Examining Environmental Education Knowledge and Skills gained in the Master's for K-12 Teachers Program

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Abstract

Teachers seek Master's programs as one way of continuing their professional development in their journey of lifelong learning. The purpose of this research is to evaluate one of those Master's programs, the Master of Science in Natural Resources in Environmental Education for K-12 Teachers (MSNREE) program offered since 1992 by the Wisconsin Center for Environmental Education (WCEE) within the College of Natural Resources (CNR) at the University of Wisconsin – Stevens Point (UWSP).

As in any program, initiative or endeavor, it is always important to evaluate progress and outcomes to make sure you are meeting your goals and objectives. This research verified that the National Council for Accreditation for Teacher Education standards for the preparation of teachers in environmental education (NCATE EE *Standards 2007*) are taught as part of the MSNREE program. Through a questionnaire, graduates were asked about the skills and knowledge they gained though the program correlating to the NCATE EE *Standards.* Knowledge gained from this research informs faculty and staff on improvements needed to courses or components of the program. Further, exploring if environmental topics and citizen engagement strategies are being taught in graduates' classrooms provides evidence that perceptions of EE knowledge and skills gained are accurate. Additionally, this research explores the leadership skills that graduates utilize to advance environmental education.

The results of the questionnaire show that graduates agree that the MSNREE was responsible for increasing their knowledge and skills corresponding to the NCATE EE standards. Improvement is called for in addressing technology, diverse students' learning needs, and assessment strategies within the MSNREE curriculum. Graduates are reporting that they teach many environmental topics in their classrooms, but some graduates still have barriers to fully implement environmental education in their curriculum. Graduates recognize the support structure they have within the network of professionals with which they matriculated and with local and statewide EE programs. Local leadership is demonstrated by our graduates but many have not advanced their leadership to the state or national level.

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"Cultivate the habit of being grateful for every good thing that comes to you, and to give thanks continuously. And because all things have contributed to your advancement, you should include all things in your gratitude." — Ralph Waldo Emerson

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Chapter 1: Introduction

Statement of Purpose

Teachers seek Master's programs as one way to continue their professional development in their journey of lifelong learning. The purpose of this research is to evaluate one of those Master's programs, the Master of Science in Natural Resources in Environmental Education for K-12 Teachers (MSNREE) program, offered since 1992 by the Wisconsin Center for Environmental Education (WCEE) within the College of Natural Resources (CNR) at the University of Wisconsin – Stevens Point (UWSP). As in any program, initiative or endeavor, it is always important to evaluate progress and outcomes to make sure you are meeting program goals and objectives. This research will verify that National Council for Accreditation of Teacher Education (NCATE) standards for the preparation of teachers in environmental education (NAAEE 2007b) are taught as part of the MSNREE program. Knowledge gained from this research can then inform faculty and staff if improvements to courses or components of the program are needed. Exploring which environmental topics graduates teach in their classrooms will further provide evidence that these perceptions of knowledge and skills gained are accurate. Verifying that leadership skills taught in MSNREE courses are helping create EE leaders in Wisconsin and beyond is also a goal of this research.

Program History

When a review of the status of EE in the 1970s and 1980s revealed that there were deficiencies in teacher training programs (Wilke et. all 1987), the UWSP College of Natural Resources was poised with faculty who were leaders in EE to make teacher training in EE a priority. This research seeks to provide evidence that MSNREE graduates are "competent to investigate environmental issues and evaluate alternative solutions and to develop, select and/or implement curricular materials and strategies which develop similar competencies in receivers" to which Wilke et al. eluded.

The seed for the MSNREE program in the College of Natural Resources (CNR) at UW-Stevens Point was established when four environmental education professional development courses for teachers were created in the late 1980s. These courses were titled:

- Principles of Environmental Education
- Ecological Basis for Environmental Education
- Environmental Education Teaching Strategies
- Citizen Action in Environmental Education

When the Wisconsin EE Act of 1990 created the Wisconsin Center for Environmental Education (WCEE) it also established that the WCEE should provide a Master's program in EE for teachers. In 1992, through a grant from the National Science Foundation, the first class of Master's candidates was admitted to the program. As the program celebrated its 20th anniversary in 2012 it had 213 graduates. Graduates of the MSNREE program teach subject areas as diverse as Math, Art, Special Education, Gifted & Talented, Sciences, Technology, Agriculture, and Social Studies. They teach at grade levels from Kindergarten to post-secondary.

In the early years of the program all courses were only offered face-to-face in the summer from June through early August, giving the program the internal nickname of the "Summer Master's" program. Beginning in 1999, online courses began to be offered. Gradually, required courses also were added to online course offerings in the spring, fall and eventually summer semesters to help teachers progress towards graduation throughout the year. Today fully 85% of the credits that teachers can earn in the program are online.

As the MSNREE program has evolved over the last 21 years, the profession of environmental education has also evolved. Standards for the development of environmental educators have been created during this same timeline to make sure that the knowledge and skills needed to provide quality environmental education are provided in the training of environmental educators. As UWSP Faculty members who guided the development of the MSNREE are some of the same Faculty who were very involved with the professional EE

community, it is not surprising that both the MSNREE program and professional EE standards are in close alignment.

Outline of MSNREE Program

The overarching goals and objectives of the MSNREE program have remained the same over time. The goals of developing teachers who apply quality EE within their classrooms and become EE leaders have remained the same since the program began in 1992. The courses and teaching methods to bring about those goals have evolved over time.

To be admitted to the MSNREE candidates need to have 1 year of professional teaching experience, a combined GRE score of 1000 (GRE scoring before August 2011) , and maintained a GPA of 3.0 or above during their final two years as an undergraduate. To apply a copy of the candidate's teaching license needed to be provided.

The core courses that are required are as follows:

NRES 600 – Environmental Studies for Practitioners
NRES 612 – Ecological Basis for Environmental Education
NRES 614 – Environmental Education Teaching Strategies
NRES 615 – Environmental Education Curriculum Resources
NRES 701 - Readings in Environmental Education (also titled as Environmental Education Theory and Practice and Fundamentals of Environmental Education)
NRES 705 – Environmental Issues Investigation and Action
NRES 750 – Human Dimension Research Methods: Proposal Writing
NRES 761 – Personal Environmental Education Leadership
NRES 762 – Organizational Environmental Education Leadership
NRES 795 – Graduate Seminar

Course catalog descriptions for these courses can be found in Appendix A.

In addition to the core courses above, candidates must take credits in the following areas:

Natural Resources (which includes courses in forestry, wildlife, waste, waters, etc)
Methodology (which includes course focus on applying EE to their classroom)
Interdisciplinary (which involves courses that work across traditional academic classroom subjects)

Candidates in the program can choose to complete the degree in either Plan B or Plan C. Plan B requires candidates to write a non-thesis project and take 30 credits. Plan C requires candidates to complete a comprehensive exam and 36 credits. Plan A is a standard thesis-based program for on campus graduate students. It does not apply to MSNREE candidates.

Need for Assessment

Evaluations of each course have occurred throughout the MSNREE program, but very little has been done about evaluating the impact on the gain of knowledge and skills of graduates since 1994. Each year an exit survey is done by each participant in one of their final courses of the program, NRES 795 – Graduate Seminar. The surveys are read and acted upon by program faculty and staff as they are received, but little has been done to document the recurring themes or to track changes in these surveys over time. Through surveying graduates, the knowledge and skills they gained by participating in the program can be assessed. Additionally, the program can explore how graduates incorporated these skills and knowledge into their teaching careers. The MSNREE program encourages graduates to become EE leaders in their school, district, community, state and the nation. Learning from respondents what leadership skills and knowledge they have used from the program to become a leader will also help us enhance the effectiveness of the leadership goal.

Research Question & Objectives:

Primary Question**:** To what extent are environmental education knowledge and skills gained by candidates in the Master's in EE for K-12 Teachers program?

Research Objectives:

- Verify that the "Standards for the Initial Preparation of Environmental Educators" National Council for Accreditation for Teachers Education are taught in the core courses of MSNREE program
- Assess if graduates of the program perceive that the MSNREE program taught the skills and knowledge in the above stated *Standards*.
- Seek evidence that confirms the MSNREE graduates' perceptions of knowledge and skills gained by correlating evidence of teaching in classroom/outreach to the above stated *Standards.*
    - Establish the level at which environmental topics and citizen engagement strategies are taught by MSNREE graduates.
    - Explore the barriers and factors supporting application of EE in the classroom.
    - Establish what leadership skills MSNREE graduates gained and have put into practice since graduating from the program.

Limitations

- This is an internal review of the MSNREE program. Those conducting the survey do have a vested interest in the success of the program due to the nature of their positions.
- Due to the length of time from when graduates matriculated until the time the questionnaire was administered, the length of time of recollection was quite variable. For example a graduate who graduated from the first cohort in 1994 would be recalling the knowledge and skills gained 19 years ago, while someone graduating in 2012 would be recalling information from their candidacy which ended in that year.

Definitions of Terms

EE – Environmental Education - "Environmental education is a lifelong learning process that leads to an informed and involved citizenry having the creative problem-solving skills, scientific and social literacy, ethical awareness and sensitivity for the relationship between humans and the environment, and commitment to engage in responsible individual and cooperative actions. By these actions, environmentally literate citizens will help ensure an ecologically and economically sustainable environment." (Wisconsin Environmental Education Board, 1998)

Standards – All of the standards referred to in this document are the "Standards for the Initial Preparation of Environmental Educators" National Council for Accreditation for Teacher Education published in November 2007 (NAAEE, 2007b).

NCATE - National Council for Accreditation for Teacher Education

NAAEE - North American Association for Environmental Education

MSNREE - Master of Science in Natural Resources in Environmental Education for pK-12 teachers.

Professional development - courses, workshops or other learning opportunities designed to develop knowledge and skills in the professionals who participate.

Graduate - In this document graduate refers to a person who matriculated through the MSNREE program.

Citizen engagement strategies - These are practices employed by citizens to affect change regarding issues that affect them or of which they want to change the outcome.

Environmental topics - These are topics as outlined to be covered in the Wisconsin Environmental Science network framework. These are topics that are generally taught in a high school environmental science courses, but many of the topics can be introduced at much earlier levels of education. (Wisconsin Center for Environmental Education, 2008)

Assumptions

- The MSNREE program is designed to influence graduates to implement environmental education into their teaching and encourage them to become leaders in environmental education.
- Graduates of the MSNREE program will apply the knowledge and skills gained from the program to the best of their ability within their teaching context.
- This research will not be able to prove empirically that all skills and knowledge expressed regarding the *Standards* came from participating in the MSNREE program, however the case can be made that graduates of the MSNREE do have skills and knowledge expressed in the *Standards* from wherever they learned them.
- Regardless of when the graduates matriculated they will be able to recall the skills and knowledge they received as a result of participating in the MSNREE program.

Chapter 2: Literature Review

Defining environmental education

The Wisconsin Environmental Education Board adopted the following definition of environmental education (EE) in 1998: "Environmental education is a lifelong learning process that leads to an informed and involved citizenry having the creative problem-solving skills, scientific and social literacy, ethical awareness and sensitivity for the relationship between humans and the environment, and commitment to engage in responsible individual and cooperative actions. By these actions, environmentally literate citizens will help ensure an ecologically and economically sustainable environment." (Wisconsin Environmental Education Board, 1998)

The state of Wisconsin Department of Public Instruction requires that students in all schools be taught environmental education in order for them to become environmentally literate citizens as called for in the above definition. (Wisconsin Department of Public Instruction, 2012) In order for teachers to be prepared to teach their students environmental education, teachers themselves must be prepared through their education in order to get their teaching license (Wisconsin Department of Public Instruction, 2010).

To promote environmental literacy amongst citizens as recommended in the definition above and by Ruskey, et. all (2001), programs like the MSNREE provide professional development to in-service teachers. This professional development helps build the teachers' capacity to do EE in their classrooms. The MSNREE is a component of professional development that is also called for in *Wisconsin's Plan to Advance Education for Environmental Literacy and Sustainability in PK-12 Schools* (Wisconsin No Child Left Inside Coalition, 2011). Specifically professional development is called for within *Wisconsin's Plan* Goal 3.2 - Provide professional development for teachers related to integrating education for environmental literacy and sustainability in the classroom at all grade levels and across all subject areas. This research aims to provide evidence that despite barriers, graduates of the

MSNREE program are teaching a range of environmental topics, citizen action strategies and serving as leaders in EE within their school and profession to advance environmental literacy.

Standards for the Preparation of Teachers in Environmental Education

To advance environmental literacy and for a host of other reasons, teachers can undertake professional development in EE. A set of academic standards for teacher education in EE are provided by the National Council for Accreditation of Teacher Education - NCATE (NAAEE 2007b). The "Standards for the Initial Preparation of Environmental Educators" highlight what teachers need to know to provide quality EE in their classrooms.

The "Standards for the Initial Preparation of Environmental Educators" (*Standards*) were developed by a team of 10 environmental education professionals (NAAEE 2007a). This team of 10 was composed of faculty and staff at universities and colleges from across the United States and representatives from national EE organizations. The team built on earlier standards developed in the 1990s in the *Excellence in Environmental Education: Guidelines for Learning* (NAAEE. 2010a) and the *Guidelines for the Preparation and Professional Development of Environmental Educators* (NAAEE. 2010b) from the North American Association for Environmental Education. The *Guidelines for Learning* were used to help in designing what teachers need to know in order to effectively teach their students lessons to meet those standards.

Standards are used in education to create measureable goals and objectives to ensure that all students have access to content and perform to a degree of mastery. (Ravich, 1995) Standards are also put in place to define the resources (programs, staff, teachers, etc.) that should be available for student learning. The NCATE EE *Standards* are standards for the education of teachers. They are informed in part by the standards teachers are expected to meet when educating their students in EE. The *Standards* can be used as guidelines so that all providers of teacher education in EE provide professional development knowledge and skills outlined

in the *Standards* to all candidates. Candidates referred to in the *Standards* are teacher and environmental educator candidates.

Standard 1 is created around the definition and history of environmental education. Environmental education has been defined and refined in International Conferences on Environmental Education. The latest of these 4 conferences was held in Ahmedabad, India in 2007. Beyond the formal definition process that started in the 1960s, EE has its roots in nature study, conservation education and outdoor education. This standard defines the components of environmental literacy citizens need in order to be informed on environmental issues and to make decisions regarding those issues.

Table 2.1 – NCATE EE Standard 1

STANDARD 1. Nature of Environmental Education and Environmental Literacy.
1.1 Candidates demonstrate an understanding of how environmental education has evolved over time and continue to change.
1.2 Candidates demonstrate an understanding of the defining characteristics and guiding principles of environmental education.
1.3 Candidates demonstrate an understanding of the components of environmental literacy

Standard 2 speaks to the environmental literacy of the teachers and candidates who learn environmental education. Candidates understand and can explain the complex systems that make up the world around us. Through developing inquiry and investigation skills to explore complex environmental issues, candidates are developing skills to become reflective and skillful citizens. As skillful citizens, candidates understand that the lifestyle choices they make will affect their community and the whole complex system around them. Public policy decisions affect economic, social and environmental systems.

