

**ENERGY EDUCATION PROFESSIONAL DEVELOPMENT:
ASSESSMENT OF TEACHER SATISFACTION**

By

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A Thesis

Submitted in partial fulfillment of the
requirement for the degree

MASTER OF SCIENCE

IN

NATURAL RESOURCES

(ENVIRONMENTAL EDUCATION & INTERPRETATION)

College of Natural Resources

UNIVERSITY OF WISCONSIN

Stevens Point, WI

July 2009

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ABSTRACT

The Wisconsin K-12 Energy Education Program (KEEP) was created to promote energy education in Wisconsin. KEEP is the product of an innovative public private partnership between educators and energy professionals. The Wisconsin Center for Environmental Education (WCEE) launched this effort in 1995. KEEP receives its primary funding through the Focus on Energy Residential, Business, and Renewable Energy Programs. Focus on Energy is a public-private partnership offering energy information and services to energy utility customers throughout Wisconsin. Due to the longevity of the program and multiple stakeholders, KEEP has placed importance on course evaluation. Because of its status as first in a set of courses, the NRES 603/730: KEEP In-service Course was chosen as the focus of this evaluation study.

This study used a survey and two sets of interviews to assess teachers' perception of the quality of a professional development experience in energy education as it affects the practice of energy education and students' understanding of energy concepts. The results show that teachers are satisfied regarding quality of the course, application in the classroom and students' understanding of energy concepts. Although these respondents were self-selected and are therefore not representative of the entire population of course graduates, KEEP views the data as informative and insightful.

ACKNOWLEDGEMENTS

Many people were instrumental and essential in making this research possible. First I would like to thank Dr. Jennie Lane for her guidance and support during my graduate experience. She opened the doors to graduate school when I thought they were closed to me.

I would like to thank my committee, Dr. Randy Champeau and Dr. Leslie Wilson for their advice, insight, feedback and above all patience. Thank you to the Wisconsin Center for Environmental Education for welcoming me into their community and their extended local communities. Special appreciation to the WI K-12 Energy Education Program, Resource Library, Global Environmental Teachings staff and student-staff for helping me with bookmarks and survey mailings.

This research wouldn't exist without the cooperation of the 512 teachers who completed and returned surveys. I appreciate the time and effort they put into responding to my inquiries

Finally thank you to my friends and colleagues, Jenni Webster and Rainey Kreis for making graduate school a great learning and growing experience on a personal level. Thank you my family who puts up with me and occasionally puts me up when I am homeless or unemployed or both. (Especially Ben and his Kujak-Fords.) Maybe one day I won't need a place to crash, but today is not that day.

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CHAPTER ONE INTRODUCTION

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- II. SUB-PROBLEMS**
- III. STUDY IMPORTANCE**
 - A. Introduction**
 - B. Relevancy of energy issues**
 - C. Program longevity**
 - D. Reporting to stakeholders**
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I. RESEARCH STATEMENT

The purpose of this study is to assess teachers' perceptions of how a professional development experience in energy education affected their practice of energy education and students' understanding of energy concepts.

II. SUB-PROBLEMS

1. Identify a strategy to assess teachers' perception of professional development in energy education.
2. Assess teacher perception of the quality of a professional development experience in energy education.
3. Assess teacher perception regarding application of energy education professional development in the classroom.
4. Assess teachers' perception regarding the effect of energy education professional development on students' understanding of energy concepts.

III. STUDY IMPORTANCE

A. Introduction

Assessment of energy education professional development at this time and place has three unique and important characteristics. First, energy issues are becoming more relevant to the general public due to rising energy prices and increasing concern over global climate change. Next, examination of the Wisconsin K-12 Energy Education Program (KEEP) is worthwhile to maintain the quality and relevancy of teacher professional development courses. Finally, assessment is a means of demonstrating the use of and evidence to support future stakeholder funding.

B. Relevancy of energy issues

Energy is defined as the ability to change things or do work. In fact, energy can be considered as an underlying currency, which determines human interaction as well as the supporting environment (KEEP, 1997). Contemporary American culture relies heavily on energy for lighting, entertainment, industry, information networks, heating, cooling, and transportation. The consumption demand has increased as result of population growth and increased use of personal electronic devices such as computers and cellular phones.

Despite high rates of consumption, Americans possess very little energy knowledge. A 2002 study found that only 12% of Americans passed a basic energy quiz (National Environmental Education and Training Foundation [NEETF] and Roper ASW, 2002). This same study compared actual knowledge to a 2001 survey of perceived competency. Those results showed that 75% of Americans rated themselves as having “a

lot” or “a fair amount” of knowledge about energy. Only 36% of Americans are aware that coal-burning utilities generate the majority of domestically produced electricity.

Future implications of energy use also affect economics and national security. In response to a 2001 survey, 90% of Americans felt that environmental conditions will increase in importance as a factor of the future national economy. Another 91% responded that energy conservation will also increase in importance in terms of the nation’s economic future (NEETF and Roper ASW, 2002).

Current forecasts by the Paris-based International Energy Agency, a monitor of energy markets for the world's 26 most-advanced economies and counterweight to the Organization of Petroleum Exporting Countries, indicate that future crude oil supplies will be less in amount and greater in price per barrel. Previous reports of crude oil supplies and other liquid fuels suggested a gentle upward arc that kept pace with rising demand, topping 116 million barrels a day by 2030, up from around 87 million barrels a day currently. Now, the agency is predicting that aging oil fields and diminished investment will mean a struggle to surpass 100 million barrels a day over the next two decades. Recent headlines have forecast that oil could top \$140 a barrel during the summer of 2008 and could average \$200 a barrel in 2009 (Neil and Fritsch, 2008).

Rising costs and decreasing supply means increased costs in all sectors of the world economy. Individuals with low or fixed incomes will soon find themselves priced out of the market for such essentials as food, heating and transportation.

Energy education is a means to provide participants with knowledge, skills, and attitudes that will allow them to use energy resources wisely. Energy literacy is vital to our collective economic and environmental future.

C. Program longevity

When KEEP became a reality in 1995, it was unclear if energy education in Wisconsin would garner enough support to outlive the original \$850,000 provided by the Energy Center of Wisconsin. The first NRES 603 course was piloted during the summer of 1997. Teachers received a free graduate credit and a monetary stipend to evaluate two KEEP activities for inclusion in a revised *KEEP Activity Guide* in 1999.

In 2005, KEEP published a report entitled *10 years of Empowering Energy Education in Wisconsin*. It details the complete history of KEEP organizational activities. During those 10 years, KEEP has evaluated, revised and adapted itself and educational materials to meet the changing needs of teachers. When asked, “Does KEEP work?” Director Jennie Lane used the 10 year report to detail organizational accomplishments. “Does KEEP work?” has broader implications than just organizational accomplishments. It made sense then to gather teacher perceptions of the original course to find out if KEEP provides what teachers need to practice energy education in the classroom setting and how that practice affects student understanding of energy concepts.

D. Reporting to stakeholders

Assessment of the NRES 603/730 course is a means of reporting outcomes to KEEP stakeholders. It is also a method to justify continued funding and general support when stakeholders examine their own organizational objectives and budgets. Funding organizations include Focus on Energy, Energy Center of Wisconsin, Wisconsin Center for Environmental Education, University of Wisconsin-Stevens Point, Alliant Energy,

Madison Gas & Electric Company, Manitowoc Public Utilities, We Energies, Wisconsin Public Power, Inc, Wisconsin Public Service Corporation and Xcel Energy.

