, and *Man and Nature* (1864) by George Perkins Marsh. In 1883, Sir Patrick Geddes held the first Summer Meeting of Art and Science. These meetings were to help teachers teach natural sciences and encourage students to learn by doing (North American Association for Environmental Education, 2019).

John Muir and Enos Mills promoted nature as renewal, recreation and comfort in the early 1900's with their writings and public speeches. Meanwhile, Liberty Hyde Bailey, the first president of the American Nature Study Society, rejects the term "environmental education"(North American Association for Environmental Education, 2019), thinking it would constantly need to be explained. One of his students, Anna Botsford Comstock, published the *Handbook of Nature Study* in 1911, which is still in use today (Comstock, 2010). The idea of EE appeared again during ~~T~~he "Dust Bowl" era in America, which gave rise to the conservation education movement of the 1930's. In John Dewey's Experience and Nature (Dewey, 2018), he promotes many aspects of EE, such as learning by doing, integrated and interdisciplinary efforts, and lifelong learning (North American Association for Environmental Education, 2019).

The first public professional use of the term "environmental education" was used at the Conference for the Established of International Union for the Protection of Nature in 1948. A year later, Aldo Leopold published *A Sand County Almanac* (1949). Leopold discussed the relationship between the environment and people and

established a basis for environmental movements in the 1960's and 1970's. The American people became more aware of a deteriorating environment and some of the cause of the deterioration due to Rachel Carson's publication of *Silent Spring* (Carson, 2002). In 1969, *The Journal of Environmental Education* began and in its first edition, Dr. William Stapp and his students publish a definition of "environmental education" (North American Association for Environmental Education, 2019).

In the late 1960's, national policies that directly address EE came into existence. President Richard Nixon signed the *National Environmental Policy Act* of 1969 into law. That same year, he signed the *Clean Air Act.* The *National Environmental Education Act of 1970* authorized the establishment of a domestic grant program, the establishment of a National Advisory Council for EE and the creation of an Office of Environmental Education in the U.S Department of Health, Education and Welfare (North American Association for Environmental Education, 2019). The creation of a professional association for environmental educators occurred in 1971, the National Association for Environmental Education, which is now known as the North American Association for Environmental Education (NAAEE). NAAEE promotes EE and supports the work of people who engage with EE through teaching, research, and service (North American Association for Environmental Education, 2019). In Belgrade, Yugoslavia, 1975, The Belgrade Charter was developed at the International Workshop on Environmental Education. The charter defined goals, objectives, audiences, and guiding principles of EE. The next year, the development of EE curricula began. These curricula included Project Learning Tree, Project WILD, Project WET, and Windows on

the Wild. In 1976, the Kentucky Association of Environmental Education, or KAEE became the first state affiliate of NAAEE. KAEE helps to represent everyone who understands that citizens should be making knowledgeable decisions concerning the environment (Kentucky Association of Environmental Education, 2019).

In his essay "Two Hats" (1977), John Hug argues that environmental educators should remain neutral and present all sides of a situation in order to let students develop their own conclusions. That same year, the world's first Intergovernmental Conference on Environmental Education was held in Tbilisi, Georgia. This is where The Tbilisi Declaration came into existence, which remains the most widespread accepted statement and definition of EE. Congress passed the National Environmental Education Act in 1990, creating the Office of Environmental Education in the U.S. Environmental Protection Agency (McCrea, 2006). In 1993, NAAEE starts the *National Project for Excellence in Environmental Education* which offers guidelines for the development and assessment of EE materials as well as benchmarks for students and teacher knowledge. Five years later, the State Education and Environmental Roundtable releases *Closing the Achievement Gap: Using the Environmental as an Integrating Context for Learning* in 1998. This was the first comprehensive analysis of the efficacy of using the environment for learning (North American Association for Environmental Education, 2019).

In 2005, Richard Louv's, *Last Child in the Woods* awakens the EE movement*: Saving Our Children from Nature-Deficit Disorder.* Louv discusses the causes and consequences of many modern illnesses found in society. The *No Child Left Inside Act*

passed in 2008 by the United States House of Representatives. This legislation was supported by the No Child Left Inside Coalition which represents more than 50 million people. In 2014, the NAAEE reviewed the State Environmental Literacy Plans (ELPs). NAAEE found 13 states have completed Environmental Literacy Plans (ELPs) adopted by state governments and departments of education, four states have ELPs that have been adopted but not implemented, 12 states have ELPs that have not been adopted, 18 states are planning and writing their ELPs, and four states have not begun developing ELPs. The *Every Child Succeeds Act*, which supports opportunities of EE and hands-on, field based learning experiences, replaced *No Child Left Behind* in 2015 (North American Association for Environmental Education, 2019).

Incorporating Environmental Education into Content

One goal of EE is to help instill environmental stewardship into the students for the future (Hungerford and Volk, 1990). Hungerford and Volk (1990) believe that environmental stewardship is changing behaviors, values, or beliefs related to human-environment interaction. In today's society, there is increase in the extent to which citizens make decisions, either directly or indirectly, that affect their environment (Hungerford and Volk, 1990). It is important for people to learn at young age about these environmental concepts, so they will care about them in the future. EE programs seek to give students a positive experience with nature, thus creating a positive view of the environment, and ideally, a desire to protect it in some way.

Because EE is not a formal discipline, it has not been a part of the formal education system (Heimlich, 2002). However, schools and leaders within EE have been

working together in order to develop curriculum-based programs. Formal educators are working with non-formal educators because of their experience and their access to resources (Castelli, 2004). Furthermore, EE programs and public schools' relationship increased at the state-level when the Next Generation Science Standards (NGSS) were revised in 2013 (Cagle, 2018). The purpose of NGSS is to emphasize the development of skills students need to contribute to solutions to challenges within this century. These skills include solutions to the problems related to the environment and sustainability, is the purpose of NGSS (NEEF, 2019). In order to help teachers not trained in EE, various organizations offer free downloadable resources. An example of this is BEETLES (Better Environmental Education, Teaching, Learning & Expertise Sharing). BEETLES offers resources that support teachers with science explanations, instructions, and templates to help implement EE lessons (Cagle, 2018). This organization provides resources for program leaders, field instructors and classroom teachers. BEETLES resources can be found here: http://beetlesproject.org/resources/.

EE is also a very diverse field. Teaching EE through science curriculum is not the only option. EE is taught in many different subjects, including civics education, social studies, English, math, and reading. It can even be integrated across multiple subjects (Carleton-Hug and Hug, 2010; Cermak, 2012). For example, Cermak (2012) used poetry as an outlet for his study to understand EE. The students were able to develop their poetry skills, while simultaneously becoming aware of the environmental issues that surround their everyday lives. National EE curriculum, for example, Project WET, Project WILD, and Project Learning Tree, provide EE lessons that can be used to teach a

variety of different subjects (American Forest Foundation, 2006; Watercourse & Western Regional Environmental Education Council, 1995; Western Association of Fish & Wildlife Agencies & Council for Environmental Education, 1992). For example, in Project Learning Tree, Activity 16, titled "Pass the Plants, Please", students learn the importance of plants in people's diets and how plants make different types of foods. This activity illustrates how EE is cross-curricular: It teaches aspects of science, social studies, math, and language arts (American Forest Foundation, 2006, 77-81).

Carr (2005) found that 67% of assessed teachers incorporated environmental content into their classes, however, 63% of those teachers only spent 5 hours or less per month on environmental content. Teacher's attitudes toward EE and certain barriers could be the reason EE curriculum is less incorporated.