Table 2.2 – NCATE EE Standard 2

STANDARD 2. Environmental Literacy of Candidates
2.1 Candidates demonstrate environmental inquiry skills, and use technology as a tool to answer their own questions.

STANDARD 2. Environmental Literacy of Candidates (Cont'd)
2.2 Candidates demonstrate an understanding of the processes and systems that comprise the environment, including Earth as a physical system, the living environment, and human social systems and influences.
2.3 Candidates identify, select and investigate environmental issues and use technology as a tool when conducting these investigations.
2.4 Candidates demonstrate an understanding of the importance of exercising the rights and responsibilities of environmental citizenship.
2.5 Candidates identify and evaluate the need for action on specific environmental issues, identify possible action projects, and evaluated potential outcomes of those action projects.
2.6 Candidates use the results of their investigations to plan, carry out, and evaluate action projects designed to address selected environmental issues.

Standard 3 highlights candidates' understanding of students' development and learning needs. With that understanding they apply the most effective and appropriate lessons for their diverse class of learners, while focusing on environmental literacy knowledge and skills. Adapting and applying lessons based on the developmental level of individual students is important to make sure each student develops his or her own inquiry and citizen engagement skills.

Table 2.3 – NCATE EE Standard 3

STANDARD 3. Learning Theories and Knowledge of Learners
3.1 Candidates impact diverse students' learning by applying appropriate theories of learning and development when planning, delivering, and improving environmental education instruction.
3.2 Candidates impact diverse students' learning by applying an understanding of learning processes when planning, delivering, and improving environmental education.
3.3 Candidates impact diverse students' learning by applying an understanding of ability levels and cultural and linguistic backgrounds when planning, delivering, and improving environmental education instruction.

Standard 4 speaks to the integration of environmental education into educators' learning spaces. Environmental education is interdisciplinary across standard academic subjects. By aligning environmental education with national, state and local content standards, educators are ensuring students get the academic knowledge and skills they need along with expanding

their environmental literacy. Standard 4 ties to the *Guidelines for Learning* (NAAEE. 2010a), which educators can use as a planning guide to increase both environmental literacy and academic achievement for their students.

Table 2.4 – NCATE EE Standard 4

STANDARD 4. Curriculum: Standards and Integration
4.1 Candidates align NAAEE's *Guidelines for Learning (PreK-12)* 7 and associated environmental literacy components with national, state, and district content standards.
4.2 Candidates use alignment results to select, adapt, and develop environmental education curricular and instructional materials.
4.3 Candidates seek opportunities to integrate environmental education into standards-based curricula and school programs.

There are many instructional materials and resources for environmental educators. Standard 5 addresses how to describe and evaluate environmental education resources for use in a teaching setting. Quality environmental education resources and teaching methods lead to an increase in environmental literacy for all students. This includes adapting instruction and resources to address all types of learners and using technology-rich instructional plans.

Table 2.5 – NCATE EE Standard 5

STANDARD 5. Instructional Planning and Practice.
5.1Candidates describe and critically review a range of instructional materials, resources, technologies, and settings for use in environmental education.
5.2 Candidates impact students' learning by selecting and implementing instructional strategies and technologies that meet diverse students' needs and lead to the development of environmental literacy.
5.3 Candidates develop technology- rich environmental education instructional plans that address diverse students' needs.
5.4 Candidates impact diverse students' learning by delivering developmentally, culturally and linguistically appropriate and effective environmental education instruction.

Standard 6 addresses the assessment of the instruction described in Standard 5. In both formative and summative forms, assessment can improve instruction. To be successful, assessment must be planned and carried out in a consistent manner. The variety of assessment methods and tools should be applied where most appropriate. It is important for

the educator to reflect on their teaching practices in light of the assessment to inform adjustments for future lessons to be taught. Assessment can help identify gaps in environmental knowledge and skills of the students with which the educator works.

Table 2.6 – NCATE EE Standard 6

STANDARD 6. Assessment
6.1 Candidates integrate assessment that meets the needs of diverse students into environmental education instruction.
6.2 Candidates impact diverse students' learning by using assessment data, collected and analyzed with the aid of technology, to inform environmental education instruction.
6.3 Candidates impact diverse students' learning by communicating assessment results and achievement to appropriate individuals.

Environmental educators and the community to which they belong are diverse. Standard 7 speaks to the benefits of belonging to a professional environmental education community which can include local through the international in scope. Professional growth and lifelong learning go hand in hand. Environmental educators can learn from one another in their professional community and use reflection as a tool for personal growth as well. Additionally, they recognize that it is important to provide accurate, balanced and effective environmental education. Advocating for the environmental education field is an important way to make sure that resources continue to be available for this important work.

Table 2.7 – NCATE EE Standard 7

STANDARD 7. Professional Growth in Environmental Education.
7.1 Candidates identify the benefits and recognize the importance of belonging to a professional environmental education community.
7.2 Candidates engage in environmental education professional development opportunities, including technology-based opportunities.
7.3 Candidates provide accurate, balanced, and effective environmental education instruction.
7.4 Candidates develop a rationale for environmental education and understand the need to advocate for the field of environmental education.

The *Standards* were not in place when the MSNREE was created, but evolved in the 1990s & 2000s in the same timeframe as the MSNREE program evolution. Despite the fact the *Standards* were not in place at the beginning of the MSNREE program and were evolving at the same time the program evolved, the *Standards* should be a good measure of the program throughout its whole history. MSNREE should still have fulfilled all of the *Standards* even from the earlier years as the founders of the program were very much in tune with the evolving EE profession which was creating the standards.

Teacher Professional Development in EE

In-service teachers are mandated to have professional development to keep a teaching license in most states in the US. An effective way to get the professional development they need for maintaining licensure is to seek a Master's degree. In a study conducted by Dawkins and Penick (1999) North Carolina teachers who were surveyed indicated the top 3 reasons they sought Masters Degrees were for improvement in teaching, financial reward, and improvement of student learning. For environmental educators in any setting there are many options for professional development, but most seek it for reasons often stemming from a desire to become a more competent educator by leaning new teaching techniques or getting a better grasp on environmental issues content (Lozar Glenn 2011). When it comes down specifically to K-12 teachers who are seeking EE professional development, they are primarily looking for opportunities that allow for collaboration, include reflection, and include time for integration of goals (Fleming 2010).

The North Carolina survey (Dawkins & Penick 1999) also indicated that teachers' preferences in professional development include lessons that are applicable to their classrooms (teaching practice) rather than theory (research). In the study by Desimone, Porter, Garet, Yoon & Birman, (2002) they found that teachers who experience consistent, high-quality professional development are implementing what they learn in their classrooms. Practice-based professional development has also shown to be effective for teachers and students. (Harris, Lane, Graham, Driscoll, Sandmel, Brindle & Schatschneider, 2012) In the research done by Harris et.al instruction was modeled and practiced in the teacher

professional development workshops. The ultimate goal of the MSNREE program is to provide consistent, high-quality, practice-based professional development for teaches in EE so they apply EE in their classrooms to teach students to become environmentally literate citizens.

Beyond professional development for the sake of implementing EE in their classroom, the MSNREE seeks to transform graduates into EE leaders. Jurow (2009) demonstrated that transformative professional development relies on the educator to be reflective and engage with a true-self with modeled practices. Additionally Santo (2005) remarks, "Success can be more than the achievement of knowledge/skills and program completion." Measuring success for adult learners who are teachers can mean transforming their worldview and how they interact with other professionals or their students.

Quality professional development of teachers in EE

At the heart of EE teacher professional development is a holistic approach to create environmental literacy in students. (Carter & Simmons, 2010) According to McDonald & Dominguez (2010), "Thoughtful integration of concepts, ideas, pedagogy, and skills for EE should reach beyond subject area barriers into the rich scope of knowledge included in many areas of study." By developing EE knowledge and skills within candidates in the MSNREE program using quality EE practices, graduates of the program can foster environmentally literate students in any subject area they teach.

Best practices in EE for teachers include both face-to-face and online learning opportunities. In generalizing the data of teachers' preferences of EE, most pK-12 teachers prefer face-to-face workshops on specific topics in the summer using experiential or hands-on methods (Fleming 2010). Online education has been shown to be highly effective, keeping participating teachers connected who would have a hard time getting to the physical campus during the school year. Online courses with self-directed activities where teachers make connections with local resources in their area have been found to be very effective (Clary & Wandersee, 2009) In addition online learning can "generate a deeper knowledge and learning

process than ordinary contact teaching, because students have to learn by themselves while they are completing assignments. This also makes the continuation of learning after the program ends more probable."(Kápylá & Wahlström, 2010) Thus, the online learning opportunities provided within the MSNREE program can be a significant link in the chain of lifelong learning of program graduates. Hybrid professional development (programs in which face-to-face and online courses are taught) is working for teachers (Davis 2011). Implementation of curriculum has been found to be happening within teachers' classrooms whether they are taught the curriculum via online or face-to-face courses (Fishman, Konstantopoulos, Kubitskey, Park,, Johnston & Edelson, 2013).

The EE NCATE *Standards* create measureable goals and objectives that also inform specific best practices for educating teachers in EE (NAAEE 2007b). For example *Standard* 2.2 – "Candidates demonstrate an understanding of the processes and systems that comprise the environment, including Earth as a physical system, the living environment, and human social systems and influences." An example of a target measure for this goal is "Candidates demonstrate in-depth knowledge of the interface of environment and society including; consumerism; uses of land; ecosystem alteration; energy and resource consumption; and human population growth. They analyze and explain the roles that social, economic, political and cultural systems play in issues such as resource depletion, environmental degradation and sustainability." By deliberately modeling EE standards and target measure assessments within teacher professional development, the probability is increased of EE lessons being applied to candidates' classrooms if support is provided and barriers are removed.

Barriers to application and factors that support the application of EE in the classroom

As EE is not a standard academic subject like math, reading or science, "it has the advantage of flexibility to be aligned with a variety of disciplines and championed by partners from different sectors." (Biedenweg, Monroe & Wojcik, 2013) With flexibility comes the price of being an easy "extra" curricula to cut if it doesn't fit the standard academic curricula being tested when budgets and/or time gets restrictive.

With the emphasis on standardized testing in K-12 classrooms today, it has become increasingly difficult to have time to address EE separately from all the core academic subjects (math, science, language arts, etc.). This presents a great opportunity because EE has always lent itself to being integrated into any of the core academic areas. By emphasizing the learner objectives that meet the core standards of other subjects, EE providers support building competencies students need to be successful in standardized tests while also developing an environmentally literate citizenry. (Monroe, Wojcik & Biedenweg, 2013)

Many of the most effective teachers of EE in the pK-12 classroom have adopted environment – based education (EBE). (Ernst 2009) Schools and classrooms that adopt this interdisciplinary, learner-centered instruction are engaging their students more fully in EE. Although the effectiveness of EBE is growing in the literature, we are not seeing a growing trend of adoption. Ernst's study of the barriers brings up other barriers that may be inhibiting some of MSNREE teachers from adopting into their classrooms.

One of the key factors for good EE is knowing how to investigate and take action on environmental issues. The program at the core of the study by Paul and Volk (2002) develops knowledge and skills in teachers in order to have students investigate and take action on environmental issues. The key to the success of the program was the additional supports that participants in the program continued to utilize after the training. Supports that significantly contributed to successful EE issues investigation in the classroom included: follow-up from the trainer, networking communications with fellow teachers, and group follow-up trainings.

Good professional development of teachers leads to good EE in classroom

There are many in-depth EE professional development training programs that have proven to be effective in preparing teachers for implementing EE in their classrooms. (Harris, et. al. 2012; Kápylá, & Wahlström. 2010; McDonald & Dominguez, 2010; Moseley, Huss, & Utley, 2010; Paul & Volk ,2002) Moseley, Huss, & Utley, (2010) found that teachers who

participated in their GLOBE teacher training gained both personal environmental teaching efficacy (PETE) and environmental teaching outcome expectancy (ETOE).

Effective education methods are ever-evolving in both the pK-12 classrooms as well as the classrooms that provide professional development for pK-12 teachers. Professional development that focuses on "Learner-centered teaching" is a growing trend. (Kayler 2008) Teachers in Kayler's program were appreciative of peer teaching and practical information they learned from each other. In addition to having a learner-centered focus it is often possible for trainer and teachers to craft lessons that are specifically appropriate to the learner as called for in Wojcik et.al. (2012).

Conclusion

Environmental education that can help create an environmentally literate citizenry is mandated for teachers and students in the state of Wisconsin. The NCATE EE *Standards* help ensure that teacher EE professional development has a certain level of quality for those programs who adhere to the *Standards*. Teachers who participate in standards based professional development are more fully prepared with knowledge and skills to implement EE in their classrooms. There are a variety of EE methods to ensure that students are educated to be environmentally literate. Modeling of these methods in teacher professional development increases the use of these methods in teachers' classrooms.

Chapter 3: Research Methods

Several sources of data and analysis methods were used to determine if the MSNREE program has met the NCATE EE *Standards*. Content analysis of syllabi, a focus group with faculty members and questionnaire development are reviewed in this chapter. Also included is a review of the logic model developed for describing the MSNREE program.

Content Analysis of Core Courses Syllabi

The syllabi from the Program's core courses were collected from the MSNREE faculty and teaching staff. The learning objectives and course goals listed in the syllabi were used in verifying that the NCATE EE *Standards* (NAAEE 2007b) are taught in core courses. A summary of the course syllabi is included in Appendix B. This summary lists the course goals or objectives and assessments as listed in each corresponding syllabi.

The researcher read all the syllabi, compiled them in the summary document and began matching the course goals or objectives to the *Standards* in a separate document. Due to the variety in the structure of the course syllabi, some *Standards* were easy to identify and others impossible. Based on this first stage of verification the following *Standard* were identified to be taught in the MSNREE core courses based on the syllabi collected: 1.1, 1.2, 1.3, 2.1, 2.2, 2.4, 3.1, 3.2, 3.3, 4.1, 4.2, 4.3, 5.1 and 5.2. Please refer to Tables 2.1 – 2.7 for their full listing.

Focus Group with Faculty

To further match the course goals and objectives to the *Standards* a focus group with the faculty and instructional staff was held. All MSNREE core teaching Faculty and staff met on June 24, 2011. In the meeting all who attended worked through the grid of *Standards* as a document to guide discussion. Each faculty or staff called out the number of courses which

met the standard. The final discussion of the meeting was to determine if the Standards were the best benchmarks by which to evaluate the MSNREE program.