Focus on Energy is of particular importance in terms of reporting. The primary objective of Focus on Energy is reduction of kilowatt/hour consumption by Wisconsin residents. Being a teacher professional development program, KEEP is unable to report it's activities in terms of kilowatt/hour savings. Wisconsin Energy Conservation Corporation, provider of Focus on Energy Residential, Business and Renewable Energy Programs, has created a special category for KEEP. *Market transformation* is the phrase used to describe the future affect KEEP will have on kilowatt/hour savings. In other words, teacher professional development programs are changing attitudes and behaviors which will result in delayed savings.

E. Conclusion

This study has value in terms of the general energy consumer, KEEP course participants, and KEEP financial stakeholders.

IV. LIMITATIONS

1. The study will not assess student energy literacy in Wisconsin.
2. The study will not compare student energy literacy in KEEP and non-KEEP classrooms.
3. The study will focus on teachers that have successfully completed a NRES 603/730 course.

4. The teachers chosen for the pre-survey interview participation will not be selected randomly, but rather a representative group that will include all grade levels and subject areas.

V. DEFINITION OF TERMS

Energy. Energy is the ability to organize or change matter, or the ability to do work.

Energy concepts. Energy concepts refer to the concepts identified in the KEEP Conceptual Framework.

Energy Education. Energy Education is a component of Environmental Education which aims to increase knowledge and skills related to energy with an overall goal to increase energy literacy.

Energy Literacy. Comprehensive knowledge of energy concepts.

Environmental Education. Environmental Education (EE) helps students become environmentally aware, knowledgeable, skilled, dedicated citizens who are committed to work, individually and collectively, to defend, improve, and sustain the quality of the environment on behalf of present and future generations of all living things

Competency. A measurable skill that demonstrates a person is properly or sufficiently qualified.

KEEP. The Wisconsin K-12 Energy Education Program (KEEP) initiates and facilitates the development, dissemination, implementation, and evaluation of energy education programs within Wisconsin schools.

KEEP Adjunct Faculty. KEEP Adjunct faculty are a group of university approved teacher educators and energy resource managers who teach the KEEP courses throughout the state of Wisconsin.

KEEP Teachers. KEEP Teachers are teachers who have successfully completed a Wisconsin K-12 Energy Education Program course.

Perception. Recognition and interpretation of sensory stimuli based chiefly on memory.

Professional Development. Professional development is a continuous learning process across all levels of education for the entire learning community. Quality professional development expands the capacity of the learning community to realize its vision and reach its goals (Wisconsin Department of Public Instruction [WDPI], 2005).

NRES 603. Teacher professional development in energy education through in-service course hands-on activities, class discussions, and peer teaching. NRES 603 is the first course developed by KEEP.

NRES 730. Teacher professional development in energy education through in-service course hands-on activities, class discussions, and peer teaching. NR 603 became NR 730 when it was approved to be a 700-level course by the College of Natural Resources. For this study, the course is often referenced as NR 603/730.

VI. ASSUMPTIONS

1. Teachers will provide candid information about and perceptions of NRES 603/730.
2. Teachers will provide candid information about and perceptions of their competency to teach energy education.

3. Teachers will provide candid information about and perceptions of student learning as a result of their energy education teaching competencies.

CHAPTER TWO LITERATURE REVIEW

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- II. ENERGY EDUCATION AS A COMPONENT OF ENVIRONMENTAL EDUCATION**
- III. IMPORTANCE OF ENVIRONMENTAL AND ENERGY EDUCATION**
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- V. TRENDS IN ENVIRONMENT EDUCATION PROFESSIONAL DEVELOPMENT**
- VI. ENERGY EDUCATION PROFESSIONAL DEVELOPMENT EXPERIENCES**
- VII. PURPOSE OF TEACHER PROFESSIONAL DEVELOPMENT**
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I. ENVIRONMENTAL EDUCATION

Environmental Education (EE) has been defined as a learning process by which students acquire environmental awareness and sensitivity, ecological knowledge which collectively lead to responsible citizen skills and individual or group action (Tbilisi, 1978). This statement encompasses the five sub-goals of environmental education.

1. Perceptual Awareness: To help students develop the ability to perceive and discriminate among environmental sensory stimuli; to acquire an aesthetic sensitivity and appreciation of natural and built environments.
2. Knowledge: To help students develop a basic understanding of how natural environments function; to acquire understanding of how human activity affects the functioning of natural environments.
3. Environmental Ethic: To help students develop a personal environmental ethic which they may act on to defend, improve and sustain natural environments.
4. Citizen Action Skills: To help students explore and acquire skills needed to identify, investigate and act on environmental issues.
5. Citizen Action Experience: To help students apply perceptual awareness, knowledge, environmental ethic and citizen action skills in working toward prevention, mitigation and resolution of environmental issues at all geographic scales (Engleson & Yockers, 1994). This educational movement is a long term response to cultural shift from dispersed agrarian society to an industrial urban society. Precursors to the modern version of EE include nature, conservation, and outdoor education (Swan, 1975). Each of those movements is represented in EE by simple nature appreciation, maintaining natural resources for future use, and conducting an integrated curriculum in the out of doors. Current environmental education theory places greater emphasis on issue investigation (Jensen and Schnack, 2006) and citizen involvement (Tilbury, 1995). Energy issues affect all aspects of life and human economic activities. Therefore it is a prime issue to investigate and promote citizen involvement.

II. ENERGY EDUCATION AS A COMPONENT OF ENVIRONMENTAL EDUCATION

Morrisey and Barrow (1984) defined energy education as “a vehicle to help students respond to present and future energy-related concerns, which include the political, social, economic, and environmental dimensions.” This relates to the skills and action sub goals of EE. The purpose of any energy education program should provide understanding of basic energy concepts and enable informed decision-making about the options and consequences of energy conservation, development, and utilization (Petrock, 1981). Here the sub goals of awareness, knowledge, and values are addressed.

In order to understand environmental issues and evaluate potential solutions, knowledge of energy concepts is critical (Snyder, 1994). That knowledge is severely lacking, as shown by a 1999 National Environmental Education & Training Foundation (NEETF) report. On the *Environmental Readiness Report Card*, the American public received a grade of “F” in the area of “Understanding the causes of basic environmental problems in the 21st century” (NEETF and Roper ASW, 1999). In Wisconsin, only 50% of 1840 5th graders could identify the sun as the energy source for all living things (Champeau, 1997). High school students, in the same study, did not perform any better than the 5th grade students. The following examples illustrate a void of energy education:

- ✓ 62% identified automobiles and coal burning power plants as the main source of emissions that are known to contribute to acid rain in the United States.
- ✓ 46% identified oil as a non-renewable energy resource.
- ✓ 17% recognized energy conservation as a solution that offers the most potential for reducing immediate energy problems (Champeau, 1997).

III. IMPORTANCE OF ENVIRONMENTAL AND ENERGY EDUCATION

Inclusion of environmental education and energy education have implications that affect both students and the world those students will encounter. Use of actual environmental issues in the classroom stimulates and motivates students. It provides a point of relevance to their lives where they can develop and practice real world skills such as critical thinking, decision making, and problem solving (Pennock and Bardwell, 1994). These are skills students need for everyday life in and out of the classroom.