Environmental Education Barriers including Teacher Attitudes

Many barriers prevent teachers from teaching EE. These barriers may include logistical, educational, or attitudinal barriers. Logistical barriers may stem from the belief that there is a lack of time, funding, suitable class size, instructional resources, and so forth. In addition to these logistical concerns, there are educational barriers, coming from teachers' beliefs about their competence to instruct EE programs. There are also barriers that stem from teacher's attitudes about EE and science in general (Anderson and Jacobson, 2018). Conducting a variety of studies helped to understand these barriers and teachers' attitudes toward EE. (Castelli, 2004; Lane and Wilke, 1996; McCaw, 1980; Zint et al, 2002). A study by Lane and Wilke (1996) showed the main reason teachers do not teach about the environment is because of their lack of an EE

background and the belief that EE is unrelated to their disciplines. Other researchers found that when it came to EE programs that involved a trip from the school, the leading barriers were transportation, school finances, and time conflicts (McCaw, 1980). Despite all of this, Castelli (2004), found that outside EE programming had positive impacts on teachers. It gave teachers new perspectives and methods on how to present EE to their class. The EE programs helped the teacher become familiar with the materials and more comfortable presenting the content (Castelli, 2004). Various groups that implement EE programs can help coordinate curriculum and provide field trip opportunities and school visits in order to help alleviate some of the barriers teachers face when dealing with EE (Zint et al, 2002).

Jickling (1997) believes that in order to get teachers, administrators, and scholars involved and on board with EE, it is important to be aware of how we define EE. It is important to make sure everyone understands the concepts and ideas of what EE programs seek to do. In order to do this, EE program providers must first identify the needs of the teachers and other participants in order to improve the programs for effectiveness (Thomson et al, 2010).

Evaluating Environmental Education Based Programs

There is a gap between the actual practice of evaluation of EE programs and the potential of evaluation (Carleton-Hug and Hug, 2010). Despite this, some programs are being evaluated (Castelli, 2004; Smith-Sebasto and Semrau, 2004; Stern et al, 2008; Zint et al, 2001). There are different types of EE evaluations including measuring attitudes towards the environment, gains of environmental knowledge, awareness,

and stewardship, and on the overall satisfaction of the program itself (Thomas et al, 2010). Many of the evaluations seem to deal with the first two evaluation types. For example, researchers used an EE program evaluation to look at the effectiveness of the program on the student's attitudes towards the environment in a study at the New Jersey School of Conservation. Smith-Sebasto and Semrau (2014) also evaluated to see if the programs were meeting the school's mission objectives. The evaluation was ineffective at altering the overall attitudes of the students towards the environment, and found that the lesson plans of the program did not meet all of the mission objectives (Smith-Sebasto and Semrau, 2004). With the information from the evaluation, the school could consider making changes to their EE programs to meet their goals and objectives.

A different study evaluated the participants' connectedness with nature, environmental stewardship, interest in learning and discovery, and awareness of biodiversity. Results showed short term effects on all of the outcomes of interest (Stern et al, 2008). With the information they received from the evaluation, Stern, Powell, and Ardoin (2008) could improve their programs, in order to help boost the long term effects of their program content.

During the research though the related literature, there were a lack of studies found that look at the overall satisfaction of EE programs (including the presentation of the program and the content). This study will be an example of this evaluation method.

Out of 56 published reports, less than one-third reported formative evaluations and less than one-quarter applied summative evaluations (Norris and Jacobson, 1998). In order to provide quality programming and receive funding, environmental educators are challenged to produce great results. However, evaluations of the program can help with this challenge. Assessments offer a way to improve the EE programs and help accomplish goals and objectives (Thomson et al, 2010).

Purpose

The purpose of this study is to assess teacher perceptions of environmental education programming offered at Maywoods and Lilley Cornett Woods by EKU Division of Natural Areas. This is an evaluation of the programming from the teacher perspective with the intent of improving programming for future endeavors.

Methods

Researchers utilized quantitative methods to evaluate teacher perceptions of EE school group programs offered at Maywoods and Lilley Cornett Woods by EKU Division of Natural Areas. Teachers received an online Qualtrics survey (via email) adapted from a sample teacher evaluation survey from Thomson et al (2010) and can be seen in Appendix V. Using a Likert scale from 1-5, researchers collected data that included thoughts and perceptions of the EE school group programming provided at Maywoods or Lilley Cornett Woods. The areas of inquiry included program content, learning experiences, program station leaders, and program logistics. The online survey included demographic questions to aid the researcher in the analysis of the

data. The survey also inquired about potential barriers that may prevent the teachers from bringing their students to the programs in the future.

Only teachers whose students participated in the school group programs at Maywoods (Garrard County, KY) or Lilley Cornett Woods (Letcher County, KY) for EE were solicited to participate in the study. There were 11 EE programs delivered to school groups in the Spring 2019 semester: April 9, April 11, April 16, April 18, April 23, April 25, April 30, May 2, May 7, and May 16. The estimated number of students that attended the programs was 854 and 50 teachers. The schools were from the following Kentucky ~~C~~ounties: Garrard, Boyle, Letcher and Madison. The school groups included: one kindergarten group, one 1st grade group, one 2nd grade group, two 4th grade groups, one 5th grade group, two 6th grade groups, and two 8th grade groups.

On the day of the programs, the researcher asked the teachers if they would like to participate in the study by taking the survey. If yes, the researcher recorded their valid emails. The researcher sent the online survey via email within 24 hours of program participation. The researcher sent the survey to 57 teacher emails.

The researchers facilitated descriptive and frequency statistics and, based on the results, developed improvements for EKU Division of Natural Areas EE school group programming.

Results

The response rate was 43.85%., resulting in 25 teachers participating in the evaluation survey in total. Before they could complete the survey, the teachers had to

indicate that they were at least 18 years old and that they consented to taking the survey. 100% of the 25 teachers indicated that they are at least 18 years of age and they agree to take the survey (Figure 1). The researchers asked the teachers to select which natural area they attended an EE program at. Of the 25 teachers, 100% of them indicated they attended EE program at Maywoods (Figure 2).

The researchers asked the teachers to evaluate the program based on the program content. First, the researchers asked the teachers if the content was clear; delivered in a balanced, fair and educational way; age appropriate; and aligned with their curriculum. 75% of teachers strongly agreed the content was clear, 20.82% agreed, and 4.17% strongly disagreed (mean=4.63, std. deviation=0.86, variance=0.73). 75% of teachers strongly agreed the content was delivered in a balanced, fair, and educational way, 20.83% agreed, and 4.17% strongly disagreed (mean=4.63, std. deviation=0.86, variance=0.73). 79.17% of teachers strongly agreed the content was age appropriate, while 16.67% agreed, and 4.17% strongly disagreed (mean=4.67, std. deviation=0.85, variance=0.72). 75% of teachers strongly agreed the content aligned with their curriculum, while 16.67% agreed, 4.17% were neutral, and 4.17% strongly disagreed (mean=4.58, std. deviation=0.91, variance=0.83) (Table 1 and Figure 3).

The teachers were then asked if the program content focused on the Discipline Core Ideas, the Science and Engineer Practices, and the Crosscutting Concepts of the Kentucky Science Academic Standards (KSAS). 78.26% of teachers strongly agreed that the content focused on the Discipline Core Ideas of the KSAS, while 21.74% agreed (Figure 4) (mean=4.78, std. deviation=0.41, variance=0.17) (Table 2). 69.57% of

teachers strongly agreed the content focused on the Science and Engineer Practices for the KSAS, while 26.09% agreed, and 4.35% was neutral (Figure 4) (mean=4.65, std. deviation=0.56, variance=0.31) (Table 2). 73.91% of teachers strongly agreed the content of the EE program focused on the Crosscutting Concepts of the KSAS, while 13.04% agreed, and 13.04% were neutral (Figure 4). Based on the standard deviation and variance for this response, means across teachers seem to agree on this aspect.

The teachers were asked about the learning experience as a whole. They were asked if the learning experience was engaging and interesting and if it was suitable for program content. 78.26% of the teachers strongly agreed that the learning experience was engaging and interesting, while 17.39% agreed, and 4.35% were neutral (Figure 5) (mean=4.74, std. deviation=0.53, variance=0.28) (Table 3). 86.96% of the teachers indicated they strongly agreed that the learning experience was suitable for the program content, while 13.04% agreed (Graph 5). The mean is high and the standard deviation is low (mean=4.87, std. deviation=0.34, variance=0.11) (Table 3).