Development of Questionnaire

A questionnaire sent to all MSNREE graduates was designed and administered in this phase of the research. In the questionnaire a mixture of qualitative and quantitative data were collected. The questionnaire was administered online and in paper form, but before it was distributed it was tested in paper form with a focus group of local MSNREE graduates. Once the questionnaire was piloted and further edited, based on feedback from additional faculty members, it was published online within the UWSP Select Survey tool. All graduates were contacted with an initial letter and invited to complete the questionnaire online. Responses were tracked and reminders were sent twice to those who did not participate by the time the next reminder was sent. Data collection was complete on August 2, 2013.

Logic Modeling

Before designing the questionnaire the researcher used logic modeling (W.K. Kellogg Foundation 2004) to summarize the MSNREE program. This logic model was developed step by step as the researcher examined the details of the MSNREE program goals, objectives and organization. Information was gathered from the MSNREE website, knowledge the researcher had from working with the program, and communications with faculty and staff associated with the program.

The purpose of a logic model was to help the researcher to visualize the whole MSNREE program and identify questions to be asked about each component. By visualizing the whole program, questions could be designed to evaluate various inputs, outputs and objectives as they related to the *Standards*. It also is a communication tool so that all stakeholders of the MSNREE program will understand the objectives, outcomes and context of the program as it relates to the *Standards.*

To create the logic model, the program was described using clear and specific language. This included describing program goals, situation, program objectives, assumptions and the environment the program operates within. Information was gathered about the process from resources/inputs, to activities and participant outputs, to short, medium and long term outcomes.

Questionnaire Item Development

Have we met the Standards?

Three sets of questions were designed to measure the graduates' perception of the level at which the MSNREE program was responsible for their ability listed in the NCATE EE *Standards*. The standards were grouped into 3 categories to break them down into manageable sets to which to respond. The categorization of the *Standards* was based on the researcher's view on whether the standard matched best with overall EE, teacher-centered and student-centered categories. These Likert-scale questions had a range of 5 responses to choose from strongly agree to strongly disagree with a neutral choice in the middle. The base questions for these standards are highlighted in green in Table 3.1.

Table 3.1 – Base questions of MSNREE Graduate Questionnaire

Base Question	**Type of question**
How much did each of the following factors influence your decision to apply to the MSNREE program? Please circle the corresponding level at which you would consider the factor.	Likert-scale
If a colleague were to choose to start the MSNREE program now, how much of a factor do you think the following would be? Please circle the corresponding level at which you think a colleague would consider the factor.	Likert-scale
How much do you agree that participating in the MSNREE program is responsible for improving your ability to do the following? Please circle the corresponding level at which you agree or disagree.	Likert-scale
How much do you agree that participating in the MSNREE program is responsible for improving your ability to do the following *teacher-centered* actions? Please circle the level at which you agree or disagree.	Likert-scale

Base Question	Type of question
How much do you agree that participating in the MSNREE program is responsible for your ability to do the following *student-centered* actions? Please circle the level at which you agree or disagree.	Likert-scale
What were the benefits of participating in the MSNREE program, if any?	Open-ended
What challenges did you experience when participating in the MSNREE program? What improvements could we make to the program to address those challenges?	Open-ended
Did your career change because of participating in the MSNREE program? Please explain your answer.	Open-ended
In what year (academic or calendar) did you most recently teach:	Open-ended
What was your position title in the last year you taught:	Open-ended
During your latest teaching year, what grade level(s) did you teach?	Select all that apply
During your latest teaching year, what subjects did you teach?	Select all that apply
During your latest teaching year, at which level have you explored with your students the following environmental themes within your curriculum? Please circle which level best describes the amount of instruction you spend on the topic.	Likert-scale
What barriers have you encountered to teaching environmental themes?	Open-ended
What supports have you encountered for teaching environmental themes?	Open-ended
During your latest teaching year, what % of <u>all</u> the lessons you teach in all subjects are related to the following environmental values?	Likert-scale
During the last 5 years of teaching what citizen engagement strategies have you conducted or facilitated with your students? Please indicate the number of times you have facilitated these strategies.	Likert-scale
How often have you used the following leadership and communication skills which you learned from the MSNREE program in your career since graduation? Please circle the value level.	Likert-scale
To what extent did the MSNREE program contribute to your leadership and communication skills?	Open-ended
If a colleague were to choose to start the MSNREE program, how many credits would you think they would prefer to take in each of the following terms each year? The program requires 30-36 credits in total.	Open-ended
In taking courses for professional development, what would be your preferred course delivery mode? Please select your preferred course delivery mode for individual courses within each term.	Likert-scale

Base Question	Type of question
UWSP is exploring the possibility of offering an Educational Doctorate (Ed.D.) program with a Sustainability focus. Is this a program in which you would consider participating?	Open-ended

Evidence of Application of EE knowledge and skills in graduates' classrooms

In a series of questions respondents were asked to answer based on their most recent year of teaching. It was stated in the questionnaire that teaching was based on a broad definition of teaching including non-formal community outreach as well as formal classroom teaching. Respondents were asked to record the year, the position title they held that year, the grade levels taught and the subjects taught. Base questions for this information are highlighted in pink in Table 3.1.

Graduates were then asked the level at which they taught 9 broad environmental topics. The environmental topics were derived from the Wisconsin Environmental Science Course Framework (Wisconsin Center for Environmental Education, 2008) with 2 additional categories as recommended by the questionnaire pilot focus group. Levels were defined as week(s) = 5 or more days of instruction, day(s) = more than 3 hours but less than 5 days of instruction and hour(s)= 1 to 3 hours of instruction. The base question pertaining to levels of environmental topics taught is highlighted in yellow in Table 3.1.

In anticipation that teachers perceived that they learned skills and knowledge from participating in the MSNREE program, but are not able to apply those knowledge and skills to their teaching, graduates were asked about barriers to teaching environmental themes that they encountered. Graduates were also asked what supports they encountered for teaching environmental themes. Base questions pertaining to barriers and supports are highlighted in pale peach in Table 3.1

Citizen engagement strategies are important in EE so students who are aware of environmental issues are also aware of the actions they can take to affect change. These citizen engagement strategies are standards 2.3 – 2.6 in the NCATE EE Standards (NAAEE,

2007). For the last 5 years of teaching, respondents were asked about the frequency with which they conducted or facilitated citizen engagement strategies with students. The base question pertaining to levels of citizen engagement strategies taught is highlighted in lavender in Table 3.1.

EE Leadership in action

As one of the goals of the MSNREE program is to develop MSNREE graduates into leaders, graduates were asked how often they used their leadership and communication skills. These leadership and communication skills correspond with the standards 7.1 – 7.4 in the NCATE EE *Standards* (NAAEE, 2007). Of the twelve leadership and communication skills, respondents were asked how often since graduation they have used the skills. The base question pertaining to leadership and communication topics is highlighted in blue in Table 3.1.

Focus Group Pilot

In March 2013 local MSNREE graduates (graduates who live or work within 60 miles of Stevens Point) were invited to participate in a focus group to pilot the questionnaire. On March 19, 2013, five MSNREE graduates met at the Wisconsin Center for Environmental Education in the evening. The questionnaire was administered via paper and once everyone had completed it the group discussed the questionnaire overall and suggested edits. Based on their feedback the questionnaire was modified. The modified questionnaire was sent for review to the Master's Program Coordinator and additional interested faculty members. The questionnaire was edited further based on their feedback and set up in the UWSP online Select Survey system. The questionnaire was also formatted for print. The full print version can be found in Appendix C.

Questionnaire Implementation

Contact information was assembled for all 212 MSNREE graduates in April 2013. Continuing Education staff at the College of Natural Resources maintains a database of all MSNREE graduate and potential students. Graduates' names, addresses, emails, graduation

years, project titles (if applicable) and Plan C status was pulled from the database and kept in a separate spreadsheet for the purpose of this study. Each student was assigned an ID code so the data from the questionnaire could be kept separate from the student's identifying data. Once data were collected the ID codes allowed for the matching of the student with graduation year and plan B or C code.

The span of time from the first graduates in the program in 1994 and the last graduates in 2012 saw rapid change in technologies and many changes in addresses for people. Email was in its infancy when the graduates matriculated in the mid-1990's so there were no email addresses on file for many graduates from early in the program. Additionally many of the addresses that were on file for the graduates are dated. Still these were the two forms of communication used to communicate with the students.

For graduates for whom only a physical address was available an initial letter (see Appendix D) was sent via mail. For graduates for whom an email address was available the initial letter was sent via email. Both letters contained the same information and a URL to the Select Survey questionnaire. As responses came in, the ID codes were noted and tracked in the spreadsheet containing all graduate information so reminders were not sent to those who had already responded. Each email was individually sent since it had the student's ID code in it.

Table 3.2 Questionnaire Communication Summary

When communication was sent	**Communication sent to Physical Address**	**Communication sent to Email Address**
End of April 2013	Initial letter	Initial letter in email
End of May 2013	Questionnaire, with letter & return postage envelope	Reminder email
End of July 2013	Reminder postcard	Final reminder email

Incentive for participating

To reward graduates for their time spent to complete the survey, everyone who completed the questionnaire received a gift of either a UWSP Alumni window decal or lapel pin. In addition, everyone who completed the questionnaire was entered in a drawing for a $100 Amazon Gift Certificate. Summaries of the results were sent to respondents at the time their participation gifts were distributed.

Screening of Data

Once all the data from the print copies was entered in the system, the researcher double checked using the ID numbers reported. Some respondents used the wrong ID number so therefore the researcher was unable to match up their graduation year and project status. For complete analysis their data was removed. Also some respondents did not complete the full questionnaire. Data from respondents who completed the questionnaire through the NCATE EE *Standards* based questions remained in the data pool.

Data was exported from Select Survey to Microsoft Excel. Here data collected from respondents was matched to their graduation year and project status using their ID numbers. This is necessary to delineate differences when analyzing data from earlier graduates in comparison to more recent graduates.

Methods employed to analyze data:

To test the data, a mixture of qualitative and quantitative methods were used depending on the data gathered. Quantitative data from the Likert-scale questions were first analyzed in Microsoft Excel for mean and standard deviation values. For "select-all-that-apply" questions a frequency chart was generated.

Qualitative data were analyzed by open coding for common themes within Microsoft Excel. Data for these questions have been qualitatively assessed. The researcher first read through all the answers and started identifying themes. These themes were grouped and quotes which demonstrate those themes are reported.

Chapter 4: Results

The MSNREE program has graduated over 200 teachers in the 21 the years of the program. This chapter highlights the results of the questionnaire administered to the MSNREE graduates. Graduate demographics, perceptions of how well the MSNREE program met NCATE EE *Standards,* and evidence of how graduates have implemented EE in their classrooms are covered in this chapter. Additionally, leadership skills graduates have used are covered. Connections of where in the core courses the *Standards* are taught are also revealed. Additionally, where the Standards fit within the logic model of the MSNREE are also explored.

Content Analysis of Core Syllabi & Focus Group with Faculty

Data from the focus group conducted on June 24, 2011, identified in which course(s) NCATE EE *Standards* were taught and additional standards covered. The courses reported in Table 4.1 are a record of the focus group/meeting. It was established that all of the *Standards* were covered in the core courses. Most of the *Standards* were covered in more than one of the core courses. It was also established that the program had additional standards which went above and beyond the *Standards* and were recorded at the end of the document. It was agreed that the *Standards* should be used as the benchmarks by which to evaluate the MSNREE program.

Table 4.1 – MSNREE courses matched to NCATE EE *Standards*

NCATE EE Standard	Course(s) in which covered
1.1 Candidates demonstrate an understanding of how environmental education has evolved over time and continues to change	NRES 701
1.2 Candidates demonstrate an understanding of the defining characteristics and guiding principles of environmental education.	NRES 701, NRES 614
1.3 Candidates demonstrate an understanding of the components of environmental literacy	NRES 701 NRES 614 NRES 600
2.1 Candidates demonstrate environmental inquiry skills, and use technology as a tool to answer their own questions.	NRES 705 NRES 614 NRES 750 NRES 600

NCATE EE Standard	Course(s) in which covered
2.2 Candidates demonstrate an understanding of the processes and systems that comprise the environment, including Earth as a physical system, the living environment, and human social systems and influences.	NRES 600 NRES 612
2.3 Candidates identify, select and investigate environmental issues and use technology as a tool when conducting these investigations.	NRES 750 NRES 705 NRES 600
2.4 Candidates demonstrate an understanding of the importance of exercising the rights and responsibilities of environmental citizenship.	NRES 705 NRES 530 NRES 704 NRES 600
2.5 Candidates identify and evaluate the need for action on specific environmental issues, identify possible action projects, and evaluated potential outcomes of those action projects.	NRES 705 NRES 600 Electives – NRES 734
2.6 Candidates use the results of their investigations to plan, carry out, and evaluate action projects designed to address selected environmental issues.	NRES 705 NRES 798
3.2 Candidates impact diverse students' learning by applying an understanding of learning processes when planning, delivering, and improving environmental education.	NRES 701 NRES 761 NRES 614 NRES 615 NRES 640
3.3 Candidates impact diverse students' learning by applying an understanding of ability levels and cultural and linguistic backgrounds when planning, delivering, and improving environmental education instruction.	NRES 640 NRES 701 Elective -Urban EE
4.1 Candidates align NAAEE's *Guidelines for Learning (PreK-12)* 7 and associated environmental literacy components with national, state, and district content standards.	NRES 615 NRES 701 NRES 614
4.2 Candidates use alignment results to select, adapt, and develop environmental education curricular and instructional materials.	NRES 615 NRES 614 NRES 701
4.3 Candidates seek opportunities to integrate environmental education into standards-based curricula and school programs.	NRES 701 NRES 614 NRES 615 Electives - NRES 730-740
5.1Candidates describe and critically review a range of instructional materials, resources, technologies, and settings for use in environmental education.	NRES 615 NRES 701 NRES 706 NRES 600
5.2 Candidates impact students' learning by selecting and implementing instructional strategies and technologies that meet diverse students' needs and lead to the development of environmental literacy.	NRES 615 NRES 614 NRES 600 Electives - NRES 730-740 NRES 640
5.3 Candidates develop technology- rich environmental education instructional plans that address diverse students' needs.	NRES 615

NCATE EE Standard	Course(s) in which covered
5.4 Candidates impact diverse students' learning by delivering developmentally, culturally and linguistically appropriate and effective environmental education instruction.	NRES 615 NRES 614 NRES 701 Electives - NRES 640
6.1 Candidates integrate assessment that meets the needs of diverse students into environmental education instruction.	NRES 701 NRES 615 NRES 614 Electives - NRES 640
6.2 Candidates impact diverse students' learning by using assessment data, collected and analyzed with the aid of technology, to inform environmental education instruction.	NRES 750 NRES 798
6.3 Candidates impact diverse students' learning by communicating assessment results and achievement to appropriate individuals.	NRES 798 NRES 761 Electives - NRES 640
7.1 Candidates identify the benefits and recognize the importance of belonging to a professional environmental education community.	NRES 614 NRES 600 NRES 701 NRES 761 NRES 762
7.2 Candidates engage in environmental education professional development opportunities, including technology-based opportunities.	NRES 600 All online
7.3 Candidates provide accurate, balanced, and effective environmental education instruction.	NRES 615 NRES 795 NRES 798 NRES 701 NRES 614
7.4 Candidates develop a rationale for environmental education and understand the need to advocate for the field of environmental education.	NRES 761 NRES 762 NRES 600
8.0 Candidates develop and apply skills in research and program evaluation	NRES 750 NRES 798
9.0 Candidate develop and apply skills in community involvement & partnership building	NRES 761 NRES 762

Questionnaire:

Logic Model of MSNREE

In the initial development of the questionnaire a logic model was developed to explain the context in which the MSNREE operates and establish where the *Standards* were covered in relationship to the organization of the MSNREE program. Figures 4.1, 4.2, and 4.3 display the logic model that was developed. Within Figure 4.2 connections to the *Standards* are

highlighted and are indicated with a *Std* 1.1 for example. Note that the Program Objectives are the NCATE standards with 3 additional standards.