Current environmental issues include global climate change, energy use, and sustainability. There has been evidence that education has not been part of the solution to manage these issues. Robinson and Shallcross (2006) have shown that there is a positive correlation between CO₂ emissions, education level and per capita income. Furthermore, current traditional educational systems promote the “problem of un-sustainability because it spreads a ‘culture of denial’ that rejects the link between modernity and the problems that threaten humanity’s and ecology’s future” (Bowers, 1997). This proposed culture of denial contributes to environmental crises. Students develop a skewed perception and value of the natural world. The culture of denial is then also written into ethical and legal codes that regulate actions regarding the biosphere and natural systems (Shallcross & Robinson, 2007).

If there is to be cultural change, it must begin with skilled and well-informed students. Therefore there must also be change within teacher training and educational reform.

IV. WHY TEACHER PROFESSIONAL DEVELOPMENT IN ENVIRONMENTAL EDUCATION?

As facilitators of education, teachers are key players in accomplishing the sub goals of EE. Therefore teachers must possess both content and pedagogical knowledge of environmental issues (Buethe, 1985, Cooper et al 1989, Stone 1989, Wilke, 1985). A study conducted by the University of Maryland Survey Research Center indicates that only about 10% of teachers were exposed to EE during their pre-service education (2000). Current pre-service teacher education programs tend to isolate core subject areas and integrate EE within only the science subject area (McKeown-Ice, 2000). Among those teachers that have participated in EE pre-service training, there is a reported lack of confidence in teaching affective education models and environmental action strategies (Lane et al, 1995). This information suggests that pre-service training does not provide the necessary foundation for effective EE in school classrooms.

Lack of pre-service preparation makes in-service training necessary to increase teacher confidence in EE. Lane et al (1994) found that teachers who had received in-service education in EE teaching methods perceived higher competency with the use of those methods as compared to teachers who did not have the same experience.

V. TRENDS IN ENVIRONMENT EDUCATION PROFESSIONAL DEVELOPMENT

Teachers have reported external and logistical barriers to teaching environmental issues (Ham & Sewing 1987-88; Ko & Lee, 2003). External and logistical barriers can be lack of preparation time, curriculum focus on teaching to academic standards, lack of support from school administrators. Internal barriers also prevent teachers from

addressing environmental issues in the classroom. Several studies have shown that teachers possess a positive attitude toward teaching environmental issues (Ko & Lee 2003; Lane et al 1994; Shigley & Koballa 1983; McCaw 1997-80). Despite having a positive attitude, teachers' lack of content knowledge could explain why they don't teach some environmental issues (Fortner & Corney, 2002). Further studies have shown, "if a teacher has a positive attitude toward teaching environmental issues (attitude), has enough knowledge on environmental issues (content knowledge) and know how to teach environmental issues (pedagogical knowledge), then he or she will teach the issues more often or more properly" (Jegade, Taplin & Chan, 2000; Shulman, 1987). Kim and Fortner (2006) also found that pedagogical knowledge training based on characteristics on environmental issues can encourage teachers to teach more of these issues. Regardless of the research to the contrary, teachers still believe that external barriers are more important than internal knowledge barriers.

VI. ENERGY EDUCATION PROFESSIONAL DEVELOPMENT EXPERIENCES

Training in the practice of energy education has been inconsistent across time and geographic areas. After the oil shortage of the 1970's crippled the U.S. economy, the National Science Foundation and U.S. Department of Energy funded faculty development institutes designed to prepare teachers with skills for teaching energy related topics (Morrisey and Barrow, 1984). An example of the Faculty Development Project in Energy Education was conducted in the school district of Newark, New Jersey and districts nearby 125 teachers attended as a requirement, but emerged from the workshop with "a better

overall understanding of the energy question, and were better equipped to introduce energy related topics to their classrooms” (Kimmel and Tomkins, 1985). After the national attention on development of energy curricula, state departments of education began their own curriculum projects and teacher workshops. Federal funding also supported these efforts. California, Florida, Indiana, Iowa, Maine, Minnesota, New Jersey, New Mexico, and Nebraska are a just a few of the states that made an early investment in energy education. Iowa in particular had conducted energy education workshops during 1981-82 at the Science Education Center at The University of Iowa. It was a cooperative effort between The University of Iowa, the Iowa Department of Public Instruction, area education agencies, and the non-profit organization Energy and Man’s Environment (Geil and Sheldon, 1983).

The early 1980s was an era of energy education collaboration. Former U.S. President Jimmy Carter declared that March 20, 1981 was National Energy Education Day or NEED (Morrisey and Barrow, 1984). The National School Boards Association, National Association of Student Councils, and National Association of Secondary School Principals acted as cooperative sponsors (Morrisey and Barrow, 1984). NEED began to write and review curricula as well as hold teacher workshops on the state and national levels. In that same year, energy educators met at the 1981 Conference for State Department Energy Education Consultants and created an energy education network (Morrisey and Barrow, 1984).

Other national interests replaced energy education during the 1990s. Despite the lack of interest, some programs managed to survive. Teacher professional development opportunities were still available and curriculum planners were reviewing existing energy

education materials. NEED began outreach for energy educators at satellite offices in various states. During the mid-1990's, Wisconsin began the creation of an independent state-wide energy education program.

The Wisconsin K-12 Energy Education Program (KEEP) was developed as a part of the Wisconsin Center for Environmental Education (WCEE). KEEP as a program was generated from the results of a WCEE 1997 study titled *Are we walking the talk?* Champeau et. al (1997) found that the state supports environmental education but lacks the knowledge and support to provide adequate instruction in that area. A recommended strategy for improvement was K-12 teacher in service and support from environmental educators. Because energy is the fundamental currency of the environment, energy education teacher in service was a logical development for the WCEE.

Currently, almost every state in the nation supports some type of energy education professional development for teachers. Some programs operate out of universities while others function with funding from NEED.

VII. PURPOSE OF TEACHER PROFESSIONAL DEVELOPMENT

According to Griffin (1983), the purpose of professional development programs is to “alter the professional practices, beliefs, and understanding of school persons toward an articulated end.” Guskey (2002b) expanded on that definition by identifying professional development programs as a “systematic effort to bring about change in the classroom practices of teachers, in their attitudes and beliefs, and in the learning outcomes of students.” A change in teacher attitude and belief will then initiate specific changes in classroom behaviors and result in enhanced student learning.

From a teachers' perspective, professional development is a method of combating boredom as well as a pathway to greater competence and greater professional satisfaction (Huberman 1995). Teachers also expect to gain specific, concrete and practical ideas that have relevance in the day to day operation of their classrooms (Fullan and Miles 1992). The most promising and readily available route to job growth is continued participation in professional development programs (Fullan 1991, 1993).

VIII. COMPLEXITY AND TEACHER PROFESSIONAL DEVELOPMENT

Although there is a growing body of literature, very little systemic research has been conducted on teaching improvements or student outcomes resulting from professional development (Garet et al 2001). There are two confounding factors that limit the ability of researchers to isolate the effects of teacher professional development. First, schools rarely implement single reform initiatives. Most schools are occupied with multiple reform plans that are being carried out simultaneously. Second, "the relationship between professional development and improvements in student learning on these real-world settings is far too complex and includes too many intervening variables to permit simple causal inferences" (Guskey 1997; Guskey & Sparks 1996).