The researchers asked the teachers if the station leaders were knowledgeable of the content, were engaged with the students, and if they maintained a positive attitude. 65.22% of the teachers strongly agreed that the station leaders were knowledgeable of the content and engaged with the students, while 34.78% agreed (Figure 6) (mean=4.54, std. deviation=0.48, variance=0.23) (Table 4). 73.91% of the teachers strongly agreed that the station leaders maintained a positive attitude, while 26.09% agreed (Figure 6) (mean=4.74, std. deviation=0.44, variance=0.19) (Table 4).

The researchers asked the teachers about specific program logistics, including: if station group size was appropriate, the program length was appropriate, and the amount of student engagement was appropriate. 69.57% of teachers strongly agreed that the station group size was appropriate while 26.09% agreed, and 4.35% were neutral (Figure 7) (mean=4.65, std. deviation=0.56, variance=0.31) (Table 5). 65.22% of teachers strongly agreed that the program length was appropriate, while 26.09% agreed, 4.35% were neutral, and 4.35% disagreed (Figure 7) (mean=4.53, std. deviation=0.77, variance=0.60) (Table 5). 65.22% of the teachers strongly agreed that the amount of student engagement was appropriate, while 30.43% agreed and 4.35% was neutral (Figure 7) (mean=4.61, std. deviation=0.57, variance=0.33) (Table 5).

The average age of the teachers was 25.91 years old (Table 6) and the average number of years the teachers have been teaching is 15.48 years (Table 7). The researchers asked the teachers what grade level they taught. 40.91% indicated they teach 6^{th} grade. 13.64% indicated they teach 4^{th} grade. 13.64% indicated they teach 1^{st} grade. 9.09% indicated they teach 8 grade. 9.09% indicated they teach 2^{nd} grade. 9.09% indicated they teach kindergarten. 4.55% indicated they teach 5^{th} grade (Figure 8). The researchers asked the teachers how long they have been teaching at that grade level. The average was 9.36 years (Table 8).

The teachers were asked about their highest level of education. 82.61% indicated a Master's degree was their highest level of education. 8.70% indicated a Bachelor's degree was their highest and 8.70% indicated a doctoral or professional degree was their highest level of education (Figure 9).

The researchers asked the teachers where they received their teaching certificate. 56.52% of teachers indicated that they received their teaching certificate at Eastern Kentucky University. Other universities mentioned included: University of the Cumberlands, University of Kentucky, Kentucky Christian College, Taylor University, Louisiana State University, Pikeville College, Centre College, and Brescia College (Figure 10).

The researchers asked the teachers how they found out about the school programming. The teachers typed their individual answers. Some of their responses included: hearing about the program from a colleague, knowing Dr. Wilder, because they attended EKU, their school had already been going to the programs over the years, etc. Appendix IX shows all of the teachers' responses.

The researchers asked the teachers how many times they have participated in school programming in the past. The average was 4.55 times (Table 9).

The researchers asked the teachers if they would be interested in participating the program again after considering their most recent experience. 100% of the teachers indicted that "yes" they would be interested in participating in the program again.

The researchers asked the teachers if they were familiar with other EKU Division of Natural Areas programs. 52.17% of the teachers indicated that no they are not familiar with other programs, while 47.83% are familiar with other EKU Division of Natural Areas programs.

The researchers asked the teachers options for potential barriers and asked them to indicate which ones might prevent them from coming to programming in the future. 40.91% indicated that funding for transportation was a potential barrier. 22.73% indicated that “Other” were potential barriers. 18.18% indicated that lack of time within the school year was a potential barrier. 9.09% indicated that funding for substitutes was a potential barrier. 4.55% indicated that lack of administrative support and 4.55% indicated that liability issues were potential barriers (Appendix X). Appendix XI shows the comments left on the survey where teachers were allowed to leave comments related to the program or survey.

Discussion

Based on the results, the EE school group programming facilitated by EKU Division of Natural Areas is effective in meeting its goals. For instance, a majority of teachers agreed or strongly agreed that the content of the programs was balanced, fair, and educational. Comments made by the teachers about the overall programming were positive. One teacher said, “Many of my students live in town and have never been to an outdoor area to 'see' the outdoors. Many of my students raved about the creek adventure and were surprised by the different 'life' that they found. It was so fun to see them learning on their own and making memories.” Another teacher commented, “Maywoods provides a wonderful, safe, outdoors experience for our first grade students. I look forward to our trip there every year and it never disappoints.

Student come back excited about what we saw and did and with a greater appreciation of the great outdoors."

Other comments made by teachers indicate that changes could improve the school group programming. One teacher said, "…there are only a few dates available fall and spring. If you are not quick to respond, you miss the opportunity." A teacher also indicated this as a potential barrier, preventing them from coming to Maywoods for programming. The Division of Natural Areas offering more dates for school groups could improve the potential of missing out due to limited availability, whether that be by starting earlier in the semesters or adding more days per week for school groups. Investigating alternative ways to schedule program days could help overcome this problem. Perhaps scheduling personnel could be more aware of what schools participated in the programming the semester before and give new participating schools priority when scheduling upcoming program days.

Another comment made by a teacher was, "I would like to see station groups that incorporate Language Arts." The content for the school group programs align with the NGSS, which are incorporated into the Kentucky Academic Science Standards. The content for the programs could incorporate other standards as well. For instance, they could include the Kentucky Academic Standards for Reading and Writing, Mathematics, Visual and Performing Arts, and Social Studies. To solve this, Division of Natural Areas programming staff could alter the content of the programs to emphasize other types of curriculum. This would provide the opportunity to show how EE may be included across all subjects. All new content could be created as well. For instance,

DNA could set aside one or two dates that are classes other than science. The theme of the entire program would be environmentally based, but focused on another subject rather than science. DNA could reach out and promote their school group programs to other teachers apart from science teachers to fill these spots. Another teacher said, “The visuals in the guidebooks were great, but due to time limitations our group did not have time to use the guidebooks. Next time we will have to allot more time so that we can have plenty of time at each station as well as time to allow children to have breaks to get water drinks so that they stay more content and engaged.” The scheduling of programming within the day may be adjusted to fit the content. For instance, if certain stations allow for books and research, more time could be given to those stations. Another improvement to the programming could be to include water breaks into the schedule. Especially during hot days, students could begin to lose interest in the stations. Having water breaks to could the students to stay focused as well as hydrated. Another solution to this would be to ask students to bring refillable water bottles with them to the program and take with them to each station, and provide refillable water bottles to students who do not have access to one.

‘Funding for transportation’ received a high score from teachers as well, which highlights it as a potential barrier, preventing schools from coming to Maywoods or Lilley Cornett Woods for programming. The Division of Natural Areas could have promotional opportunities or grants to help with transportation costs or connect schools with opportunities to help offset costs. An example of a promotional opportunity is DNA will pay for transportation costs for the first two teachers to

completely register for a school group day. Another option would be to have transportation reimbursement forms. Prior to the programming, teachers can fill out the forms explaining why they need to be reimbursed for transportation and DNA can decided on a case to case basis. 'Lack of time within the school year' also had a high percentage as a barrier. Providing more dates for school group programming could help with this. DNA tries to have eight days set aside each semester for school group programming at Maywoods, and two to three days set aside for Lilley Cornett Woods. They could start earlier or end later each semester. The days they set aside are on Tuesdays and Thursdays due to the class schedules of student workers, but another option could be to open school group programming on other days of the week.