Figure 4.1 - Logic Model of MSNREE – Goals, Situation & Objectives

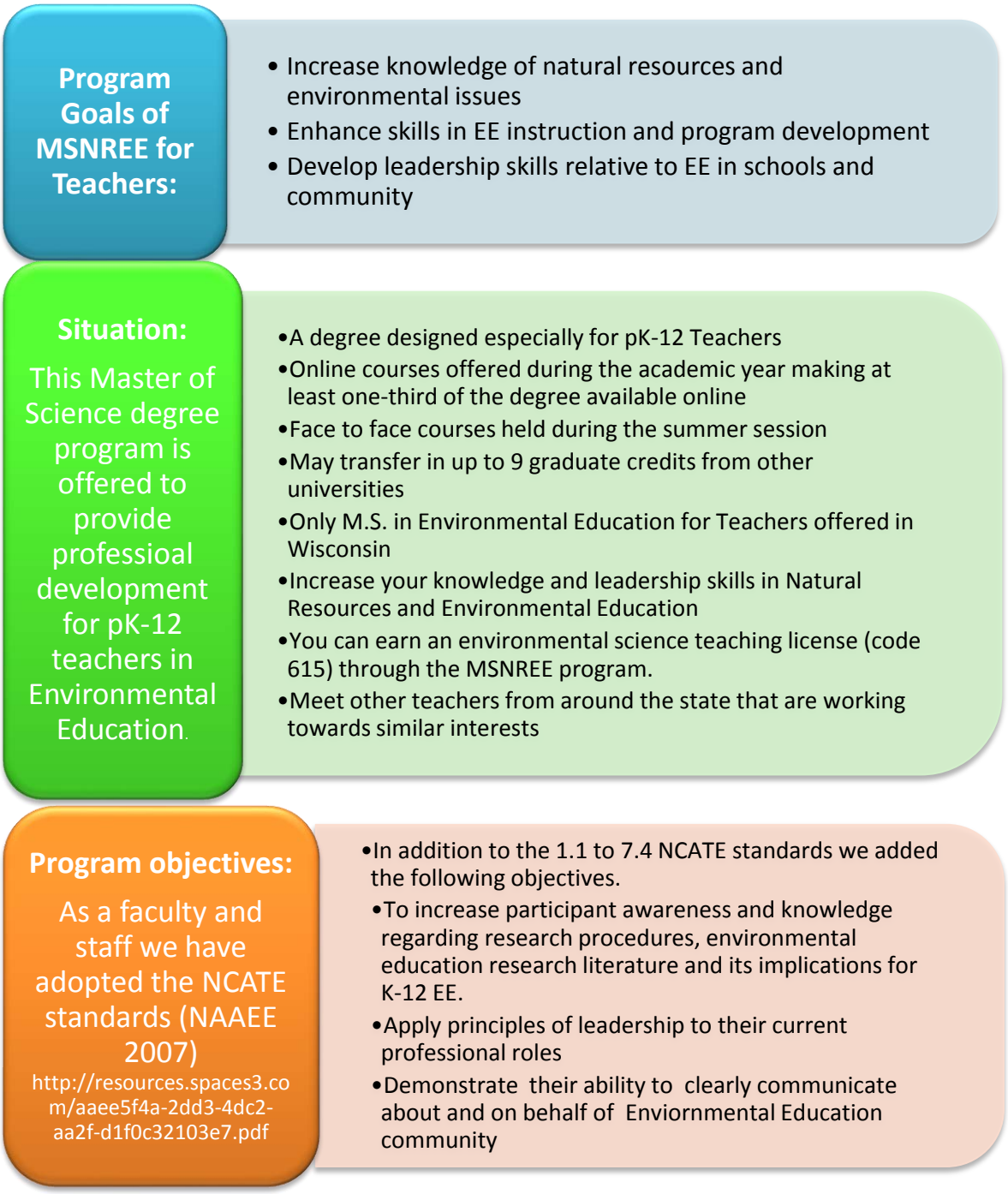
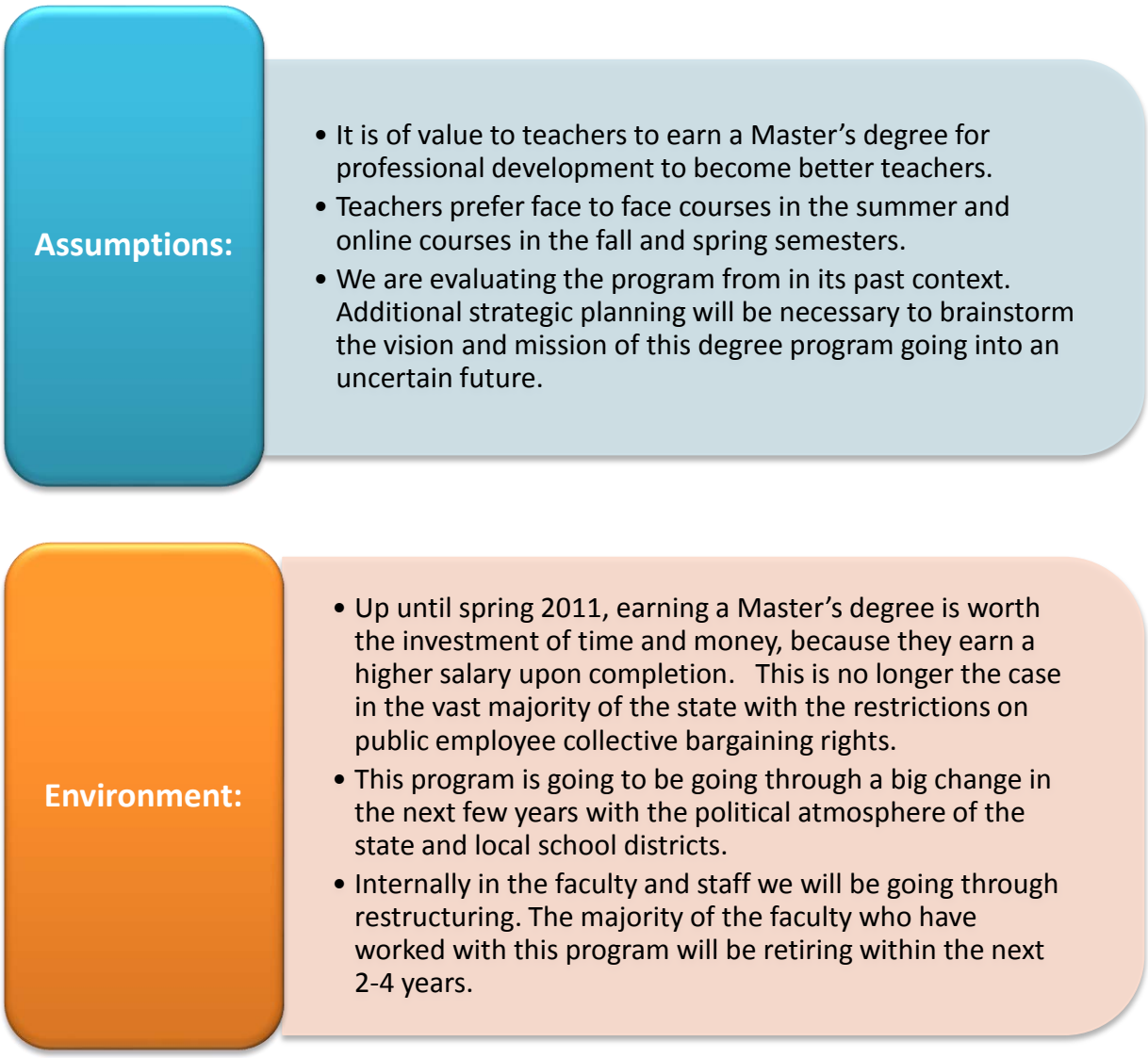


Figure 4.2 - Logic Model of MSNREE – Inputs, Outputs and Outcomes

Inputs	Outputs		Outcomes		
	Activities	Participants	Short	Medium	Long
Staff • CE Staff • Faculty & • Academic Staff Instructors Revenue from Tuition Office Supplies Online course management software Recruitment materials	Face to Face Classes Online Classes Program Orientation	MSNREE teachers Additional teachers taking individual EE professional development courses	• Gain knowledge of EE's history and definition (*Std* 1) • Apply EE knowledge to their curriculum (*Std* 5) • Inquire and investigate local, regional and national environmental issues(*Std* 2) • Introduce students to values of environmental studies(*Std* 3) • Evaluate EE curriculum for effectiveness(*Std* 4) • Explore with students actions that can be taken as citizens (*Std* 2)	• Apply leadership and communication skills to School District and community (*Std* 7) • Leading fellow teachers through example and leadership roles to bring more EE into Wisconsin's classrooms (*Std* 7) • Become involved in EE professional development organizations (*Std* 7)	• More environmentally literate citizenry (All *Stds*) • Students are educated on and working toward building sustainable communities (All *Stds*)

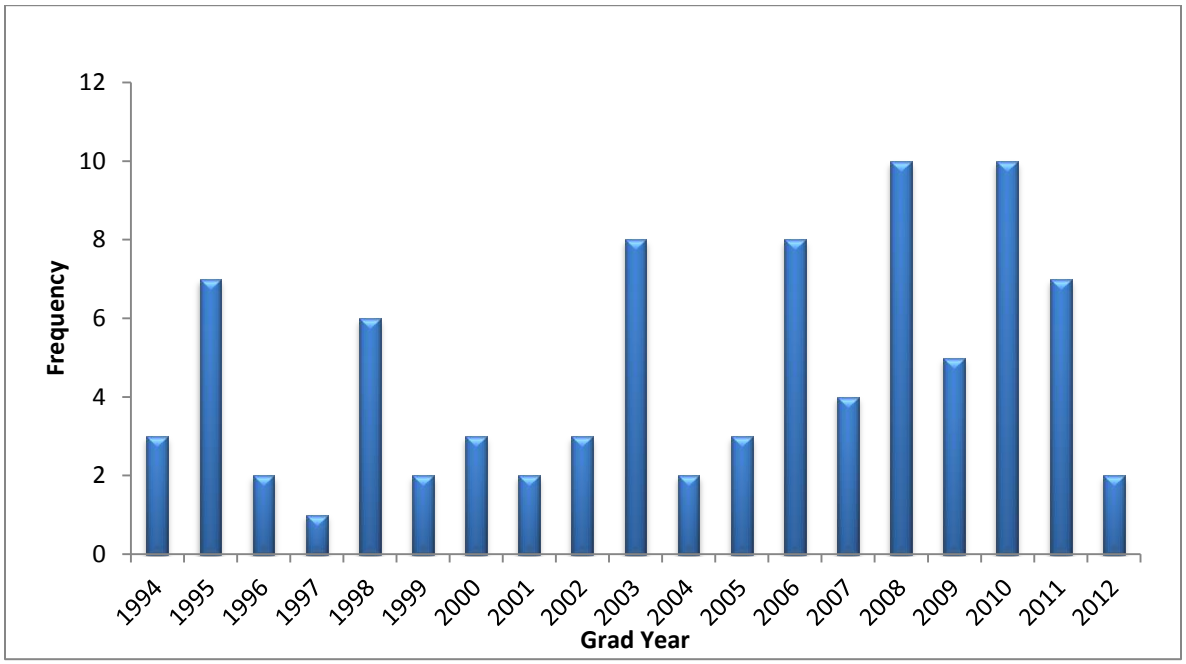
Figure 4.3 - Logic Model of MSNREE – Assumptions and Environment



Respondents' demographics

Ninety-five of 212 graduates responded to the survey for a 45% response rate. When the responses were screened for ID accuracy and to verify that the *Standards* based questions were answered, the number of responses analyzed for this study dropped to 88 of 211 graduates for a 41% response rate.

Figure 4.4 – Frequency chart of graduating years of respondents (n=88)



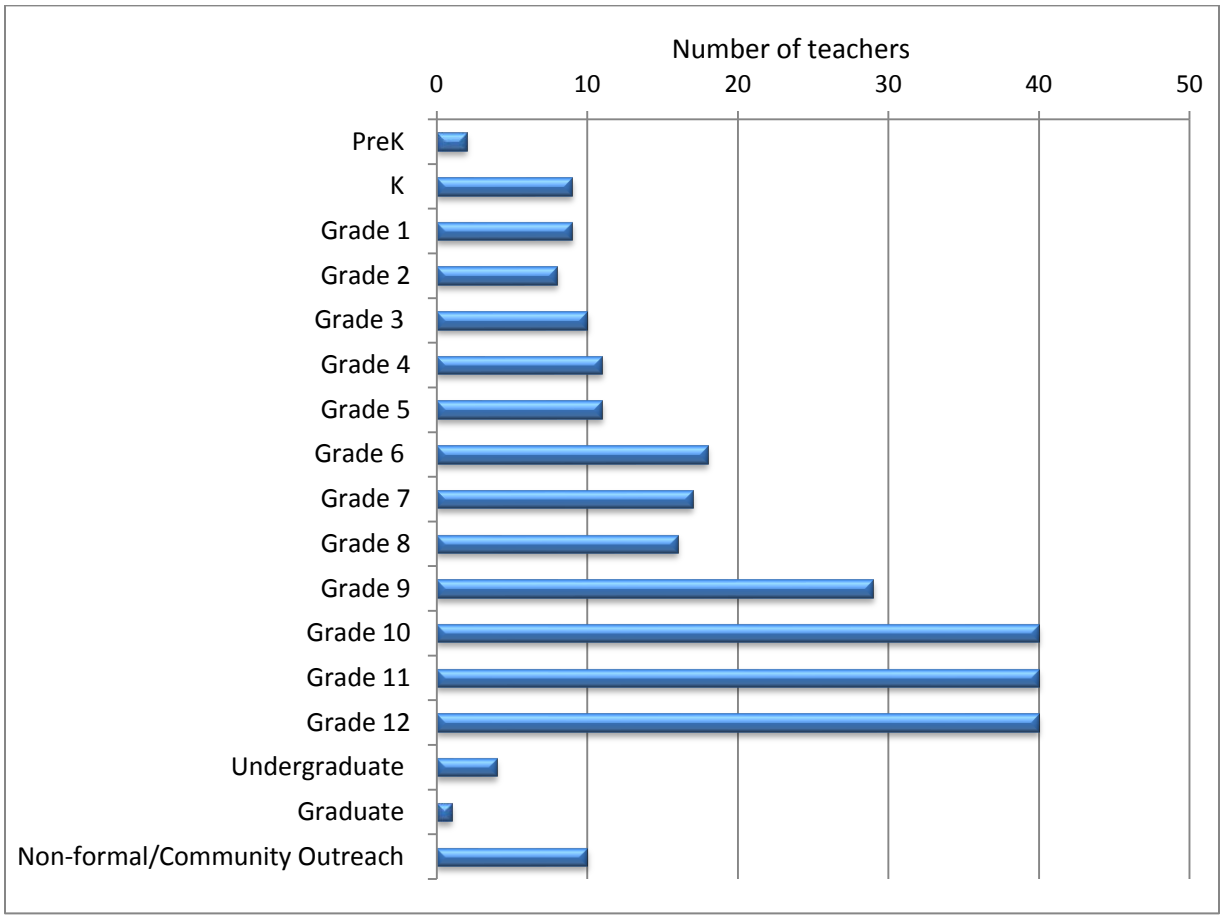
As shown in Figure 4.4 the distribution of graduation years spans the full 18 years we have graduates in the program. The chart shows that there are on average more recent graduates (2002-2012) than early graduates (1994- 2001) who responded to the questionnaire. This is not surprising as the addresses of earlier graduates are more likely to be outdated than recent graduates.