IX. EFFECTIVE TEACHER PROFESSIONAL DEVELOPMENT

Eleven separate organizations have published a list of characteristics of an effective professional development program. Those organizations are American Federation of Teachers, Association for Supervision & Curriculum Development, Education Development Center, Educational Research Service, Educational Testing Service, Eisenhower Professional Development Program, National Governor's Association, National Institute for Science Education, National Partnership for Excellence and Accountability in Teaching, National Staff Development Council, and U.S. Department of Education. The most frequently cited characteristic was enhancement of teachers' content and pedagogical knowledge (Guskey 2003). Other consistent effective program characteristics include promotion of collaborative exchange, formative evaluation, alignment with other reform initiatives, and modeling of high-quality instruction. Although an effective program places value on student performance, less than five of the lists mention the importance of using student learning data to guide professional development activities (Guskey 2003). It is clear that there is little agreement between professional development researchers or practitioners about a common set of criteria for effective professional development (Guskey 2002a). When there is criteria agreement and provision of clear descriptions of important contextual elements, there can be sure improvement of professional development programs through research-informed decision making and planning (Guskey 2003).

Teachers as individuals are key stakeholders to consider when planning a successful professional development program. Lester (2003) suggests the following points, (1) Teachers are eager to learn about best practices (2) Teachers want their voices

heard (3) Teachers are already doing what they have to do (4) Teachers need a structured professional development program (5) Teachers must be held accountable for professional development outcomes.

X. PROGRAM EVALUATION

Evaluation is defined as the systematic collection of information about the activities, characteristics and outcomes of programs to make judgments, improve effectiveness, and inform decision makers (Patton, 1997). As a systematic process, evaluation is intentional and goal-driven. It is not a haphazard or event-driven. As an investigation, there must be collection and analysis of appropriate and pertinent information. The last component is judgment making, which implies a measure of merit or worth (Guskey, 2000). Worthen & Sanders (1987) describe the process of determining value as follows (1) determine standards for judging quality, (2) decide whether those standards should be relative or absolute, (3) collect relevant information, and (4) apply the standards to determine value or quality.

A. Phases of evaluation

Evaluation occurs in three broad phases. Front-end, needs assessment and planning evaluation are three ways of identifying evaluation that occurs before an activity or event. In this phase the evaluator collects evidence that will assist in the decision-making about whether or not a given activity or event should be implemented. If the activity or event is implemented, the evidence will also inform the content and strategies to adopt in a given setting (Owens and Rodgers, 1999). Formative evaluation occurs during the life of the activity or event. It provides information about how well the event

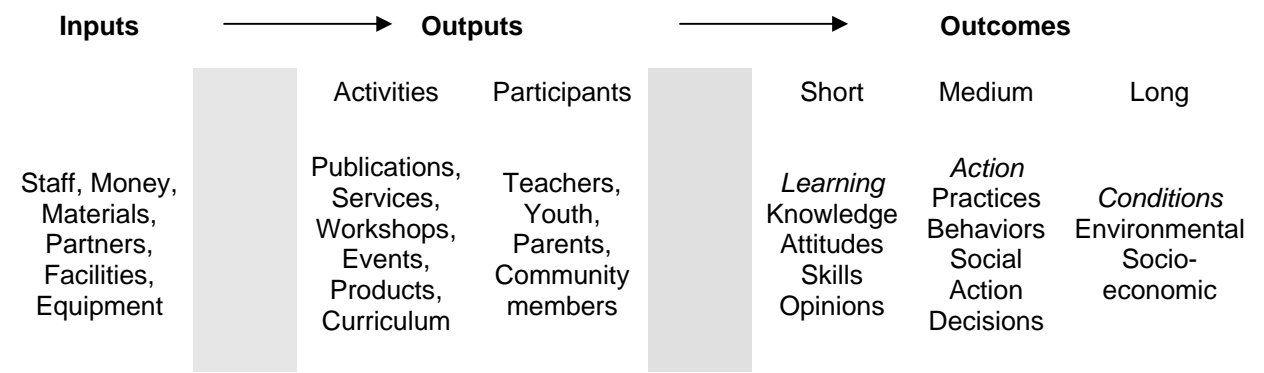
or activity in implementation matched the event or activity as planned. Formative evaluation can also identify flaws, weaknesses, benchmark achieved and improvements or changes to implementation (Scriven, 1991). Summative evaluation is conducted at the completion of event or activity. The purpose of this evaluation is to ascertain the success or failure of an activity or event. Accomplishments, positive and negative consequences, intended and unintended results are all components of a summative evaluation. Evaluators may also use the evaluation to do a cost/benefit analysis of the event or activity that will determine its existence or termination (Guskey, 2000).

B. Logic Model and Evaluation Plan

A logic model is a graphic display of the chain events that will facilitate change and achieve event or activity goals and objectives. It shows the cause and effect relationships of an event or activity in action. According to Fleming, the “process of developing and using a logic model is instrumental to improve planning, enhance the meaningfulness of evaluation results and to establish a logical link between program development and evaluation” (Section 2.2).

Construction of a logic model shows the links between inputs, outputs, and outcomes. Table 2.1 below displays examples of the categories.