When the dates for the EE school group programming are set, they are sent out to a list of teachers who have participated in the program in the past and teachers who have reached out to DNA requesting to be on the list. Another way to ensure that school group programming is optimal is to market to other schools throughout Kentucky and potentially home school groups. This could help to expand the EE school group programming. Marketing to more schools, perhaps targeting schools further away, could help bring awareness to the Division of Natural Areas as well other programs and events Natural Areas provides. Marketing to other schools also allows for more of a chance for students to become environmentally literate and to participate in hands on learning experiences. Also, this could help with Eastern Kentucky University recruitment numbers. Since DNA is a department within EKU, if students enjoy the programming or are impact in a positive way by the programming,

they now have a positive experience associated with EKU as well. It could be something they remember when it is time to start looking at colleges and universities.

One of the limitations of this study was the time frame. Teachers were surveyed after their students participated in EE school group programming only during spring 2019. If the study was conducted throughout the academic year, there would be more data and a better understanding as teachers evaluate the EE school group programming. Another limitation to the study was participation. The survey was sent to 57 teachers, but only 25 participated. These 25 teachers represent only a few grade levels. Some grades were not accounted for in the data and results. Survey participation from more teachers from all grade levels would provide for a better overall understanding of how the programming is doing. Also, the only participants of the survey were teachers who came to Maywoods. DNA programming is at both Maywoods and Lilley Cornett Woods. The results could have better represented DNA's school groups if teachers from both sites would have participated in the survey. Teachers at Lilley Cornett Woods could have different points of view and barriers that were not represented in the results.

Another limitation for this study is that students were not surveyed. This study only assesses teachers' perceptions on the EE school group programming, but not the impact the programming has on students. The goal of the EE school group programming is to increase environmental literacy within students through hands on, three-dimensional phenomenon based content and by providing a positive experience in a natural area. In order to understand if the programming is reaching this goal, the

students who participate in the EE programming need to be evaluated to see if they are being affected or not.

The next steps within this study is to continue to survey teachers who bring their students to Maywoods and Lilley Cornett Woods for EE school group programming over several semesters and years and begin to evaluate the students who participate. Pre and post assessments of the students would give information on if the students are actually learning and if the programming is impacting them in some way.

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APPENDICES

Appendix A: Tables

Appendix A: Tables

Table 1. Results of Teacher Perceptions on Program Content

Question	Minimum	Maximum	Mean	Std. Deviation	Variance
Clear	1	5	4.63	0.86	0.73
Delivered in a balanced, fair, and educational way	1	5	4.63	0.86	0.73
Age appropriate	1	5	4.67	0.85	0.72
Aligned with your curriculum	1	5	4.58	0.91	0.83

Table 2. Results of Teacher Perceptions of How Focused Content is on Kentucky Science Academic Standards

Question	Minimum	Maximum	Mean	Std. Deviation	Variance
Focused on the Discipline Core Ideas of the KSAS	4	5	4.78	0.41	0.17
Focused on the Science and Engineer Practices for the KSAS	3	5	4.65	0.56	0.31
Focused of the Crosscutting Concepts of the KSAS	3	5	4.61	0.71	0.50

Table 3. Results of Teacher Perceptions on the Learning Experiences

Question	Minimum	Maximum	Mean	Std. Deviation	Variance
Engaging and interesting	3	5	4.74	0.53	0.28
Suitable for program content	4	5	4.87	0.34	0.11

Table 4. Results of Teacher Perceptions on Station Leaders

Question	Minimum	Maximum	Mean	Std. Deviation	Variance
Were knowledgeable of the content	4	5	4.65	0.48	0.23
Were engaged with students	4	5	4.65	0.48	0.23
Maintained a positive attitude	4	5	4.74	0.44	0.19

Table 5. Results of Teacher Perceptions on Program Logistics

Question	Minimum	Maximum	Mean	Std. Deviation	Variance
The station group size was appropriate	3	5	4.65	0.31	
The program length was appropriate	2	5	4.53	0.60	
The amount of student engagement was appropriate	3	5	4.61	0.33	

Table 6. Results of the age of the Teachers

Question	Minimum	Maximum	Mean	Std. Deviation	Variance
What is your age?	7	49	25.91	12.52	156.69

Table 7. Results of How Long the Teachers Have Been Teaching

Question	Minimum	Maximum	Mean	Std. Deviation	Variance
How long have you been teaching?	2	39	15.48	10.03	100.60

Table 8. Results of How Long the Teachers Have Taught their Specific Grade Level

Question	Minimum	Maximum	Mean	Std. Deviation	Variance
How long have you been teaching this specific grade level?	1	23	9.36	7.62	68.14

Table 9. Results of Where the Teachers Received Their Education

Institution	# of participants
Eastern Kentucky University	13
Centre College	1
Brescia College	1
Pikeville College	1
Taylor University	1
Louisiana State University	1
Kentucky Christian College	1
University of the Cumberlands	3
University of Kentucky	3

Table 10. Results of How Many Teachers Have Participated in the School Programming in the Past

Question	Minimum	Maximum	Mean	Std. Deviation	Variance
How many times have you participated in school programming in the past (at Maywoods or Lilley Cornett Woods)?	1	15	4.55	3.80	14.43

Appendix B: Figures

Appendix B: Figures

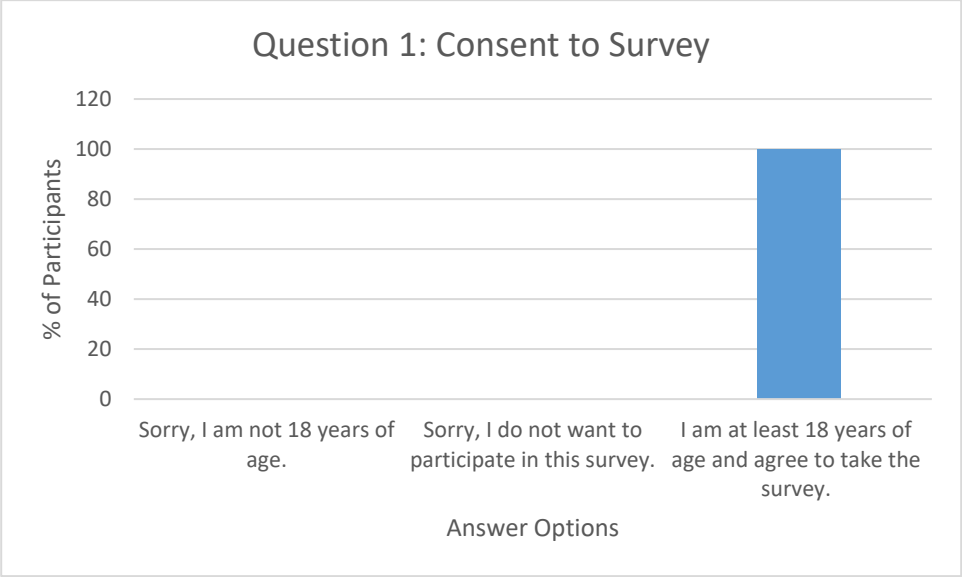

Figure 1: The percentage of teachers who agreed to take the survey.

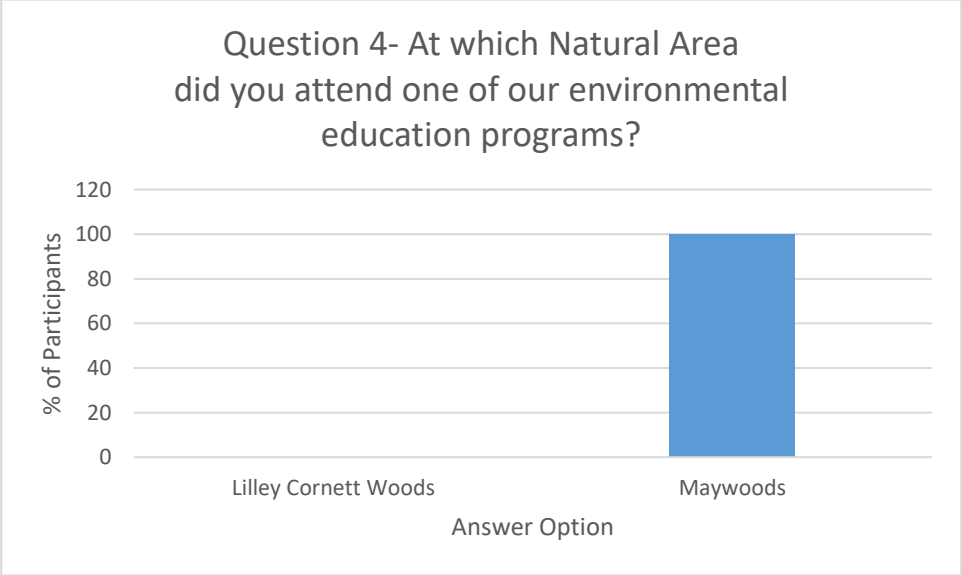

Figure 2: The percentage of teachers who participated in the survey at each Natural Area.