Respondents were asked their most recent year of teaching. It was stated that teaching was based on a broad definition including non-formal community outreach as well as formal classroom teaching. Respondents were asked to record the year, the grade levels taught that year and the subjects taught.

Eighty-seven percent of the respondents to the questionnaire taught in the 2012-2013 academic year. Most who did not teach in that current academic year indicated somewhere in their response that they had retired.

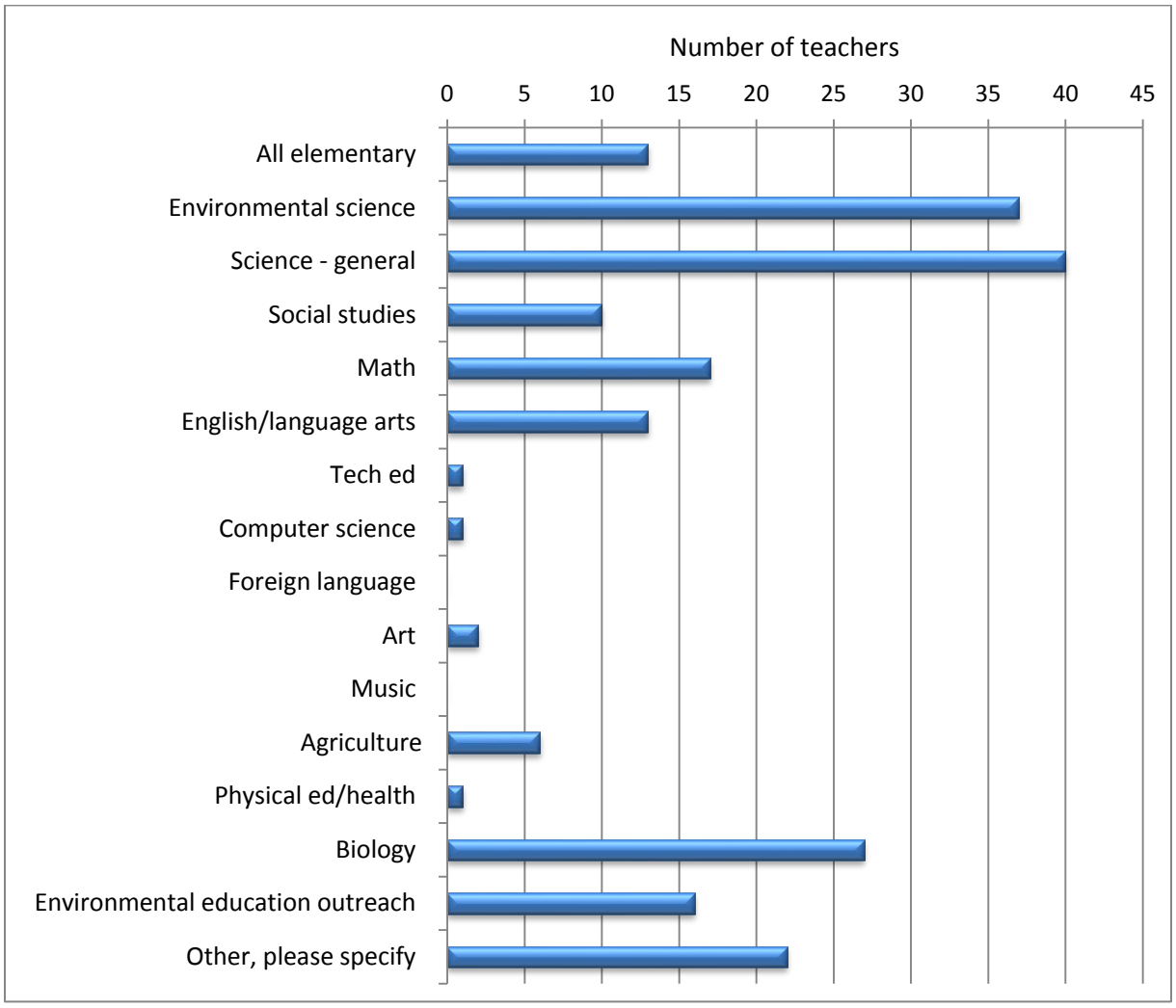
When asked which grade level they taught, respondents were allowed to select all levels at which they taught. 73% of the respondents teach at the high school and middle school levels.

Figure 4.5 – Frequency chart of grade level(s) taught in most recent teaching year



Though EE can be incorporated in all subjects, most respondents teach in environmental science, general science, biology and in EE outreach. Most "others" subjects were specific sciences not mentioned above (i.e. Chemistry, Earth Science, AP Biology).

Figure 4.6 – Frequency chart of subject(s) taught in most recent teaching year



Have we met the NCATE Standards?

Three sets of questions were used to measure the graduates' perceptions about the degree the MSNREE program was responsible for their knowledge or skills as outlined by the NCATE standards. The standards were grouped into 3 categories (overall EE, teacher-centered EE and student-centered EE).

As seen in the data presented in Table 4.2 the graduates of the MSNREE perceive that they received these general EE *Standards*. Over 90% of the graduates strongly agreed or agreed that they received knowledge and skills associated with these standards. The cells of the table

shaded in darker green indicate a level of over 50% strongly agreeing with the *Standard*. Just fewer than 50% of respondents strongly agreed with the *Standard* "Engage in environmental education professional development opportunities, including technology-based opportunities." Even taking into account the standard deviation agreement can be seen across these standards.

In the 7th *Standard* in Table 4.2 - *"*Engage in environmental education professional development opportunities, including technology-based opportunities" less than 50% of graduates strongly agreed with this statement. As will be demonstrated in the subsequent sets of *Standards* most standards that mentioned technology were generally rated lower on average.

Table 4.2 – Frequency table of responses to general EE *Standards* (N=88)

General EE Standards	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**	**Stand Dev**	**n**
1. Understand environmental education has evolved over time and continues to change (*Std 1.1*)	56.82%	39.77%	2.27%	1.14%	0%	4.52	0.606	88
2. Understand the defining characteristics and guiding principles of environmental education (*Std 1.2*)	69.32%	28.41%	2.27%	0%	0%	4.67	0.519	88
3. Understand the components of environmental literacy(*Std 1.3*)	64.71%	27.06%	7.06%	1.18%	0%	4.55	0.681	85
4. Understand the processes and systems that comprise the environment, including Earth as a physical system, the living environment, and human social systems and influences(*Std 2.2*)	51.14%	39.77%	9.09%	0%	0%	4.42	0.656	88
5. Understand the importance of exercising the rights and responsibilities of environmental citizenship (*Std 2.4*)	62.5%	35.23%	2.27%	0%	0%	4.6	0.536	88

General EE Standards	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Stand Dev	n
6. Identify and evaluate the need for action on specific environmental issues, identify possible action projects, and evaluated potential outcomes of those action projects (*Std 2.5)*	64.77%	28.41%	6.82%	0%	0%	4.58	0.620	88
7. Engage in environmental education professional development opportunities, including technology-based opportunities (*Std 7.2*)	48.86%	46.59%	4.55%	0%	0%	4.44	0.584	88
8. Develop a rationale for environmental education and understand the need to advocate for the field of environmental education (*Std 7.4*)	81.82%	14.77%	3.41%	0%	0%	4.78	0.490	88

In the teacher-centered EE *Standards* groups there is continued general agreement in the perception that the MSNREE program was responsible for graduates' knowledge and skills. This is shown in Table 4.3. The cells shaded in darker green indicate a greater than 50% strong agreement on those *Standards*. Fewer than 50% of graduates strongly agreed with the second (T2), and sixth (T6) *Standards* statements and indicated by the light green shading, but no one strongly disagreed with either statement. The first (T1) and fifth (T5) *Standards* indicated by blue shading show *Standards* that have at least 60% agreement (either strongly or just agree). In the *Standards* T1. and T5, again the mean is lower, but none of the graduates strongly disagreed.

Table 4.3 - Frequency table of responses to teacher-centered EE *Standards* (N=88)

Teacher Centered	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Mean**	**Standard Dev**	**n**
T1. Align NAAEE's Guidelines for Learning (PreK-12), EE Curriculum Guide for WI and associated environmental literacy components with national, state, and district content standards (*Std 4.1*)	37.93%	37.93%	20.69%	3.45%	0%	4.1	0.849	87
T2. Use alignment results to select, adapt, and develop environmental education curricular and instructional materials (*Std 4.2*)	42.05%	46.59%	10.23%	1.14%	0%	4.3	0.697	88
T3. Seek opportunities to integrate environmental education into standards-based curricula and school programs. (*Std 4.3*)	73.56%	19.54%	5.75%	1.15%	0%	4.66	0.643	87
T4. Describe and critically review a range of instructional materials, resources, technologies, and settings for use in environmental education (*Std 5.1*)	54.55%	39.77%	5.68%	0%	0%	4.49	0.606	88
T5. Develop technology- rich environmental education instruction that address diverse students' needs (*Std 5.3*)	22.73%	36.36%	35.23%	5.68%	0%	3.76	0.870	88
T6. Identify the benefits and recognize the importance of belonging to a professional environmental education community (*Std 7.1*)	42.53%	48.28%	8.05%	1.15%	0%	4.32	0.673	87
T7. Provide accurate, balanced, and effective environmental education instruction (*Std 7.3*)	70.45%	27.27%	2.27%	0%	0%	4.68	0.515	88

In the student-centered EE *Standards* groups there is overall agreement in the perception that the MSNREE program was responsible for graduates' knowledge and skills. This is shown in Table 4.4. No one strongly disagreed with these *Standards*, but the means are lower that on other categories. More than 60% of graduates strongly agreed or agreed most of the *Standards* and no one strongly disagreed with any of the statements. This is indicated by the blue shading in the table. The cells shaded in orange indicate standards where over 60% of respondents indicated that they agreed or remained neutral on the *Standard*.

Table 4.4 - Frequency table of responses to student-centered EE *Standards* (N=88)

Student- Centered	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Standard Dev	n
S1. Use environmental inquiry skills and use technology as a tool to answer students own questions (*Std 2.1*)	37.33%	50.67%	10.67%	1.13%	0%	4.24	0.694	75
S2. Use the results of student investigations to plan, carry out, and evaluate action projects designed to address selected environmental issues (*Std 2.6*)	26.14%	52.27%	20.45%	1.14%	0%	4.03	0.718	88
S3. Impact diverse students' learning by applying appropriate theories of learning and development when planning, delivering, and improving environmental education instruction (*Std 3.1)*	29.55%	54.55%	12.5%	3.41%	0%	4.1	0.743	88
S4. Impact diverse students' learning by applying an understanding of ability levels and cultural and linguistic backgrounds when planning, delivering, and improving environmental education instruction (*Std 3.2*)	21.84%	41.38%	29.89%	6.9%	0%	3.78	0.868	87

Student- Centered	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Mean	Standard Dev	n
S5. Impact diverse students' learning by delivering developmentally, culturally and linguistically appropriate and effective environmental education instruction (*Std 3.3*)	22.73%	45.45%	23.86%	7.95%	0%	3.83	0.873	88
S6. Integrate assessment that meets the needs of diverse students into environmental education instruction (*Std 6.1*)	15.91%	46.59%	30.68%	6.82%	0%	3.72	0.815	88
S7. Impact diverse students' learning by using assessment data, collected and analyzed with the aid of technology, to inform environmental education instruction (*Std 6.2*)	19.32%	29.55%	35.23%	15.9%	0%	3.52	0.982	88

Evidence of Application of EE knowledge and skills in graduates' classrooms

To determine levels of application of EE skills and knowledge in the classroom, graduates were then asked the level at which they taught 9 broad environmental topics.

Levels were:

Week(s) = 5 days or more of instruction

Day (s) = more than 3 hours but less than 5 days of instruction

Hour(s) = 1 to 3 hours of instruction

As indicated by the darker green shading in Table 4.5 over half of respondents said they teach 5 days or more in "Ecological principles" and "Living resources & biodiversity" and just over 40% of respondents teach 5 days or more of "Energy resources" as indicated by the lighter green shading. An environmental topic that more than 40% of people did not cover was outdoor skills as indicated by the red shaded cell.

Table 4.5 - Frequency table of environmental topic levels taught

	Week(s)	Day(s)	Hour(s)	Didn't Cover	Response Total
Ecological principles (i.e. -ecology, population, interdependence)	58.62%	13.79%	17.24%	10.34%	87
Human systems (i.e. waste reduction, product lifecycles, environmental quality effects, tourism impacts, environmental justice)	33.72%	29.07%	25.58%	11.63%	86
Energy resources (i.e. energy supply, transportation, consumers/producers)	42.53%	22.99%	24.14%	10.34%	87
Air resources (i.e. air pollution, climate change)	25.29%	26.44%	32.18%	16.09%	87
Land resources (i.e. forest uses, land use, solid and hazardous waste, erosion, plants)	36.47%	28.24%	25.88%	9.41%	85
Water resources (i.e. water quality, ocean acidification, conservation)	38.37%	30.23%	23.26%	8.14%	86
Living resources & biodiversity (i.e. food systems, biodiversity, wildlife habitat, animals)	52.94%	27.06%	11.76%	8.24%	85
Outdoor skills (i.e. orienteering, GPS, snowshoeing, fishing, archery)	12.64%	22.99%	20.69%	43.68%	87
Leadership skills (i.e. team building, citizen engagement)	19.54%	33.33%	26.44%	20.69%	87

Barriers and factors supporting applying EE

Barriers to applying EE:

In anticipation that teachers perceived that they learned skills and knowledge in this area, but are not able to apply those knowledge and skills to their teaching, we asked about barriers to teaching environmental themes that they encountered.