Table 2.1 Logic Model Categories

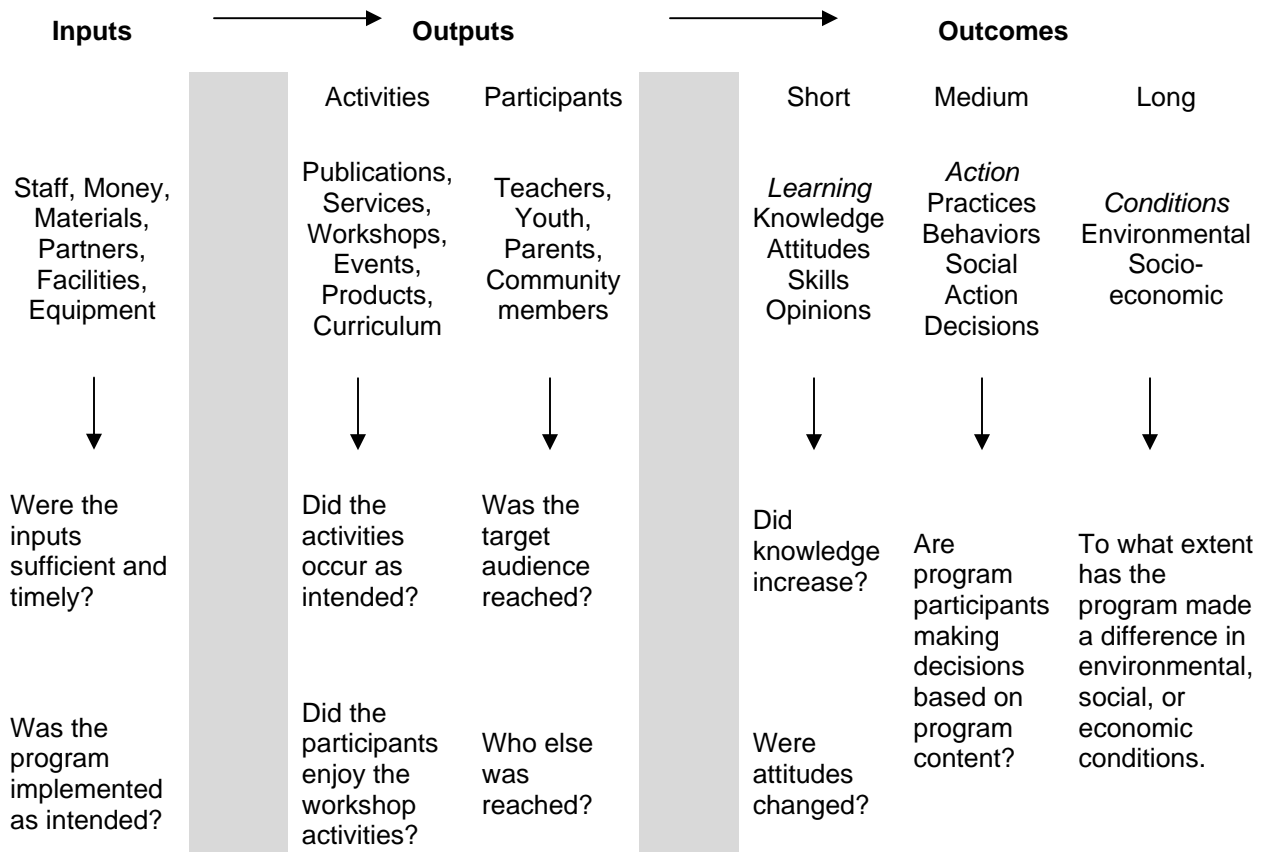


(Fleming, 2006)

To more clearly focus the evaluation, the evaluator must define what is going to be evaluated. Then articulate the purpose or reason for the evaluation. After defining the purpose, the evaluator can develop questions that reflect inputs, outputs, and outcomes.

Table 2.2 below shows example evaluation questions.

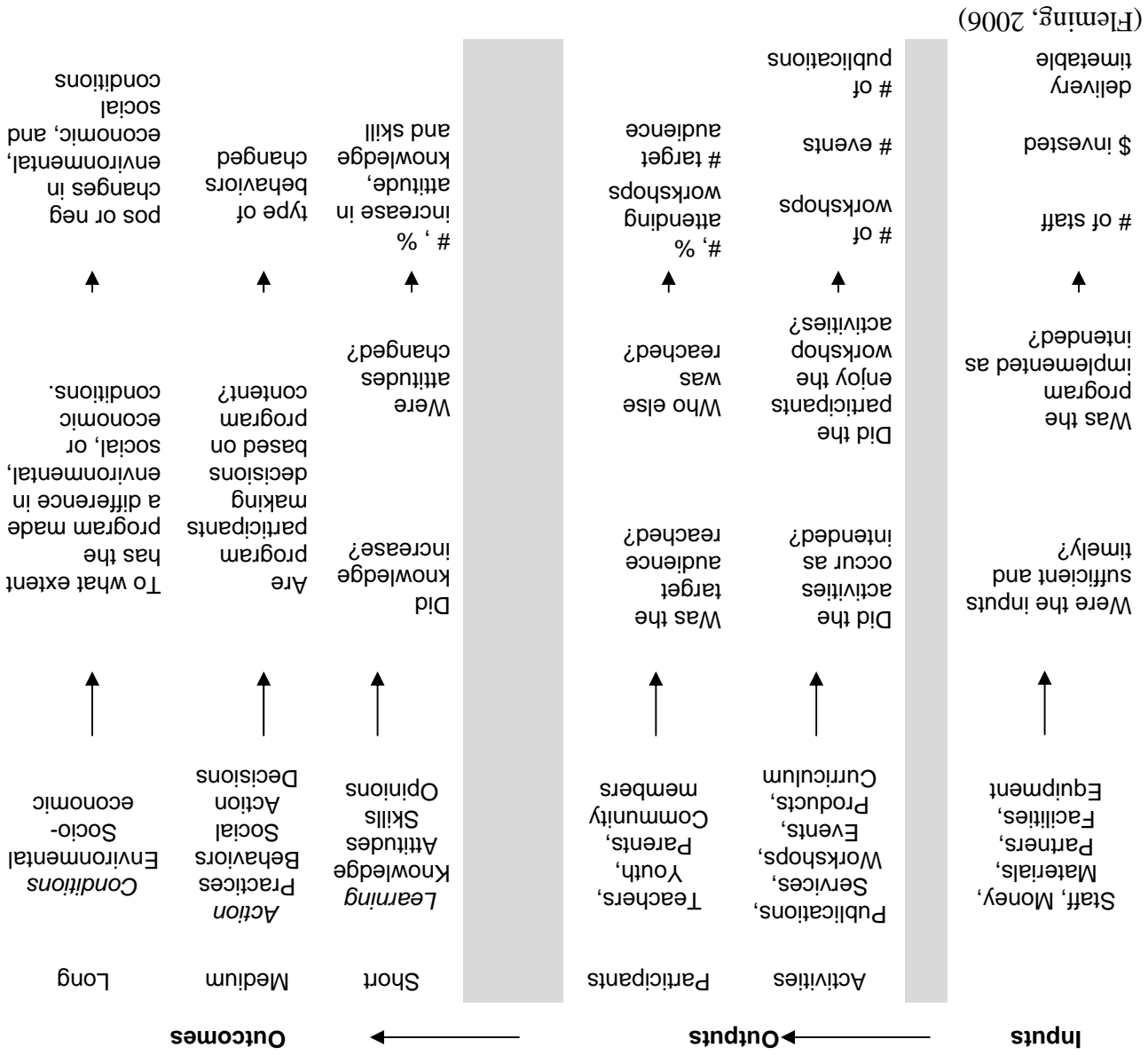
Table 2.2 Logic Model Evaluation Questions



(Fleming, 2006)

Finally, the evaluator must determine what indicators will sufficiently answer the evaluation questions. Example indicators are shown in the Table 2.3 below.

Table 2.3 Logic Model Indicators



C. Data Collection

The three main types of evaluation data collection are observation, interviews or focus groups, and questionnaires. To a lesser extent, an evaluator may choose an alternative assessment method. An alternative assessment may consist of concept

mapping, construction of a KWL (Know, Want to know, Learned) chart, journaling or portfolio compilation (Fleming, 2006).

Observation is “the systematic description of events behaviors and artifacts in a social setting chosen for study” (Marshall & Rossman 1989, p. 79). The data from observations should serve a specific evaluation purpose and be conducted/recorded in a systematic way. Documenting behaviors is the best use of observation.

Interviews or focus groups are useful for collecting information about knowledge, opinions and beliefs of program participants. Interviews are valuable in studying feelings, opinions and behaviors because these are things that an evaluator cannot observe. Focus groups are valuable in obtaining perceptions, opinions and attitudes on a certain topic. Using a set a carefully constructed questions, the natural conversation is balanced with planned group discussion.

Questionnaires are a written set of questions or statements designed to gather data from individuals. It is most useful when the intended audience is numerous resources are limited (Fleming, 2006).