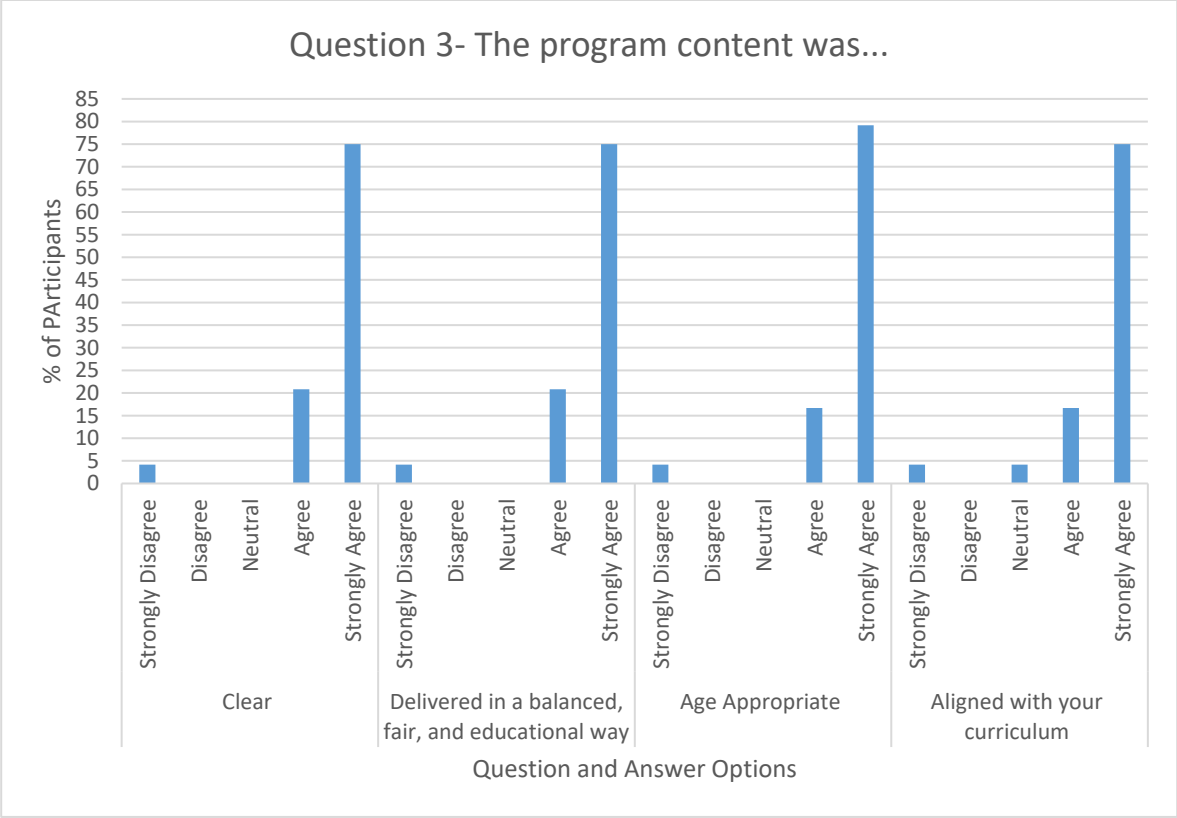

Figure 3: The percentages of teachers' perceptions on the program content, specifically if the content was clean; delivered in a balanced, fair and educational way; age appropriate; and aligned with teachers' curriculum.

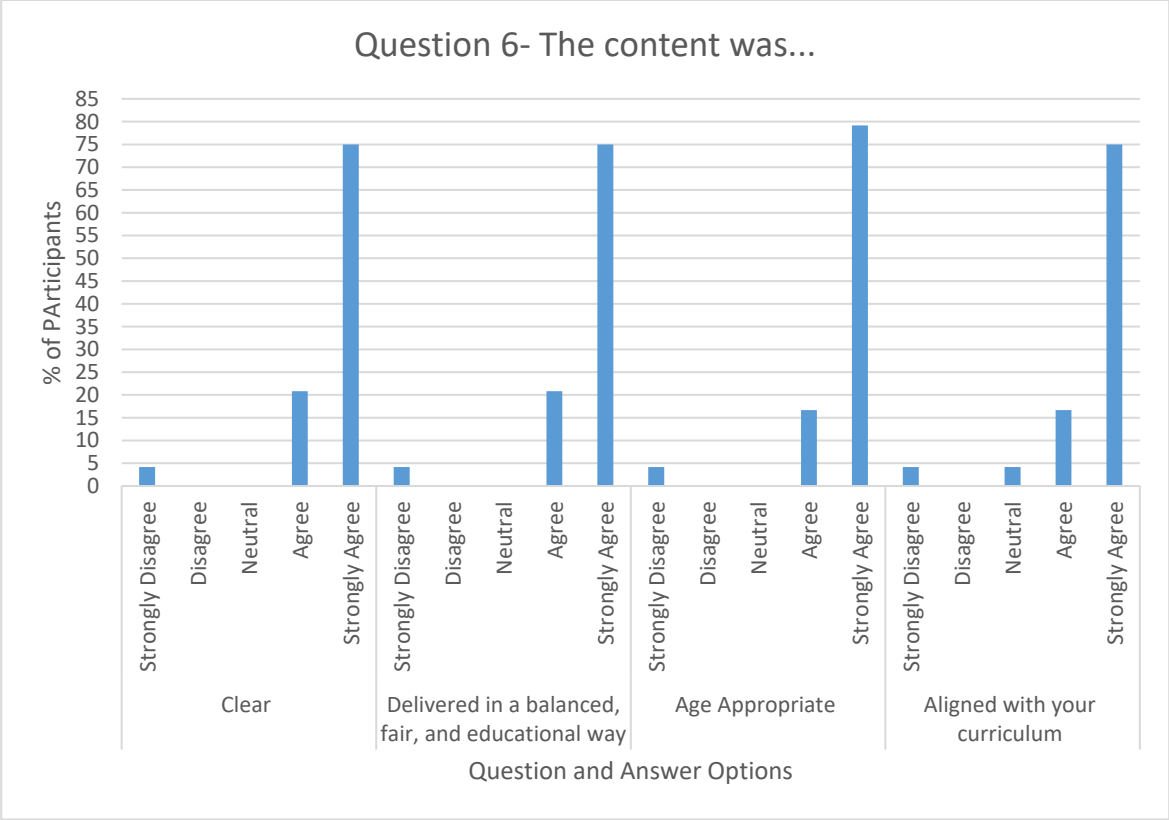

Figure 4: The percentage of teachers' perceptions of how focused the content of the programming was on the Discipline Core Ideas, the Science and Engineer Practices, and Cross Cutting Concept of the Kentucky Science Academic Standards.