The most common barrier indicated was the limited time that teacher have for various reasons. One of the factors dominating teachers' time is preparing students for standardized tests. One respondent indicated the barrier she encounters is "Time - too much time is

devoted to preparing for required tests. Too rigid curriculum based on tests." Another graduate stated a similar barrier in "Time...our state requires so much high-stakes testing (even at the K level!). Reading and Math are the subjects that are stressed! I'm not sure if all school districts are like ours, but we have drifted FAR away from other subjects in the name of increasing test scores." When teachers teach to the reading and math tests they are following a very rigid standardized curriculum.

Another common barrier that was expressed was lack of access for taking students out for field trips. The limits for accessing outdoor sites was both time and funding related as expressed by this graduate when they indicated "Time, money and support for field trips." While quality EE can be done without access to outdoor sites, outdoor access enhances or is required for some EE activities.

Beyond logistical and curricular barriers some graduates are facing political barriers as well. One graduate stated there are "very anti-environment businesses in the area questioning my curriculum with regards to agriculture and sustainability." Beyond businesses, some respondents also indicated parent opposition or administration that is unsupportive of EE as additional political barriers.

It is of note that none of the respondents indicated that a lack of skill or knowledge in EE was a barrier. Not a single respondent indicated that they felt unprepared or underprepared for teaching EE.

Factors supporting the application of EE in the classroom

For as many barriers that teachers encounter there are solutions to overcome or break down those barriers. Graduates noted that they know they can turn to resources to help them infuse more EE into their classrooms. Several graduates mentioned the Wisconsin Center for Environmental Education (WCEE), Wisconsin's K-12 forestry education program, LEAF, Wisconsin's K-12 energy education program, KEEP, the Department of Natural Resources and many local EE professionals as places to turn to for support. "Connections to people at

nearby UW system" and "Connections to professionals nearby - e.g., in agriculture, engineering, etc." are supports that one graduate found.

Many graduates have found a supportive administrator and supportive communities. As one graduate put it, "The administration in my district has been very supportive as has the community and our county conservation department." Additionally graduates have found that teams of teachers are more effective than working alone. "Several of my co-workers have also been involved with this program, and therefore we share lots of ideas with environmental themes. Resources I received during the MSNREE program have also been valuable in creating more lessons with environmental themes."

Despite many of the supports utilized by some graduates, others mentioned that they don't find support at all. These graduates stated "not much," "none" or "n/a."

Citizen Engagement Strategies

For the last 5 years of teaching, respondents were asked about the frequency with which they conducted or facilitated citizen engagement strategies with students. Citizen engagement strategies are needed to go from mere knowledge about EE to action on environmental issues that affect our world. Within the MSNREE program one of our core courses focuses directly on these strategies.

Table 4.6 - Frequency of citizen engagement strategies taught in the last 5 years

	5 or more	**4**	**3**	**2**	**1**	**0**	**Response Total**
Service learning on a local issue	25.3%	7.23%	8.43%	22.89%	12.05%	24.1%	83
School/district improvement projects	22.22%	8.64%	13.58%	19.75%	14.81%	20.99%	81
Fundraising for a local, regional, national or international issue	8.54%	4.88%	8.54%	14.63%	14.63%	48.78%	82
Educating others about issues	39.29%	8.33%	14.29%	11.9%	9.52%	16.67%	84
Contacting elected officials	8.64%	6.17%	8.64%	11.11%	17.28%	48.15%	81

As illustrated by green shaded cells nearly 40% of teachers conducted or facilitated with students "educating others about issues" five or more times. On the other hand nearly 50% have not taught or facilitated "fundraising for a local, regional, national or international issue" or "contacting elected officials."

EE Leadership in Action

Since one of the goals of the MSNREE program is to develop MSNREE graduates into leaders, respondents were asked how often they used their leadership and communication skills. Of the twelve leadership and communication skills, it was asked how often since graduation they have used the skills. The frequency with which graduates have used their leadership skills is shown in Table 4.7.

It is not possible to reach every single teacher in Wisconsin with our MSNREE program, but we do want to empower our graduates to become EE leaders within their schools, districts, community and state. Over 70% of graduates say that they "Lead projects or efforts in school", "Assist fellow teachers with lessons" and "Continue professional development" on a regular basis or several times since graduation. This is a great indicator of local leadership. Leadership at the state-wide or national level ("Present at professional conferences", "Serve on local, state, national committees or boards", "Serve in leadership role in a professional organization" and "Be an active member of a professional organization") are areas that show a need for more encouragement. The revival of the Green and Healthy Schools program is recent in Wisconsin, so it is not surprising to see so many graduates not taking leadership in this program yet within their schools. As the Green and Healthy Schools program becomes more established it will be an easy place for a MSNREE graduate to shine in a leadership role.

Table 4.7 - Frequency of leadership and communication skills used since graduation

	On a regular basis	**Several**	**Once or twice**	**Have not used**	**Response Total**
Lead projects or efforts in school	37.34%	40.96%	15.67%	6.02%	83
Apply to the Green & Healthy School Program	8.33%	2.38%	15.47%	73.81%	84
Assist fellow teachers with lessons	48.19%	31.32%	15.66%	4.82%	83
Teach graduate classes to fellow teachers	9.5%	3.57%	8.33%	78.57%	84
Write articles	10.84%	6.02%	21.68%	61.44%	83
Write EE Curriculum	17.07%	30.49%	29.26%	20.73%	82
Write & receive grants for EE projects	11.39%	15.19%	27.85%	43.04%	79
Continue professional development	38.82%	35.29%	15.29%	8.23%	85
Present at professional conferences	17.28%	11.11%	17.28%	51.85%	81
Serve on local, state, national committees or boards	17.50%	8.75%	20%	51.25%	80
Serve in leadership role in a professional organization (please list organization & position in comments section)	14.28%	7.14%	7.14%	69.04%	84
Be an active member of a professional organization (please list organization in comments section)	23.46%	6.17%	27.16%	40.74%	81

Chapter 5: Conclusions and Recommendations

Based on the results of the review of the core syllabi and the responses from the questionnaire, the following conclusions and recommendations are offered. Graduates of the MSNREE program perceive that they have received knowledge and skills that they are putting in practice in their classrooms. The leadership in EE that they show is not uniform though and there are some barriers that can be addressed.

Content Analysis of Core Courses Syllabi

Through the faculty focus group meeting it was made clear all of the NCATE EE *Standards* (NAAEE 2007b) were covered in multiple courses. Considering the *Standards* evolved in the same time frame as the core courses, this simultaneous evolution clearly points to how in tune MSNREE Faculty are to the professional EE community.

Recommendations: Since the syllabi do not fully describe all of these standards via learner objectives, it is recommended that faculty revisit the *Standards* and be sure to explicitly state the standards being met within their courses. Additional conversations should be had among faculty and instructional staff about how the *Standards* are covered. Conversation should also address depth of coverage of each *Standard*, how the *Standards* are expressly modeled and how the *Standards* are assessed.

Have we met the *Standards*?

Based on the mean values for all the NCATE EE *Standards* (as expressed in Tables 4.2, 4.3 & 4.4) graduates agree that the MSNREE is responsible for their abilities as stated by the *Standards.* Based on the responses from graduates in the questionnaire the *Standards* which we have met with greatest success are:

- 1.2 Candidates demonstrate an understanding of the defining characteristics and guiding principles of environmental education.
- 4.3 Candidates seek opportunities to integrate environmental education into standards-based curricula and school programs.
- 7.3 Candidates provide accurate, balanced, and effective environmental education instruction.
- 7.4 Candidates develop a rationale for environmental education and understand the need to advocate for the field of environmental education.

The *Standards* with the lowest means had the commonality of using technology-rich curriculum, addressing diverse student learner needs and the integration of assessment in the curriculum. They include:

- 3.3 Candidates impact diverse students' learning by applying an understanding of ability levels and cultural and linguistic backgrounds when planning, delivering, and improving environmental education instruction.
- 6.1 Candidates integrate assessment that meets the needs of diverse students into environmental education instruction.
- 6.2 Candidates impact diverse students' learning by using assessment data, collected and analyzed with the aid of technology, to inform environmental education instruction.

Recommendations: It stands to reason that the MSNREE program should work to infuse more technology-rich, diverse student learner needs and assessment strategies based lessons into the MSNREE curriculum. Dawkins & Penick (1999) demonstrated that teachers are looking for more assessment tools for their classrooms in addition to knowledge of learners and knowledge of subject matter. Additionally, a practice-based curriculum (Harris et.al. 2012) would also be an effective way to make sure we are covering technology-rich, diverse student learning and assessment needs for MSNREE graduates.

The NCATE EE *Standards* (NAAEE 2007b) can continue to act as a discussion guide for such a meeting and as examples of what to fine tune in the curriculum. For each *Standard* listed, evidence of learning examples is listed in the document. Incorporating the targets into the curriculum is a surefire way to make sure to meet the *Standards* are addressed in more depth. Improvement within the MSNREE curriculum is needed to include more modeling in technology-rich, diverse learner focused lessons with skills in assessment

Evidence of Application of EE in the classroom

Environmental Topics in the Classroom

For most of the environmental topics listed in the questionnaire over 80% of graduates are at least providing an hour of instruction to their students. Ideally the MSNREE program would like to see higher percentages at the week(s) or day(s) levels. Those who reported teaching at the higher levels also identified fewer logistical barriers (time, curriculum and administration) but continued to mention resource barriers (money for field trips, increased time with the kids). Those who taught lower levels often cited a rigid, standardized testing based curriculum.

Recommendations: Teachers could increase their level of instruction by integrating EE in a way that both satisfies standardized testing and uses the environment as a context for learning in all academic areas. As this is not expressly done within the MSNREE curriculum currently, some retooling for instructors and students may be necessary for this to happen. This could be included in the conversation mentioned in association with *Standards.*

We have graduates from the program who are already doing a great job incorporating EE in their classrooms. Sharing their success stories and providing networking opportunities of those who have overcome barriers would be helpful to those who struggle with similar circumstances.

Barriers to application of EE in the classroom

Barriers discovered in this research fell into two categories: resource-based and administration-restrictions. The resource based barriers were lack of funds or time to address

the EE that teachers want to do. The administration-restrictions are found in a curriculum which is imposed and the structure of the school day. Barriers that this research found mirror the barriers identified in the study by Moseley, Hess & Utley (2010). Solutions to either category are not simple; the context in which each graduate teaches is complex. Sharing stories of fellow graduates who overcame similar challenging circumstances and allowing for networking opportunities may help those who feel that barriers are insurmountable.

A lack of knowledge and skills is notably missing from the barriers listed by graduates. Not a single graduate said they felt ill prepared to teach Environmental Education. That points to a success of the MSNREE program. Additionally, those who listed no barriers and only supports also are successes of the MSNREE program.

There is an overarching theme among the barriers listed that it was important to get students outside to do EE. While it is true that teaching students in an outdoor setting is an important and effective way of doing EE, it is not the only way to teach students EE. Teaching about EE in the classroom should complement whatever outdoor lessons teachers are able to provide. Additionally, if outdoor resources are particularly difficult to utilize, classroom based EE is possible. Therefore an underlying barrier is that graduates don't recognize that EE done in the classroom is as valuable as outdoor time. Making it explicit that both indoor and outdoor EE have value is necessary going forward with the MSNREE curriculum.

Recommendations: More qualitative research is needed to study how successful MSNREE graduates overcome barriers. Focus groups or interviews should be conducted so the program can get a richer dialog than the brief open-ended questions this questionnaire provided. Informing people of success stories could help inspire additional success stories. Moreover, the MSNREE program could be retooled to capitalize on those success stories. Sharing stories is important. Networking to bring graduates with identified barriers and graduates with solutions is recommended. Additionally, encouraging development of school administrations through direct communication and resources for those looking to encourage their teachers to facilitate EE with their students is also called for.

Factors that support the application of EE in the classroom

The MSNREE graduates recognize that they are not alone and many people and organizations are out there to assist them in providing EE instruction. The Wisconsin Center for Environmental Education and its programs (K-12 Energy Education Program – KEEP, K-12 Forestry Education Program, and Resources Library) are known by some graduates for providing quality EE support. Also, graduates recognize the Wisconsin Department of Natural Resources, Project WET, Project WILD, Project Learning Tree, and Trees for Tomorrow as great resources as well. The EE in Wisconsin website was not mentioned. It is the clearing house for all resources and EE events in Wisconsin. More information about this site should be shared with graduates.

Recommendations: Advocating for and partnering with the programs listed above should continue. Sharing stories is important. Networking to bring together graduates with identified barriers and graduates with solutions is recommended. This can be accomplished by encouraging graduates to be active members in EE professional development organizations and other professional development organizations. As resources allow, the MSNREE could also provide alumni networking opportunities both virtually (webinars) and at professional conferences.

Citizen Engagement Strategies

Citizen engagement strategies are often thought of as a controversial part of EE. So to a certain degree it is understandable that graduates hesitate in providing citizen engagement strategies. However it is of critical importance that students understand how to be responsible citizens who go beyond learning issues to take action. These issues could be environmental, social or economic in nature.

Recommendations: Perhaps further qualitative research could be done to assess if the degree of citizen engagement strategies MSNREE graduates help facilitate with their students is related to the grade level at which they teach. Do teaching the specialization of topics taught in middle or high schools affect which citizen engagement strategies graduates will facilitate? Paul & Volk (2010) offer intensive teacher workshops that focus on citizen engagement

strategies. Just as Paul & Volk recommend in their 4th recommendation, MSNREE graduates who are incorporating citizen engagement strategies in their classrooms should be interacting with current MSNREE students. Additionally, further research into their methods and curriculum may be warranted to strengthen this portion of the MSNREE curriculum.

Leadership in action

The MSNREE program expects graduates to be leaders in EE. Networking and collaboration has the capability to advance EE further with the leadership that graduates can provide to their local area or beyond. MSNREE graduates create environmentally literate citizens, and by sharing how they do this they can encourage fellow teachers in providing EE lessons as well. It is understandable that not every graduate will go on to present at conferences or teach graduate level classes to fellow teachers. However, "active membership in professional organizations" and "assisting fellow teachers" are valuable leadership and communications skills in which all MSNREE graduates should feel comfortable.