D. Validity and Reliability

Validity and reliability are important concepts when conducting research in the social sciences. These concepts will influence the researcher’s ability to learn something about the phenomenon being studied and the extent to which a meaningful conclusion can be drawn from the data gathered.

Validity is defined as the extent to which an instrument measures what it is supposed to measure. Reliability refers to the consistency with which a measuring instrument measures the same thing.

Forms of validity include face, content, criterion, and construct. These forms are typically determined through judgment by a panel of experts. Forms of reliability include interrater, internal consistency, equivalent forms and test-retest. Reliability is enhanced through standardization of instrument administration and establishment of criteria for subjective judgments (Leedy & Ormrod, 2005).

XI. EVALUATION OF TEACHER PROFESSIONAL DEVELOPMENT

Evaluation of teacher professional development is a topic of increasing interest to educational professionals. First, there is growing realization that professional development is no longer a discrete event or activity. Educators now see it as an on-going and continuous process (Lieberman, 1995; Loucks-Horsley et al., 1987). This new emphasis on inquiry and experimentation also requires measures of progress in more meaningful ways (Guskey, 2000). Next there is increasing recognition that professional development is an intentional process (Guskey 1994; Sparks, 1996a, 1996b). As an intentional process, teachers have clear goals about positive change and improvement in classrooms. The successful achievement of those goals also necessitates gathering, analyzing and presenting relevant information (Guskey, 2000). Third, better information is needed to guide reform in professional development and educational systems. There is evidence that suggests that some school reform strategies are based on false or exaggerated claims. Better and timelier evaluation of these reform strategies will better inform potential users of outcomes – conditions of success and unanticipated effects (Consortium for Policy Research in Education, 1996). Finally, education at all levels is experiencing an increasing pressure for greater accountability. Public education

stakeholders – parents, school boards, district administrators and legislators – want to know if professional development efforts are valuable and useful to school systems, individual teachers and ultimately students (Guskey, 2000).

A. Professional Development Evaluation Standards

In order to better guide the evaluation of professional development efforts, The Joint Committee on Standards for Educational Evaluation created a list of 30 standards. Composed of fifteen educational organizations, the committee first published the standards in 1981 and a revision in 1994 (Guskey, 2000). These standards are “a principle mutually agreed to by people engaged in a professional practice, that, if met, will enhance the quality and fairness of that professional practice” (Joint Committee, 1994, p.2). The standards are organized into four groups according to the four attributes of a sound and fair program evaluation: utility, feasibility, propriety and accuracy (Guskey, 2000). For a complete listing of the standards and organizational committee members, refer to *The program evaluation standards* (2nd ed.) authored by the Joint Committee on Standards for Educational Evaluation or *Evaluating Professional Development* authored by Thomas Guskey.

B. Evaluation Plan

One model for evaluating professional development is presented in Table 2.4. This model was developed by Guskey (2000) as a guide for evaluation practioners.

Table 2.4 Teacher Professional Development Evaluation Plan

Five Levels Of Professional Development Evaluation				
Evaluation Level	What Questions Are Addressed?	How Will Information Be Gathered?	What Is Measured or Assessed?	How Will The Information Be Used?
1. Participants' reactions	<ul style="list-style-type: none"> -Did they like it? -Was their time well spent? -Did the material make sense? -Will it be useful? -Was the leader knowledgeable and helpful? -Were the refreshments fresh and tasty? -Was the room the right temperature? -Were the chairs more comfortable? 	<ul style="list-style-type: none"> -Questionnaires administered at the end of the session -Focus groups -Interviews -Personal learning logs 	<ul style="list-style-type: none"> -Initial satisfaction with the experience 	<ul style="list-style-type: none"> -To improve program delivery
2. Participants' learning	<ul style="list-style-type: none"> -Did participants acquire the intended knowledge and skills? 	<ul style="list-style-type: none"> -Paper and pencil instruments -Simulations and demonstrations -Participant reflections (oral and/or written) -Participant portfolios -Case study analyses 	<ul style="list-style-type: none"> -New knowledge and skills of participants 	<ul style="list-style-type: none"> -To improve program content, format and organization
3. Organization support and change	<ul style="list-style-type: none"> -What was the impact on the organization? -Did it affect organizational climate and procedures? -Was implementation advocated, facilitated and supported? -Was the support public 	<ul style="list-style-type: none"> -District and school records -Minutes from follow-up meetings -Questionnaires -Focus groups -Structured interviews with participants and school or district administrators -Participant portfolios 	<ul style="list-style-type: none"> -The organization's advocacy, support, accommodation, facilitation and recognition 	<ul style="list-style-type: none"> -To document and improve organizational support -To inform future change efforts

	<p>and overt?</p> <ul style="list-style-type: none"> -Were problems addressed quickly and efficiently? -Were sufficient resources made available? -Were successes recognized and shared? 			
4. Participants' use of new knowledge and skills	<ul style="list-style-type: none"> -Did participants effectively apply the new knowledge and skills? 	<ul style="list-style-type: none"> -Questionnaires -Structured interviews with participants and their supervisors -Participant reflections (oral and/or written) -Participant portfolios -Direct observations -Video- or audiotapes 	- Degree and quality of implementation	-To document and improve the implementation of program content
5. Student learning outcomes	<ul style="list-style-type: none"> -What was the impact on students? -Did it affect student performance or achievement? -Did it influence students' physical or emotional well being? -Are students more confident as learners? -Is student attendance improving? -Are dropouts decreasing? 	<ul style="list-style-type: none"> -Student records -School records -Questionnaires -Structured interviews with students, parents, teachers, and/or administrators -Participant portfolio 	<ul style="list-style-type: none"> -Student learning outcomes: <ul style="list-style-type: none"> Cognitive (performance and achievement) Affective (attitudes and dispositions) Psychomotor (skills and behaviors) 	<ul style="list-style-type: none"> -To focus and improve all aspects of program design, implementation and follow-up -To demonstrate the overall impact of professional development

Evaluation ensures that both teacher education and energy education are effectively implemented for students and teachers alike.

XII. ASSESSMENT OF ENERGY EDUCATION PROFESSIONAL DEVELOPMENT EXPERIENCES

Assessment of energy education professional development experiences tends to focus on Guskey's first two levels of evaluation (Table 2.4). When reported, it is noteworthy that energy education professional development workshops have yielded similar evaluation results in terms of teacher reactions. Teachers at workshops in Newark, New Jersey most appreciated use of experiments and demonstrations as well classroom activities and curricula materials (Kimmel and Tomkins, 1985). Participants at Iowa workshops felt that working with energy curricula and constructing classroom-appropriate materials were the most productive activities. The most popular activity at those same workshops was the hands on preparation of a solar lunch (Geil and Sheldon, 1983). Both groups reported that personal self-confidence in energy concepts and time to review materials were the biggest barriers to successful workshops.

KEEP has also most effectively and most often addressed Guskey's first two levels of evaluation (Table 2.4). As funding has allowed, KEEP has made limited forays into the Levels 3, 4 and 5 through stakeholder interest and independent research organizations.

A. Assessment of KEEP

KEEP has undergone both formative and summative assessment (Lane 2004). Both types of assessment have been used to improve course programming and justify continued stakeholder investment.