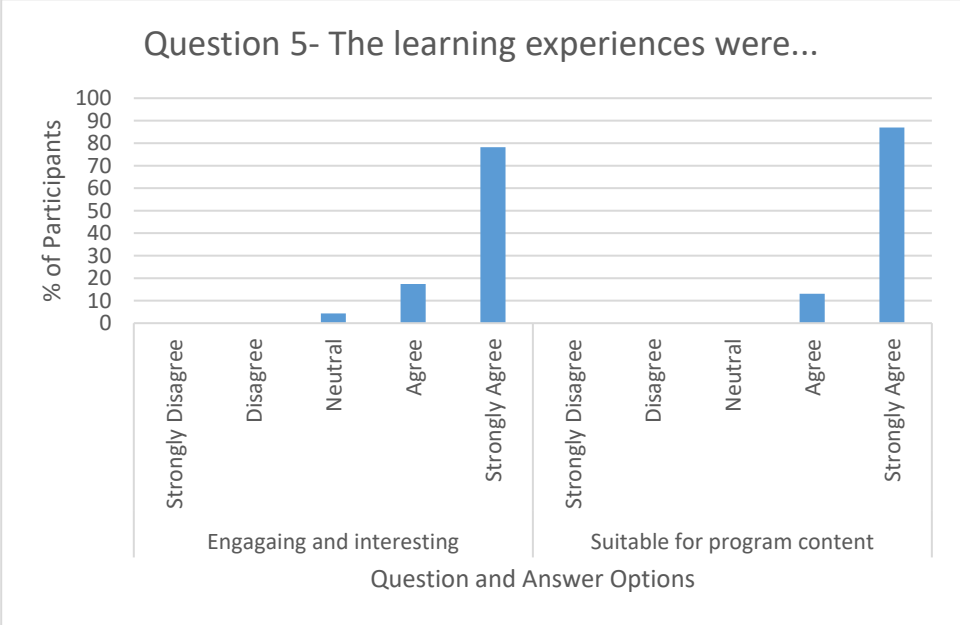

Figure 5: The percentages of the teachers' perceptions of how engaging and interesting, and suitable for the program content the learning experiences were.

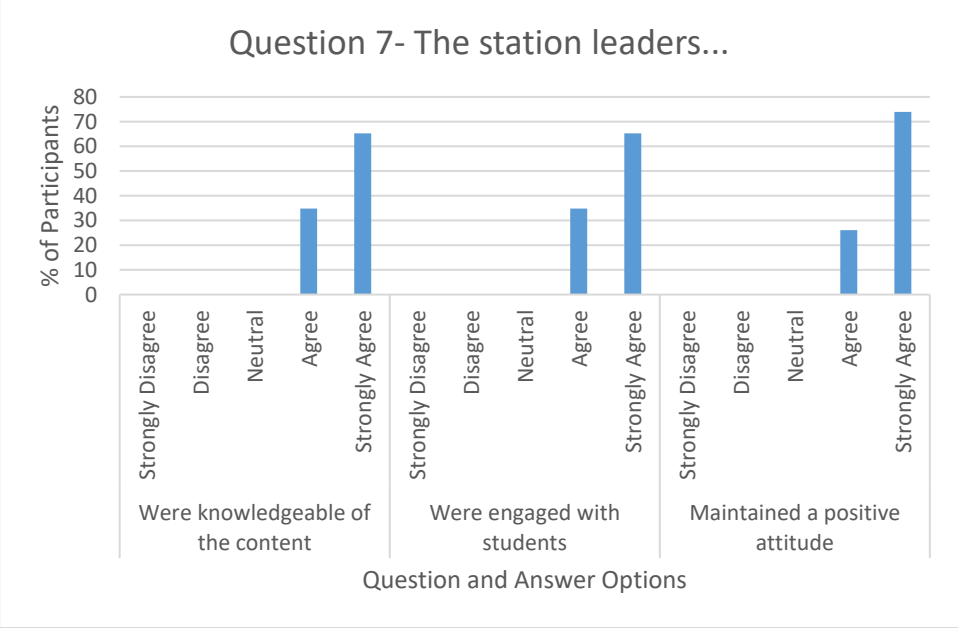

Figure 6: The percentages of teachers' perceptions of the station leaders were knowledgeable of content, were engaged with the students and if they maintained a positive attitude.

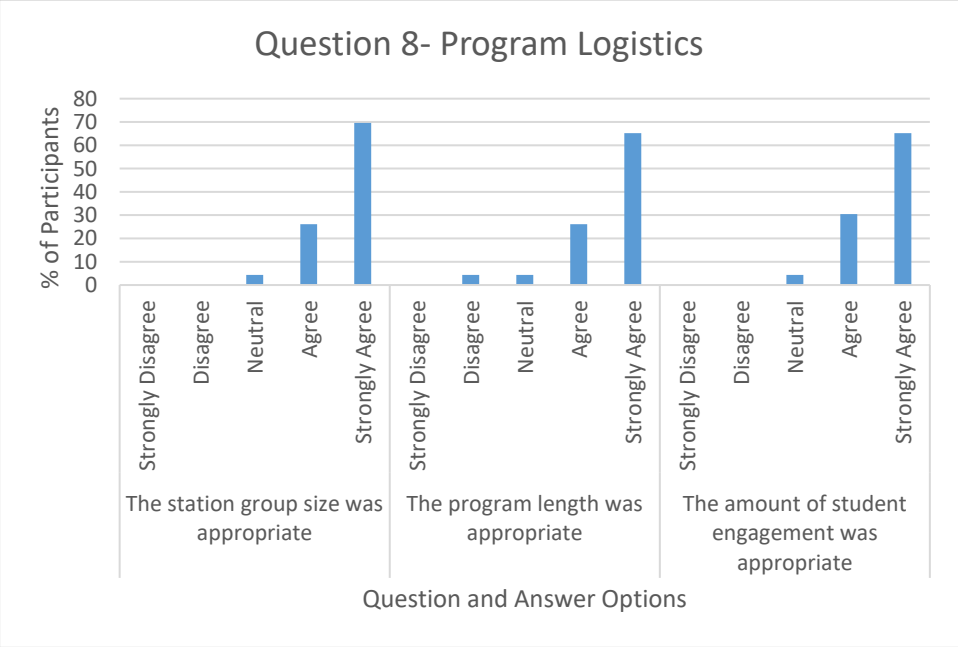

Figure 7: The percentages of teachers' perceptions of the program logistics, which include: if the station group size, the program length, and the amount of student engagement were appropriate.

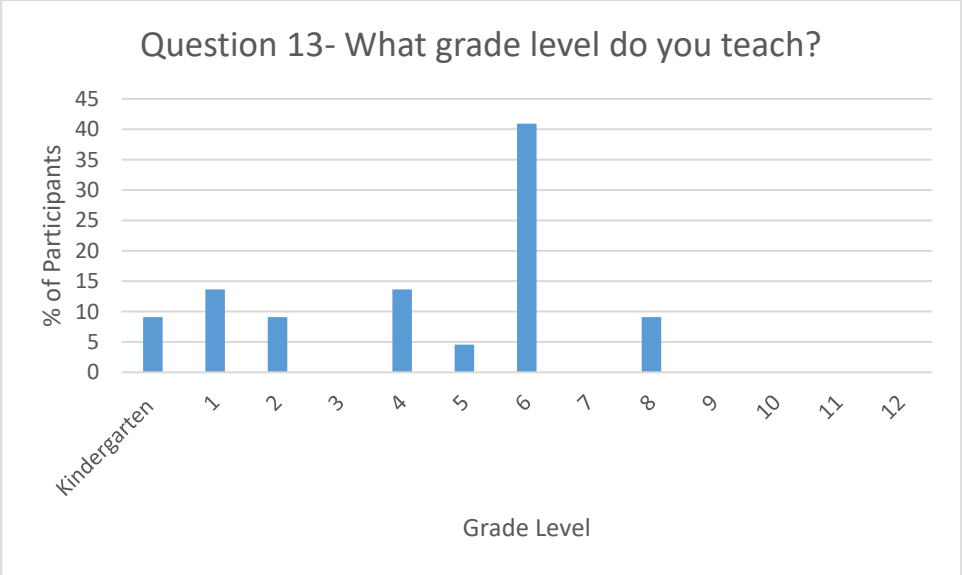

Figure 8: The percentages of how many teachers who participated in the survey teach within each grade level.