Recommendations: Based on the findings of this research leadership and communications skills should be infused throughout the curriculum if graduates are to more fully put them into action upon graduation. This includes approaching the program with a lens on transformative professional development and making sure we are addressing each graduate's true-self. (Jurow, 2009)

Additional research should be done on the factors that propel some graduates to lead and others to refrain from using their leadership skills. Interviews with graduates who have gone on to win state and national awards in EE would be good candidates for such a study. Then we can share those leaders' stories to encourage other graduate to do the same.

Conclusion

Work remains to be done to ensure that all students of today are the environmentally literate students we need for a sustainable tomorrow. Clearly there is room for improvement within the MSNREE curriculum to include more modeling in technology-rich, diverse learner focused lessons with skills in assessment. Encouraging development of school administrations which support EE and resources for those looking to do more EE with their students is also called for. Successes can be built upon by sharing success stories and allowing opportunities for graduates and other interested teachers to network. Additional research is called for to further explore successful graduates and successful implementation of EE in their classrooms.

This study provided evidence that the MSNREE program has addressed the NCATE Standards for the Preparation of Environmental Educators. It also shows that the majority of MSNREE graduates are teaching environmental topics in their classrooms, facilitating citizen engagement strategies and using leadership and communication skills to advance environmental education. The MSNREE program has graduated over 200 teachers, and a few graduates earned state and national EE awards for their work. The Faculty and staff who have worked for this success are to be commended for the 21 years of program success. With this history of success, continued dedication of Faculty and staff, and ongoing reflection on the program goals and context, continued success is likely.

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Appendix A

Core Course Catalog Descriptions

NRES 600 – Environmental Studies for Practitioners. 3 cr.
Overview of environmental studies and issues. Topic areas include: Conservation History, Ecological Foundations, Biodiversity, Water, Land, Energy, Air, Environmental Health, and Environmental Quality and the Future.

NRES 612 – Ecological Basis for Environmental Education 1 cr.
Basic ecological concepts and their relationship to understanding and evaluating environmental issues.

NRES 614 – Environmental Education Teaching Strategies 1 cr.
Plan and evaluate environmental ed curriculum materials and teaching methods.

NRES 615 – Environmental Education Curriculum Resources 1 cr.
Investigate, evaluate, and apply instructional resources for K-12 environmental ed. Includes curriculum, print, audiovisual materials, computer software and networks, organizations, people and places. Culminating project links resources encountered to grade level taught and individual areas of interest.

NRES 701 - Readings in Environmental Education 1-3 cr.
Readings on history, philosophy, practices, methods, and issues of environmental education. Assignments vary depending on credits.

NRES 705 – Environmental Issues Investigation and Action 1-3 cr.
Examine current theories of behavior change. Use primary and secondary information sources to investigate environmental issues and develop a case study. Explore strategies for issue analysis/resolution.

NRES 750 – Human Dimension Research Methods: Proposal Writing 1 cr.
Discuss research methods, relevant literature, and current issues in Human Dimensions of Natural Resources. May repeat for 4 cr max under different subtitles.

NRES 761 – Personal Environmental Education Leadership 1 cr.
Theoretical and practical background in personal leadership skills and development for implementation of EE beyond the classroom.

NRES 762 – Organizational Environmental Education Leadership 1 cr.
Practical leadership skills within context of organizational culture, power, and politics to implement EE beyond the classroom.

NRES 795 – Graduate Seminar 1 cr.
Student presentation and discussion of selected environmental and natural resource topics including results of student research.

Appendix B

MSNREE Core Courses

Prefix	Num	Title	Cr	Instr	Course Goals or Objectives	Assessments
NRES	600	Wisconsin Environmental Studies	3	Byers	To increase awareness and develop participant interests and literacy in Wisconsin environmental content, issues, and ideas.	Written Assignments Discussion
NRES	612	Ecological Basis for Environmental Education	1	Ginnett	Goal: The objective of this one credit course is to familiarize K-12 educators and pre-service educators with ***modern ecological theory, issues and practices***. Ecological topics will span the levels of ecological organization: organism, population, community, ecosystem, and biosphere. We will ***apply the basic principles of ecology to contemporary environmental issues*** and will focus on the values and roles of ecology in diverse human cultures, and the problems and solutions that arise due to competition between humans and other living organisms for common resources. In addition, the course will facilitate ***ecology-related curriculum development relevant to teaching Environmental Education*** which: 1) encourages the development of interactive inquiry lesson plans, 2) encourages place-based field trips and 3) addresses the needs of diverse student learners. Learner Outcomes:	As a student in this course you are expected to: ***Read and evaluate*** weekly online course materials and website links. ***Actively participate*** in online ecology discussions and peer work groups. ***Engage in reflective teaching practice*** as you interact with your peer teacher group for discussions and constructive feedback. ***Design an Ecology Infusion Portfolio Project*** of two interactive inquiry lesson plans which: • ***Focuses on designing inquiry labs for your classroom*** **(as per weekly**

					1. ***Understand*** the key concepts and principles of modern ecology and the applications of ecological theory at the following levels of organization: organism, population, community, ecosystem and biosphere. 2. ***Explore*** *the implications of utilizing an ecological perspective to enhance understanding of* human ecology and ***explore*** the ecological values of diverse cultures and stakeholder groups. 3. ***Apply*** the principles of ecology and management and an understanding of diverse stakeholder perspectives to the ***evaluation*** of contemporary ecological issues and solutions. 4. ***Reflect*** on pedagogy and ***discuss*** the roles of interactive inquiry, place-based learning, critical thinking and multiple intelligence instruction to enhance learning of complex ecological issues in the context of Environmental Education.	**instructions) that focus on nature journaling, lab investigations, field trips or virtual field trips.** • ***Describes*** the principles of ecology underlying environmental issues, • ***Encourages*** active scientific investigation and critical evaluation of evidence (data collection and analysis), and • ***Applies*** "best practices" in environmental education (interactive inquiry, place-based learning, critical thinking, multiple intelligences and authentic assessment).
NRES	614	Environmental Education Teaching Strategies	1	Sivek	As a result of fully participating in class, you will: **Goals:** (1) Understand and be able to apply the subgoals of environmental education (EE) and Wisconsin's EE academic standards to school curriculum and	Do self-assessments for next class on Multiple Intelligences (MI): Evaluating EE in Your School District

					other educational programs (2) Demonstrate the ability to effectively implement instructional methods and materials designed to assist the development of environmentally literate students (3) Experience and utilize a variety of instructional methods and resources appropriate for EE (4) Develop motivation to teach EE at all grade levels and in all subject areas	Instructional Plan for Infusing and Integrating Class Attendance & Participation
NRES	615	Environmental Education Curriculum Res	1	Schuller	• Students will examine and become familiar with a variety of EE materials. • Students will be able to identify several educational EE materials suitable for their grade level and subject area of interest. • Students will gain experience critically analyzing and evaluating EE materials. • Students will be able to construct a list of EE resources that can be utilized in their current curriculum.	1 Participant Survey (via email or in class) 2 'Personal Picks' EE Resources 3 EE Resources on the Internet 4 Final Project
NRES	701	Readings in Environmental Education	3	Toth	As a result of this course you will: 1) understand the history, goals and definition of environmental education,	• Participation • Quality of verbal contributions, ideas and interactions • Quality of completed

					2) be able to explain the difference between EE and environmental advocacy, 3) be aware of the status of Wisconsin as compared to other states regarding the implementation of state level EE, 4) understand what environmental literacy entails and be able to describe the status of environmental literacy in the U.S.A, 5) be able to describe the Goals for Curriculum Development in EE and apply them to your teaching, 6) be able to describe the steps involved in developing an EE curriculum, 7) be able to describe methods available to teach about environmental issues, 8) be able to describe strategies you can use to encourage responsible environmental behavior, 9) better understand your own preparation to teach EE by completing a self assessment of your EE knowledge and skills.	assignments • Written Proposal • Formulation of project based on professional need or modivation • Breathe/Depth of contents and organization • Quality of end product

NRES	705	Env Issues Invest Skills and Citizen Env Action	1	Sivek	Through full participation in NR 705, you'll be able to: 1. Relate citizen action skills and experience to the ultimate goal of environmental education. 2. Identify characteristics of successful environmental activists and synthesize these into a profile of a successful activist. 3. Identify variables which research identifies as predictive of environmentally responsible behavior, and how each might be translated into instruction. 4. Describe the relationship of levels and categories of action to environmentally responsible behavior. 5. Identify the players, positions, beliefs, and values associated with any given environmental issue. 6. Apply the above knowledge and skills to your own teaching situation	• Participation • Teaching plan for issues • Environmental leader/hero* • Political profile & letter*
NRES	750	Research Methods in EE/Interpretation	1	Lackey	**Course Goals:** 1. To increase participant awareness and knowledge regarding research procedures, environmental education research literature and its implications for K-12 EE. 2. To facilitate the completion by each	• Oral Research Report • Assignments and Participation • Written Summary of Research • Research Prospectus

					participant of a prospectus describing the research to be completed for their M.S. degree.	
NRES	761	Personal EE Leadership	1	McReynolds	By the end of this course participants will: • Apply principles of personality preferences to their professional roles. • Evaluate their personal preferences as strengths or limitations. • Use their personality preferences to improve communications among their colleagues and supervisor. • Construct a direct relationship between personality and leadership. • Apply principles of leadership to their current professional roles. • Contrast principles of leadership with fellowship. • Validate principles of fellowship to their roles within educational institutions. • Consider principles of leadership to site specific case studies. • Choose core attributes of leadership to their professional situations.	• Participation and Contribution to the Group Discussion • Participation, Sharing and Self Reflection on Assessments • Completion of a resource based self - reflection paper that analyzes and synthesizes the three core elements of the course; personality, leadership and followership.
NRES	762	Organizational EE Leadership	1	McReynolds	By the end of this course participants will: • Dramatize one of the four types of school board types.	• Presentation and Group activity • Individual presentations • discussions and reports

					• Discover the types of school boards that are typically matched to types of communities. • Relate the school board dynamics to the superintendent's role. • Contrast leadership from politics. • Discover and demonstrate the types of power and politics within their professional settings. • Interpret the organizational culture to their position. • Critically reflect and connect individual presentations to the principles of leadership. • Understand the impact of culture on the allocation of resources, learning atmosphere and success of individual projects.	• Group discussion on projects • written papers for projects
NRES	795	Graduate Seminar	1	Wilke		

Appendix C

Graduate Questionnaire – Print Copy

1. Please provide the code on the cover letter_____

   This code will connect your data to your graduation date, your project title or the fact you completed the comprehensive exam. This will not connect your data to your name, but it will verify your address in a separate set of data to which we will send an UWSP Alumni sticker or keychain.

2. How much did each of the following factors influence your decision to apply to the MSNREE program? Please circle the corresponding level at which you would consider the factor.

4 = Important factor 3= somewhat a factor 2= minimally a factor 1= not a factor

Application Decision Factors	Level at which you considered the factor			
	Important	Somewhat	Minimal	Not a Factor
Scholarship availability/NSF grant/other grants	4	3	2	1
Supportive administration/school district	4	3	2	1
Financial support from school district	4	3	2	1
Pay increase for Master's degree	4	3	2	1
Interest in Environmental Education	4	3	2	1
Relevance to courses that I teach	4	3	2	1
Belief that EE is important to teach	4	3	2	1
Course scheduled in for convenient times/weeks	4	3	2	1
Convenient location for face-to-face courses	4	3	2	1
Convenience of online courses	4	3	2	1
Only EE MS with online courses	4	3	2	1
Other Factors – please list:	4	3	2	1
	4	3	2	1

3. If a colleague were to choose to start the MSNREE program now, how much of a factor do you think the following would be? Please circle the corresponding level at which you think a colleague would consider the factor.

4 = Important factor 3= somewhat a factor 2= slight factor 1= not a factor

Application Decision Factors	Level at which you considered the factor			
	Important	Somewhat	Minimal	Not a Factor
Scholarship availability/NSF grant/other grants	4	3	2	1
Supportive administration/school district	4	3	2	1
Financial support from school district	4	3	2	1
Pay increase for Master's degree	4	3	2	1
Interest in Environmental Education	4	3	2	1
Relevance to courses that I teach	4	3	2	1
Belief that EE is important to teach	4	3	2	1
Course scheduled in for convenient times/weeks	4	3	2	1
Convenient location for face-to-face courses	4	3	2	1
Convenience of online courses	4	3	2	1
Only EE MS with online courses	4	3	2	1
Other Factors – please list:	4	3	2	1

4. How much do you agree that participating in the MSNREE program is responsible for improving your ability to do the following? Please circle the corresponding level at which you agree or disagree.

The MSNREE program is responsible for my ability to….	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Understand environmental education has evolved over time and continues to change	5	4	3	2	1
Understand the defining characteristics and guiding principles of environmental education	5	4	3	2	1
Understand the components of environmental literacy	5	4	3	2	1
Understand the processes and systems that comprise the environment, including Earth as a physical system, the living environment, and human social systems and influences	5	4	3	2	1
Understand the importance of exercising the rights and responsibilities of environmental citizenship	5	4	3	2	1
Identify and evaluate the need for action on specific environmental issues, identify possible action projects, and evaluated potential outcomes of those action projects	5	4	3	2	1
Engage in environmental education professional development opportunities, including technology-based opportunities	5	4	3	2	1
Develop a rationale for environmental education and understand the need to advocate for the field of environmental education	5	4	3	2	1

5. How much do you agree that participating in the MSNREE program is responsible for improving your ability to do the following teacher-centered actions? Please circle the level at which you agree or disagree.

Teacher-centered **The MSNREE program is responsible for my ability to….**	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Align NAAEE's *Guidelines for Learning (PreK-12), EE Curriculum Guide for WI* and associated environmental literacy components with national, state, and district content standards	5	4	3	2	1
Use alignment results to select, adapt, and develop environmental education curricular and instructional materials	5	4	3	2	1
Seek opportunities to integrate environmental education into standards-based curricula and school programs.	5	4	3	2	1
Describe and critically review a range of instructional materials, resources, technologies, and settings for use in environmental education	5	4	3	2	1
Develop technology- rich environmental education instruction that address diverse students' needs	5	4	3	2	1
Identify the benefits and recognize the importance of belonging to a professional environmental education community	5	4	3	2	1
Provide accurate, balanced, and effective environmental education instruction	5	4	3	2	1

6. How much do you agree that participating in the MSNREE program is responsible for your ability to do the following student-centered actions? Please circle the level at which you agree or disagree.