Several formative assessments were conducted in 1995 and 1996. During the first phase of program development, KEEP held a workshop for educators and curriculum planners to encourage input on the KEEP framework. The participants also commented on the effectiveness of the workshop to aid in the planning of future workshops. Focus groups met in 1995 and 1996 to allow stakeholders outside of the educational profession and opportunity to comment on the conceptual framework development process. In 1997, the KEEP framework underwent review as both formative and summative evaluation. The reviewers consisted of the focus group and workshop participants.

Next KEEP convened development of an activity guide. In 1996, a group of educators reviewed selected activities from existing resources. This formative evaluation assured that activities chosen for inclusion would directly address the KEEP conceptual framework. Educators also participated in a guide format survey in order to gather comments about how an activity guide should be organized. KEEP staff held internal reviews of draft activities to assess content and pedagogical accuracy. A series of formative and summative evaluations completed the activity guide development process. Content reviews were conducted by professionals in energy related fields. Teachers reviewed and piloted activities to be included in the guide. Comprehensive reviews were completed by the KEEP Steering Committee, Energy Advisory Review Committee,

Energy Corporation of Wisconsin Energy Education Committee and Wisconsin Utility Association Energy Education Committee.

The second phase of development focused on a university credit energy education course for teachers. Initially, energy educators and experienced teacher educators met in a focus group to share ideas about how to effectively educate teachers about energy. Next, teacher education professionals reviewed the drafts of the energy education course and adjunct faculty workshop. Then the adjunct faculty workshop was conducted in 1997. They received training on conducting the energy education course, reviewed the proposed course and reviewed the effectiveness of the adjunct faculty workshop. These formative and summative evaluations led to pilot energy education courses for teachers.

Pilot workshop participants completed a pre-course survey and post-course survey six months later. The over 500 surveys were compared pre to post course to identify any significant changes. Participants also completed a course evaluation to record data on course effectiveness and teacher perceptions of how their energy-related teaching methods had been enhanced. These teacher-participants were also asked to use and review at least two activities from the activity guide. Each activity was reviewed by at least ten teachers. Reviews were incorporated into a second edition of the activity guide.

KEEP adjunct faculty were surveyed in 1998. Data collected included course design, KEEP materials and how effectively the course increased teacher energy literacy.

Two additional KEEP program evaluations have furthered examined teacher and student outcomes. Hagler Bailly Consulting, Inc. published the KEEP Baseline Study in June 1999 (Hagler Bailly, 1999). KEEP's conceptual framework was the basis for their instrument design. The purpose of the study was (1) establish a benchmark of how energy

was being taught in Wisconsin schools and (2) measure students' and parents' knowledge of the four KEEP themes and current attitudes and practices regarding energy consumption. The following results are noteworthy:

STUDENTS

- Scored an average of 50% on a quiz about specific energy knowledge.
- Learned about energy in science class.
- Students with higher energy knowledge were more willing to take energy conservation measures, report having taken such an action in the past and to have more positive attitudes toward energy conservation and education.

TEACHERS

- Over 50% of the target population already incorporated energy into classroom curriculum.
- Energy teachers used a greater range of teaching materials
- 67% of the classes where energy is taught are at the high school level
- Non-energy teachers would be influenced to include energy issues through better access to teaching aids and more in-service classes on energy education teaching methods.

In 2002, evaluation consultants at Primen submitted a study report second draft titled Educating Wisconsin Teachers About Energy (Serchuk & Ryan 2002). Although Energy Center of Wisconsin, the contracting organization of the independent evaluation, gave a summary of tentative findings to the KEEP Advisory Committee in 2002. It was reported that KEEP teachers outdo non-KEEP teachers in the following metrics

- Frequency of student exposure.
- Amount of student exposure (time).
- Teacher perception of student learning, attitudes and energy use.
- Self-reported preparedness to teach about energy.

While these findings are not conclusive, they do suggest that KEEP is successful in transferring energy concepts to teachers and encouraging use of those concepts in the classroom.

More recent data indicates a similar positive regard for professional development in energy education. In the unpublished 2006 Course Evaluation Summary, KEEP reported general satisfaction with NRES 730 with 90 of 121 participants giving it a grade of “A” and 120 of 121 willing to recommend the in-service to a colleague. (KEEP, 2006). In terms of meeting the stated objectives, 83% reported that it provided an appreciation for energy education, 80% indicated an increase in energy resource issues, and 71% recognized a way to integrate energy concepts into an existing curriculum.

XIII. SUMMARY AND IMPLICATIONS

This literature review provided information about energy education, teacher education, and program evaluation. A recent movement in program evaluation involves the development of logic models. The Wisconsin K-12 Energy Education Program has never created an official logic model. The staff and stakeholders have a general and common understanding of immediate and long-term outcomes; however, these have never been documented. The nearest approximation of outcomes is listed on the course objectives for NR 730; since this study involves an assessment of teachers’ perception of

this course it uses the course outcomes as a basis. Teacher responses to surveys and interviews will help KEEP identify short, medium, and long-term outcomes of its initiatives, in particular the teacher in-service course. The next chapter describes steps taken to develop, administer, and analyze the interviews and survey.

CHAPTER THREE METHODS

- I. INTRODUCTION**
- II. IDENTIFICATION OF RESEARCH STRATEGY**
- III. PRE-SURVEY INTERVIEW**
 - A. Instrument Development**
 - B. Sub-problems Addressed**
 - C. Subjects**
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- IV. SURVEY**
 - A. Overview**
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- V. POST-SURVEY INTERVIEW**
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 - B. Sub-problems Addressed**
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 - D. Administration**
 - E. Analysis**
- VI. SUMMARY AND IMPLICATIONS**

I. INTRODUCTION

The purpose of this study is to assess teachers' perception of the quality of a professional development experience in energy education as it affects the practice of energy education and students' understanding of energy concepts. Teacher perceptions were collected using a pre-survey interview, survey and post-survey interview.

II. IDENTIFICATION OF RESEARCH STRATEGY

Sub-problem one is identification of a strategy to assess teachers' perception of professional development in energy education. The researcher identified assessment strategies from two sources. One of the sources was the Environmental Education and Training Partnership online course titled Applied Environmental Education Program Evaluation. Instructor Lyn Fleming, an experienced practitioner and teacher of program evaluation, taught both the theoretical aspects and practical applications of evaluation. The researcher participated in the course during Fall 2006. During the course, a logic model for evaluation of the NRES 603/730 was developed. This logic model links the NRES 603/730 inputs, outputs, and outcomes. (Figure 3.1) The other source of assessment strategies was gleaned from review of previous assessments of KEEP. The researcher read *The KEEP Baseline Study* conducted by Hagler Bailly, Inc. and *Educating Teachers Wisconsin Teachers About Energy* conducted by independent evaluators at Primen.

After course completion and KEEP assessment review, the researcher chose to use a survey and two interview instruments. Numerical data about teachers' perspectives is the primary focus of the survey instrument. Personalized information about teacher experiences is the primary focus of pre- and post-survey interviews. A pre-survey interview serves as an instrument to gather ideas for survey items. Post-survey interview responses will serve to better inform any noteworthy survey results with descriptive data. In general, the interview questions will be similar to the survey questions. Therefore the data was integrated, rather than a correlated or triangulated which both suggest an examination of comparison.