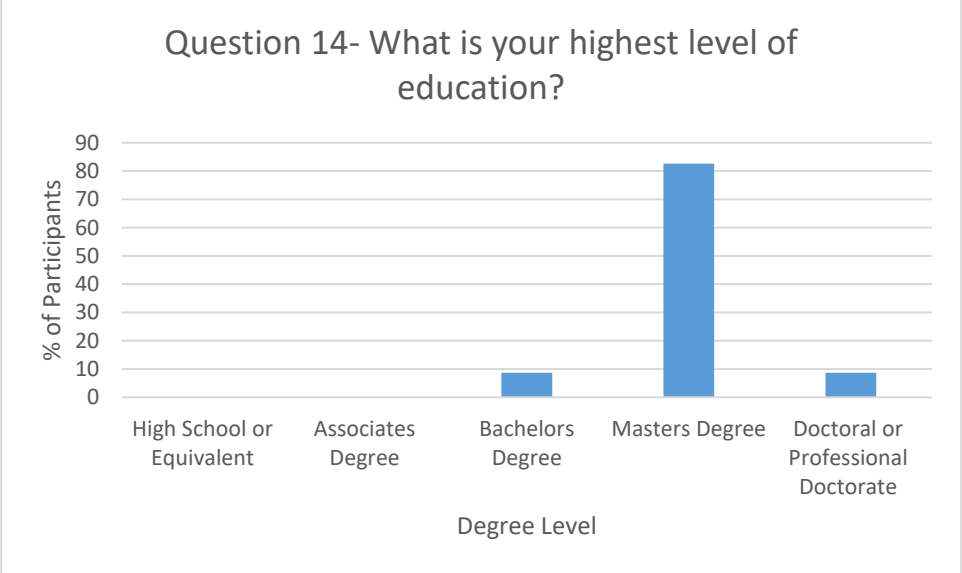

Figure 9: The percentage of the teachers who participated in the survey and their highest level of education.

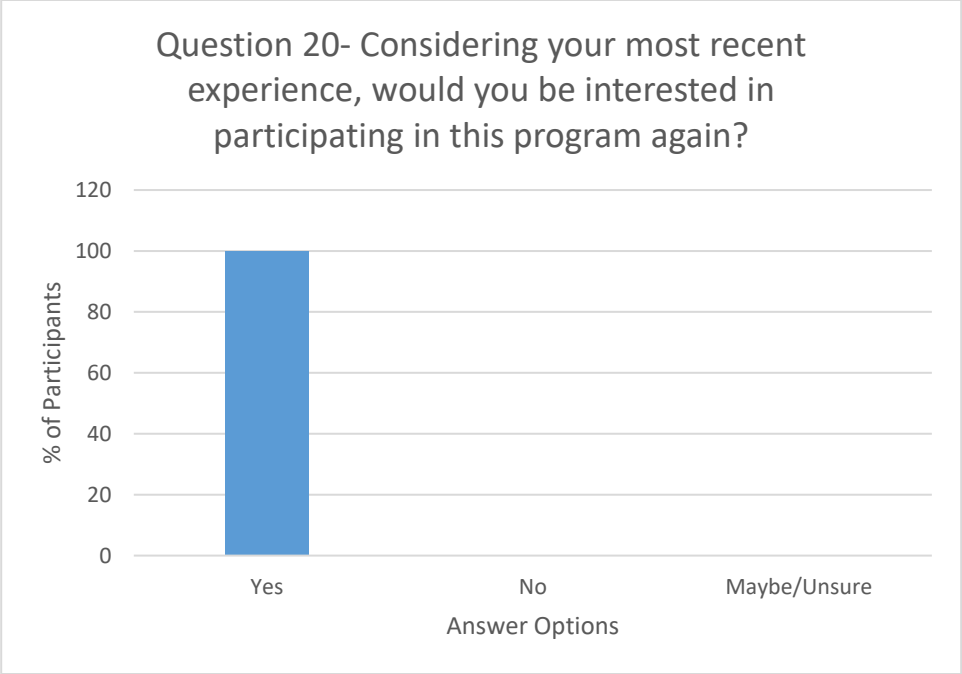

Figure 10: The results on whether or not the teachers would participate in the program again.

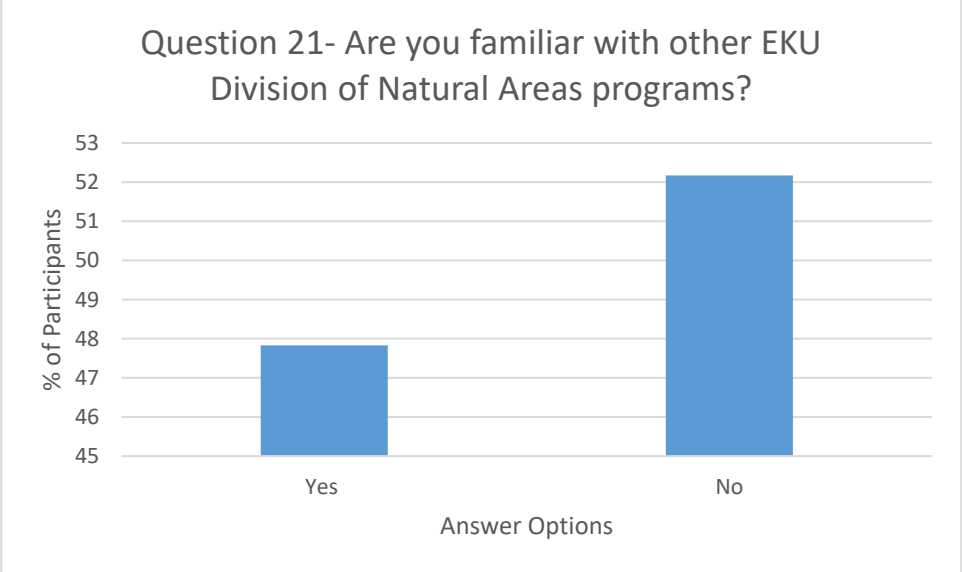

Figure 11: The results on whether or not the teachers are familiar with other EKU Division of Nature Areas' programs.

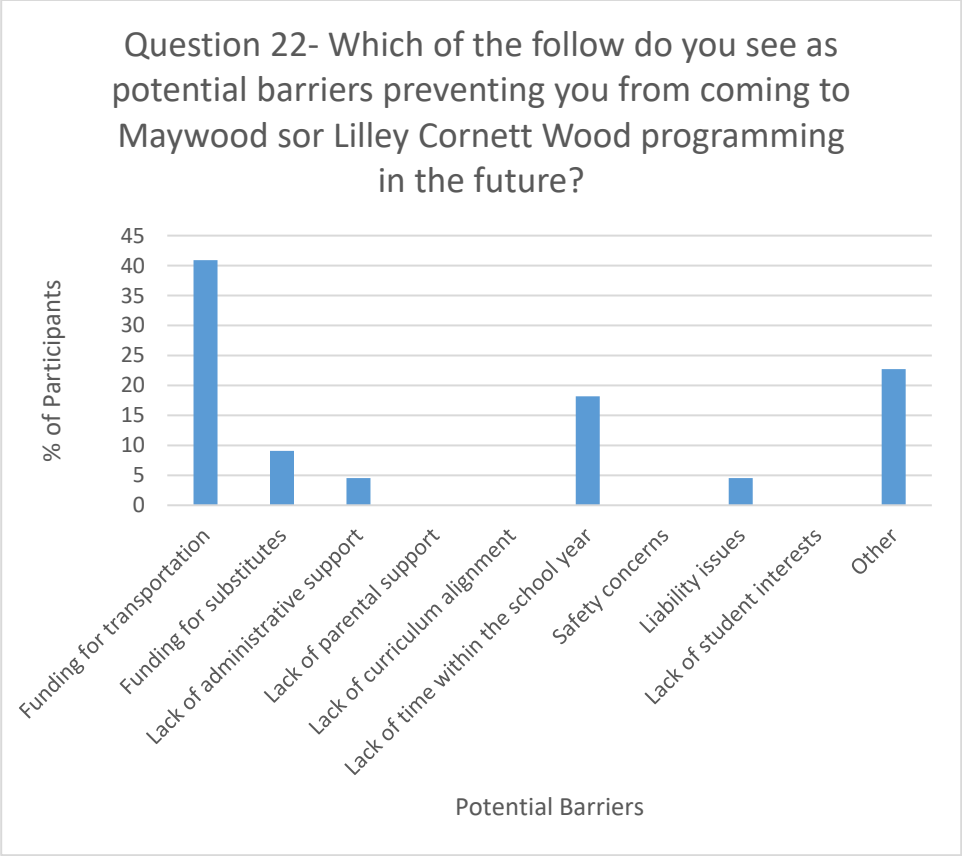

Figure 12: Potential barrier percentages preventing teachers in participating the programming in the future. *Text for other found in Appendix II