Student-Centered **The MSNREE program is responsible for my ability to….**	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Use environmental inquiry skills	5	4	3	2	1
Use technology as a tool to answer students own questions	5	4	3	2	1
Use the results of student investigations to plan, carry out, and evaluate action projects designed to address selected environmental issues	5	4	3	2	1
Impact diverse students' learning by applying appropriate theories of learning and development when planning, delivering, and improving environmental education instruction	5	4	3	2	1
Impact diverse students' learning by applying an understanding of ability levels and cultural and linguistic backgrounds when planning, delivering, and improving environmental education instruction	5	4	3	2	1
Impact diverse students' learning by delivering developmentally, culturally and linguistically appropriate and effective environmental education instruction	5	4	3	2	1
Integrate assessment that meets the needs of diverse students into environmental education instruction	5	4	3	2	1
Impact diverse students' learning by using assessment data, collected and analyzed with the aid of technology, to inform environmental education instruction	5	4	3	2	1

Comments regarding other tasks you are now better able to do as a result of participating in the MSNREEE program:

7. What were the benefits of participating in the MSNREE program, if any?

8. What challenges did you experience when participating in the MSNREE program? What improvements could we make to the program to address those challenges?

9. Did your career change because of participating in the MSNREE program? Please explain your answer.

10. How did your instruction change because of participating in the MSNREE program?

11. What was your biggest "a-ha" moment of participating in the MSNREE program?

The questions 12 - 20 pertain to applying knowledge and skills you gained from participating in the MSNREE program to teaching you have done since graduation. Answer the questions based on your most recent year of teaching. Please note that we are basing this on a broad definition of teaching, including non-formal community outreach teaching.

12. In what year (academic or calendar) did you most recently teach: _____

13. What was your position title in the last year you taught: _____

14. During your **latest teaching year**, what grade level(s) did you teach? (Please check all that apply)

☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7 ☐ 8 ☐ 9 ☐ 10 ☐ 11 ☐ 12
☐ K ☐ Pre K ☐ Undergraduate ☐ Graduate Non-formal/Community Outreach

15. During your **latest teaching year,** what subjects did you teach? (Please check all that apply)

☐ All elementary ☐ Environmental science ☐ Science-general ☐ Social studies
☐ Math ☐ English/language arts ☐ Tech ed ☐ Computer science ☐ Foreign language
☐ Art ☐ Music ☐ Agriculture ☐ Physical ed/health ☐ Biology
☐ Environmental education outreach Other, please specify_____

16. During your **latest teaching year**, at which level have you explored with your students the following environmental themes within your curriculum? Please circle which level best describes the amount of instruction you spend on the topic.

Week(s) = 5 or more days of instruction
Day(s) = more than 3 hours but less than 5 days of instruction
Hour(s) = 1 to 3 hours of instruction

Environmental topics	Level at which you teach the following topics			
Ecological principals (i.e. -ecology, population, interdependence)	Week(s)	Day(s)	Hour(s)	Don't Cover
Human Systems (i.e. waste reduction, product lifecycles, environmental quality effects, tourism impacts, environmental justice)	Week(s)	Day(s)	Hour(s)	Don't Cover
Energy Resources (i.e. energy supply, transportation, consumers/producers)	Week(s)	Day(s)	Hour(s)	Don't Cover
Air Resources (i.e. air pollution, climate change)	Week(s)	Day(s)	Hour(s)	Don't Cover
Land Resources (i.e. forest uses, land use, solid and hazardous waste, erosion, plants)	Week(s)	Day(s)	Hour(s)	Don't Cover
Water Resources (i.e. water quality, ocean acidification, conservation)	Week(s)	Day(s)	Hour(s)	Don't Cover
Living Resources & Biodiversity (i.e. food systems, biodiversity, wildlife habitat, animals)	Week(s)	Day(s)	Hour(s)	Don't Cover
Outdoor Skills (i.e. orienteering, GPS, snowshoeing, fishing, archery)	Week(s)	Day(s)	Hour(s)	Don't Cover
Leadership Skills (i.e. team building, citizen engagement)	Week(s)	Day(s)	Hour(s)	Don't Cover

Comments on additional environmental themes you teach:

17. What barriers have you encountered to teaching environmental themes?

18. .What supports have you encountered for teaching environmental themes?

19. During your **latest teaching year**, what % of **all** the lessons you teach in all subjects are related to the following environmental values?

Environmental values	% of lessons that relate to values				
Social (i.e. Our communities rely on the environment to thrive.)	1-25	26-50	51-75	76-100	Don't teach this value
Economic (i.e. Our jobs and products rely on environmental systems.)	1-25	26-50	51-75	76-100	Don't teach this value
Environmental (i.e. The environment is an important system which supports all life.)	1-25	26-50	51-75	76-100	Don't teach this value

Comments:

20. During the last 5 years of teaching what citizen engagement strategies have you conducted or facilitated with your students? Please indicate the number of times you have facilitated these strategies.

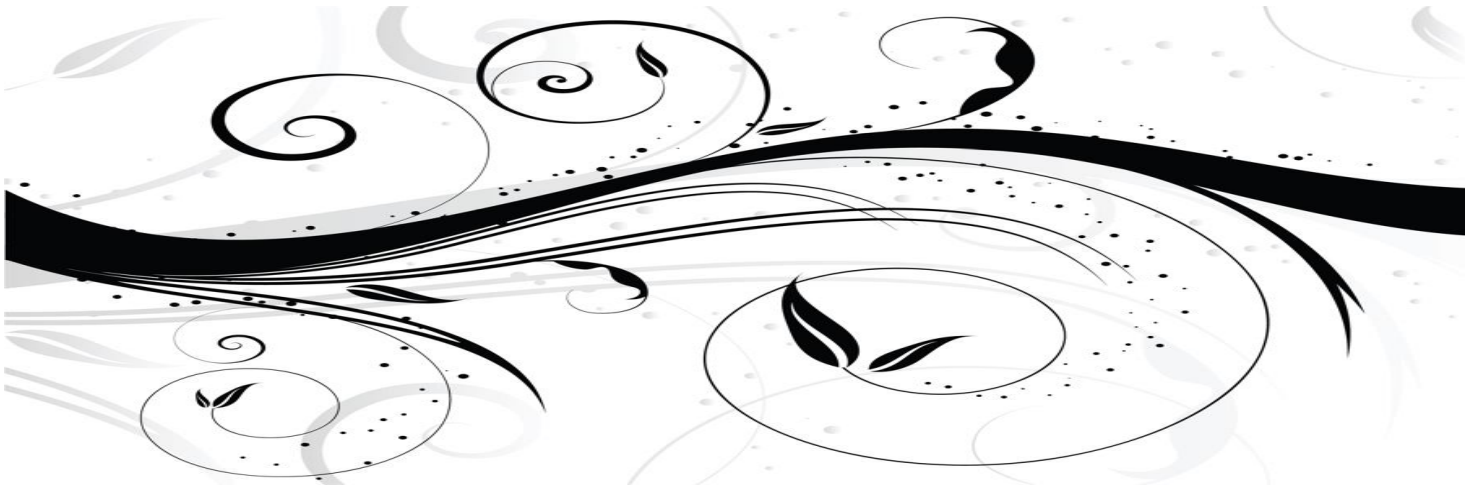
Citizen engagement strategies	Number of times facilitated					
Service learning on a local issue	5 or more	4	3	2	1	0
School/district improvement projects	5 or more	4	3	2	1	0
Fundraising for a local, regional, national or international issue	5 or more	4	3	2	1	0
Educating others about issues	5 or more	4	3	2	1	0
Contacting elected officials	5 or more	4	3	2	1	0
Other – please describe:	5 or more	4	3	2	1	0
	5 or more	4	3	2	1	0
	5 or more	4	3	2	1	0

Comments:

21. How often have you used the following leadership and communication skills which you learned from the MSNREE program in your career since graduation? Please circle the value level.

Leadership and communication skills	Number of times used skills				
	On a regular basis	Several	Few	Once or twice	Have not used
Lead projects or efforts in school	4	3	2	1	0
Applied to the Green & Healthy School Program	4	3	2	1	0
Assist fellow teachers with lessons	4	3	2	1	0
Teach graduate classes to fellow teachers	4	3	2	1	0
Write articles	4	3	2	1	0
Write EE Curriculum	4	3	2	1	0
Write & receive grants for EE projects	4	3	2	1	0
Continue professional development	4	3	2	1	0
Present at professional conferences	4	3	2	1	0
Serve on local, state, national committees or boards	4	3	2	1	0
Serve in leadership role in a professional organization (please list organization & position in comments section)	4	3	2	1	0
Be an active member of a professional organization (please list organization in comments section)	4	3	2	1	0
Other – please describe:	4	3	2	1	
	4	3	2	1	
	4	3	2	1	

Comments:



22. If a colleague were to choose to start the MSNREE program, how many credits would you think they would prefer to take in each of the following terms each year? The program requires 30-36 credits in total.

Summer _____ Fall _____ Spring _____

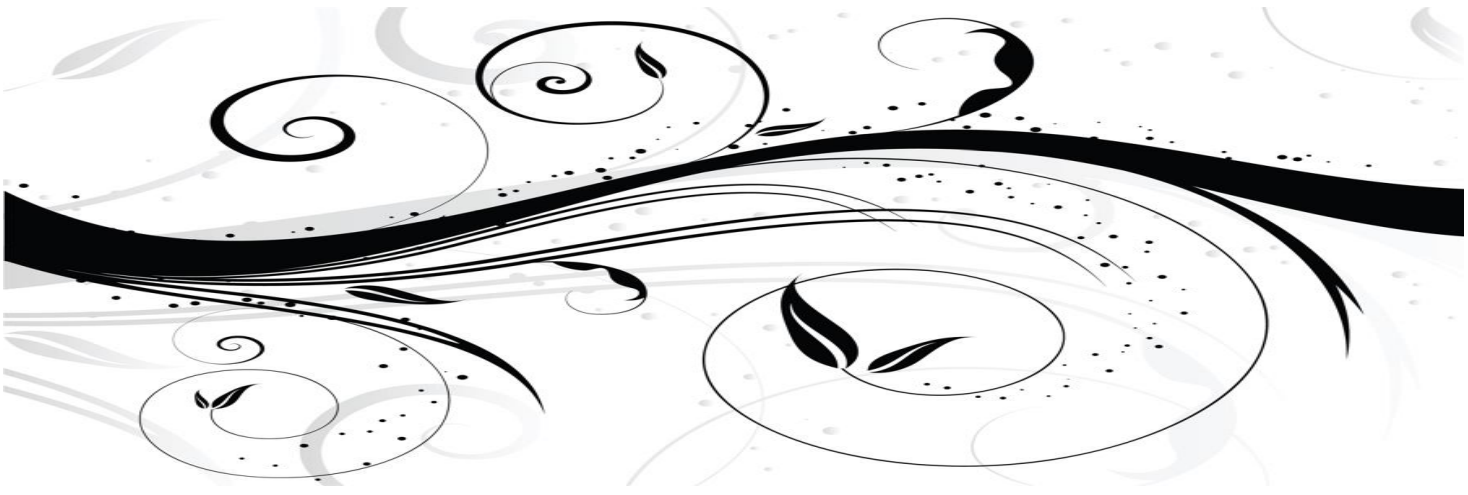
23. In taking courses for professional development, what would be your preferred course delivery mode? Please select your preferred course delivery mode for individual courses within each term.

Term	Preferred course mode for a single course				
Spring	Face-to-face evenings	Face-to-face weekends	Online	Hybrid (online & face to face in same course)	I don't prefer to take course this term
Summer	Face-to-face weekdays	Face-to-face weekends	Online	Hybrid (online & face to face in same course)	I don't prefer to take course this term
Fall	Face-to-face evenings	Face-to-face weekends	Online	Hybrid (online & face to face in same course)	I don't prefer to take course this term

Comments:

24. UWSP is exploring the possibility of offering an Educational Doctorate (Ed.D.) program with a Sustainability focus. Is this a program in which you would consider participating?

Any additional comments:



Appendix D

Initial Letter Example

University of Wisconsin - Stevens Point
College of Natural Resources Stevens Point WI 54481-3897

715-346-4973 Fax 715-346-3025

Al Umni Graduateson
123 Great Teaching Lane
Outdoorsville, WI 54444-5555

Identification Code: 9999

Dear Al,

Congratulations on completing your Master's degree with the Environmental Education for K-12 Teachers (MSNREE) program from UWSP. Below is a link to an online questionnaire to gather feedback from you as an important step in evaluating the program and planning for the future. This questionnaire is the cornerstone of Jessica Tomaszewski's graduate thesis. The questionnaire can be found at:
http://survey.uwsp.edu/TakeSurvey.aspx?SurveyID=m4K29581

As in any initiative or endeavor, it is always important to evaluate whether you are meeting your goals and objectives. Feedback gathered from this MSNREE program evaluation will be used to improve the degree program. We expect the results of the evaluation will inform improvements to courses, how courses will be offered, better ways to fit the needs of participants and ways to address the rapidly changing pK-12 education climate.

The information that you give us on the questionnaire will be confidential. We will not release information that could identify you. The summary of the results will be presented without connection to your name or any information that could identify you. All completed questionnaires will be kept in a locked file cabinet in the office of Continuing Education in the College of Natural Resources and will not be available to anyone not directly involved in this study.

As teachers we know your time is increasingly valuable and scarce, so we appreciate you taking time to review and complete this questionnaire. It should take you about 30 minutes to complete the questionnaire. To reward you for your time, everyone who completes the questionnaire will receive a gift of either a UWSP Alumni window decal or key chain. In addition everyone who completes the questionnaire will also be entered in a drawing for a $100 Amazon Gift Certificate.

If you want to withdraw from the study at any time you may do so without penalty. The information on you up to that point would be destroyed and you would no longer be eligible for the window decal, key chain or the drawing for the Amazon Gift Card.

Once the study is completed, we would be glad to share the results. In the meantime, if you have any questions, please contact us. Please use the contact information is listed in the signature block below.

If you have any complaints about your treatment as participant in this study, please call or write:

Dr. Jason R. Davis, Chair
Institutional Review Board for the Protection of Human Subjects
School of Business and EconPatrick Arndt
N 4070 30th Drive
Pine River, WI 54965-8210omics
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 346-4598

Although Dr. Davis will ask your name, all complaints are kept in confidence.

Your completion and submission of the Questionnaire to the researchers represents your consent to serve as a subject in this research.

The questionnaire can be found digitally at http://survey.uwsp.edu/TakeSurvey.aspx?SurveyID=m4K29581 For those who do not complete the questionnaire digitally by May 10th, a paper copy of the questionnaire will be sent by mail or you can contact Jessica to request a paper copy right away.

Sincerely,

Jessica Tomaszewski | Dennis Yockers | Tim Byers

Jessica Tomaszewski
Outreach Specialist
(715) 346-3854
Jessica.Tomaszewski@uwsp.edu

Dennis Yockers
Professor Emeritus

Tim Byers
Program Manager

110 TNR 800 Reserve Street
University of Wisconsin Stevens Point
Stevens Point WI 54481

This research project has been approved by the UWSP Institutional Review Board for the Protection of Human Subjects.