Appendix C: Question 22 “Other” Text Responses

Appendix C: Question 22 “Other Text Reponses

- Funding for Maywoods program
- None
- Limited Schedules
- The only barriers are that there aren’t a lot of time slots available & each year we have to try to be one of the first one to try to respond. This year I was able to be the last available slot.
- n/a

Appendix D: How did you find out about the school programming?

Appendix D: How did you find out about the school programming?

- I have previously had the Division of Natural Areas do programming at Maywoods. I received emails from the Division regarding dates for school programming fall and spring.
- Other schools told be about the experience
- We come each year to Maywoods. Our Science teacher originally found out about it several years ago.
- One of our Science teachers organized it.
- Through EKU.
- Through our Science Teacher.
- Through other teachers that were aware of the program.
- Through Dr. Wilder and the Environment Ed. Classes at EKU.
- Through a colleague.
- Email
- Colleague
- From Science professors at EKU…through collaboration on other projects.
- From our Science teacher.
- I first learned about Maywoods when I was taking Science Methods with Dr. Townsend at EKU. When I started teaching, first grade had be going to Maywoods for a while.
- I attended an event at Mawyoods when I taught at a summer camp many years ago and later found out about it being offered to schools.
- We have been coming for years so I am not sure how we were first made aware.
- School science teacher
- N/A
- Past Experiences with Maywoods.
- I went to school there and know Dr. Wilder.

Appendix E: Other comments regarding the survey or programming provided by EKU Division of Natural Areas

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- One concern that I have which has become one only in recent years is that there are only a few dates available fall and spring where the Division of Natural Area will provide programming. If you are not quick to respond, you miss the opportunity to provide students with this amazing field experience.
- I would like to see station groups that incorporate Language Arts. I know this was part of the work in earlier years where the students wrote poems and then one time when they wrote examples of figurative language. This kind of work really supported my content.
- This was the best trip yet. The activities all connected to the same core content.
- This program is one of the best and reasonable place to take students out in nature to experience the living ecosystem and have the hands on activities. Such a great program at a reasonable price!
- It was wonderful and the students really enjoyed themselves! I'm hoping we can come back next year!
- Maywoods provides a wonderful, safe, outdoors experience for our first grade students. I look forward to our trip there every year and it never disappoints. Student come back excited about what we saw and did and with a greater appreciation of the great outdoors. It is a wonderful resource right in our backyard.
- We love Maywoods, & the people who run this place. It is so well put together & reasonably priced. This gives our students the rare opportunity to get outside & enjoy the great outdoors. Every year the kids come back so excited & repeatedly say this is their favorite field trip.
- This program was extremely well organized. The students gained a tremendous amount of science information related to our core content. We will definitely participate again in the future.
- Please disregard my first page of responses. I intended to click Strongly Agree, but I believe I clicked Strongly Disagree. I could not go back and correct them.
- Many of my students live in town and have never been to an outdoor area to 'see' the outdoors. Many of my students raved about the creeking adventure and were surprised by the different 'life' that they found. It was so fun to see them learning on their own and making memories. The $40 fee is a great price for a school to be able to have the students pay for the field trip, the transportation is what causes so many schools to not be able to attend. It would be wonderful to have this offered more often than it is, it's such a great opportunity for the kids to get outdoors.
- Great experience.... All the guides were excellent.

- The visuals in the guidebooks were great, but due to time limitations our group did not have time to use the guidebooks. Next time we will have to allot more time so that we can have plenty of time at each station as well as time to allow children to have breaks to get water drinks so that they stay more content and engaged. I think having the visuals (or the time to look at them in advance before the activity) is so important at this age, as it helps them to know what they are looking for in the woods and creek, as well as the types of nests to get them brainstorming how they can make their nests. Having time to actually use and refer to the guidebooks would make the activities more meaningful. The kids had lots of fun and we are so thankful to have a "nature" spot to take them that is safe and part of EKU! The Maywoods leaders were all very friendly and helpful, as well as very positive and appropriate with the children. The materials for the day were thoughtfully organized and it was nice to have the multiple cameras, multiple nets, etc. so all children could easily be involved.

Appendix F: The Survey (The Evaluation Tool)

Appendix F: The Survey (The Evaluation Tool)

EKU Division of Natural Areas' Environmental Education

Program Evaluation Survey

Eastern Kentucky University Division of Natural Areas strives towards the delivery of fair, balanced and interesting environmental education programs. Your feedback is very important to us. Please take a moment to answer the following questions:

At which Natural Area did you attend one of our environmental education programs? (Please check the appropriate natural area.)

___Maywoods

___Lilley Cornett Woods

Please evaluate this program based on the following themes:

(1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree)

Program Content: The program content was

Clear: 1 2 3 4 5

Delivered in a balanced, fair and educational way: 1 2 3 4 5

Age appropriate: 1 2 3 4 5

Aligned with your curriculum: 1 2 3 4 5

Focused on the Discipline Core Ideas of the Kentucky Academic Science Standards: 1 2 3 4 5

Focused on the Science and Engineer Practices of the Kentucky Academic Science Standards: 1 2 3 4 5

Focused on the Crosscutting Concepts of the Kentucky Academic Science Standards: 1 2 3 4 5

Learning Experiences: The learning experiences were:

Engaging and interesting: 1 2 3 4 5

Suitable for program content: 1 2 3 4 5

Station Leaders: The station leaders:

Were knowledgeable of the content: 1 2 3 4 5

Were engaged with students: 1 2 3 4 5

Maintained a positive attitude: 1 2 3 4 5

Program Logistics:

The station group size was appropriate. 1 2 3 4 5

The program length was appropriate. 1 2 3 4 5

The amount of student engagement was appropriate. 1 2 3 4 5

Demographics: We would also like to know a little bit about the teachers as well.

Your age (please circle one): 20-29 30-39 40-49 50-59 60-69

How long have you been teaching?

_____

What grade level do you teach?

_____

How long have you been teaching this grade level?

_____

What is your highest level of education?

_____

At what institution did you receive your teaching certificate?

_____

How did you find out about the school programming at Maywoods or Lilley Cornett Woods?

_____

_____

How many times have you participated in this program in the past?

_____

Would you be interested in participating in this program again? Yes ____ No ____

Are you familiar with other EKU Division of Natural Area programs? Yes____ No____

Which of the following do you see as potential barriers preventing you from coming to Maywoods or Lilley Cornett Woods programming in the future? Check all that apply.

___Funding for Transportation

___Funding for Substitutes

___Lack of Administrative Support

___Lack of Parental Support

___Lack of Curriculum Alignment

___Lack of Time within the School Year

___Safety Concerns

___Liability Issues

___Lack of Student Interest

Would you be willing to participate in a phone interview to discuss these questions in more detail? Yes__ No__

If yes, please provide your email address.

_____

Any other comments?

_____

_____

_____

Thank you for your time and participation!