Figure 3.1 NRES 603/730 Logic Model

Inputs	Outputs		Outcomes		
	Activities	Participants	Short	Medium	Long
<u>Staff</u> -KEEP -Adjunct Faculty -Extension Continuing Education <u>Partners</u> -Focus on Energy -Energy Ctr. Of WI -Local utilities <u>Money</u> -Utility scholarships -Class fees -Adjunct Faculty salary <u>Materials</u> -Conceptual Framework -Activity Guide -Support Resources -Laptop computer -LCD projector <u>Facilities</u> -Course location	NR 730 curriculum Hands on activities Peer teaching Unit plan NR 730 web support page	WI K-12 teachers	Increased awareness of energy education Factual understanding of fundamental energy concepts Increased recognition of energy resource issues in Wisconsin, the nation, and the world Better use of energy education support materials	Curricular environment that fosters energy education promotion between teachers Enhanced integration of energy concepts into existing curriculum Expansion of state energy activities- Solar Olympics, Energy Bookmark Contest Improved energy literacy transfer to students Improved citizen actions based on personal energy literacy Additional KEEP course participation	WI energy educator network Energy competent teachers who assess and work to improve energy literacy Energy conservation at schools and homes Increased use of renewable energy technology Increased energy advocacy to family and community
		WI K-12 students	Increased awareness of energy Factual understanding of fundamental energy concepts Increased recognition of energy resource issues in Wisconsin, the nation, and the world	Increased participation in state energy activities - Solar Olympics, Energy Bookmark Contest Improved citizen actions based on personal energy literacy	

III. PRE-SURVEY INTERVIEW

The purpose of conducting pre-survey interviews was to propose potential survey items or adapt existing survey items as a result of personalized conversations with teachers.

A. Instrument Development

The interview guide (Appendix A: Pre-survey interview guide) was adapted from the survey instrument developed for this study and an interview guide the researcher developed for the AEEPE course.

The interview guide included a place to record the specifics of each interview and a protocol to be used for all interviews. The first three items were conversational in nature, regarding general energy education. The next five items specifically address teacher perceptions of the NRES 603/730 Course.

B. Sub-problems Addressed

Pre-survey interview items four, five and six (Figure 3.2) address sub-problem three: assessment of teacher perception regarding application of energy education professional development in the classroom.

Figure 3.2 Pre-survey interview items 4, 5 and 6

- | |
|---|
| <p>4. When the course was over, what were your thoughts on how you would apply the course to your classroom?</p> <p>5. In what ways does the course currently apply to your classroom?</p> <p>6. In what way has the applicability changed over time?</p> |
|---|

Pre-survey interview item seven (Figure 3.3) addresses sub-problem four: assessment of teachers' perception regarding the effect of energy education professional development on students' understanding of energy concepts.

Figure 3.3 Pre-survey item 7.

7. How has the course experience helped you increase your students' understanding of energy concepts?

C. Subjects

Due to time constraints and proximity of potential participants, the researcher created a non-random convenience sample of teachers who had successfully completed the NRES 603/730 course. Participants were chosen according to the year they completed the course. Course years were grouped as follows, 1998-2000, 2001-2003, 2004-2006. First the researcher contacted teachers participating in 2007 summer session courses for Masters of Science in Environmental Education program. Then researcher used the KEEP participant database to create the groups. Then the researcher scrolled through the names and attempted to stop at different points in each group.

D. Administration

A total of 19 participants were called at home and six interviews were completed. All of the interviews were completed in person or via the telephone. Interviews were digitally recorded with permission of the interview participant. All the interviews followed the same protocol as outlined by the researcher and graduate committee.

E. Analysis

The researcher listened to responses to be better familiarized with them. Pre-survey interview data will be integrated with survey data where both address one of the

research sub-problems. Responses were reported descriptively using quotes and statement summaries.

IV. SURVEY

A. Overview

Survey items (Appendix C: Survey) were adapted from *The KEEP Baseline Study* (Hagler Bailly Consulting Inc.) which adapted items from two instruments designed to assess Wisconsin environmental literacy of 5th and 11th grade students (Peri, 1996 and Quale 1993).

The first portion of the survey was titled “Your Teaching and Background and Experience.” It contained questions about grade and subject area, teaching context and past experience with KEEP. Portion two was titled “Teaching Energy.” It contained questions specific to energy education, but not specific to KEEP. The introduction instructed respondents to consider all their teaching about energy, not just use of KEEP or any KEEP materials. Items asked if respondents taught energy concepts, what barriers prevent inclusion of energy concepts and what factors would influence use of energy concepts. Portion three was titled “KEEP In-service Course.” The first item in the section presented a Likert-type question (1=Strongly Disagree, 3=Not Sure, 5=Strongly Agree) regarding respondent perception of achievement of four of the NRES 603/730 course goals. Respondents were then presented with a follow up open-ended item. They could provide additional description or evidence to support responses to the previous item. The next item, also a Likert-type question (1=Not at all, 4=A great deal, 5=Don’t know), asked about respondent self-reported ability to accomplish sub goals within the

KEEP Conceptual Framework. This item also had a follow up opportunity to provide description or evidence to support the numerical response. The back page of the survey provided space for respondents to provide additional comments on perceptions of the KEEP course. (See Appendix B).

The UW-Stevens Point Institutional Review Board reviewed the survey instrument KEEP adjunct faculty and the researcher's graduate committee reviewed the instrument for validity. Adapted survey items had previously undergone validity review in Hagler Bailly (1999), Peri (1996) and Quale (1993). No significant changes were made.

A pilot study was conducted in May of 2007. The pilot population was teachers who successfully completed the October 22, 1998 NRES 730 course. A total of 41 surveys were sent via the US Postal Service. Twelve were completed and returned for a return rate of 29%. Due to the end of May timing of the pilot at study, two teachers commented that the verb tense used in the survey was confusing. Items asking for teachers to look ahead to the school year were not clear because the teachers were finishing the school year at the time of the survey. The suggested changes to verb tense were not made because the survey would correspond with the beginning the school year and therefore be appropriately worded.

B. Sub-problems Addressed

Survey items seven (Figure 3.4) and thirteen (Figure 3.5) address sub-problem two: assessment teacher perception of the quality of a professional development experience in energy education.

Figure 3.4 Survey item 7

7. Overall, how would you grade the KEEP In-service Course? (Please circle one letter.)

Excellent Failing

A B C D F

Survey item thirteen (Figure 3.5) addresses sub-problem three: assessment of teacher perception regarding application of energy education professional development in the classroom.

Figure 3.5 Survey item 13

Below are some statements teachers have made about using the KEEP In-service Course in the classroom.

13. Please indicate the degree to which you personally agree or disagree with each of these statements. (Circle one number for each statement.)

As a result of my participation in the KEEP In-service course, I am comfortable with...

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
the amount of training and experience I have to teach about energy.	1	2	3	4	5
the accessibility of published resources (e.g., teacher guides, videos, trade books) I can acquire to help me develop energy education lessons and activities.	1	2	3	4	5
contacting local, statewide, or national community resources (e.g., professionals and agencies) to support my efforts to teach about energy.	1	2	3	4	5
my ability to integrate energy concepts into my curriculum.	1	2	3	4	5

Survey item fifteen (Figure 3.6) addresses sub-problem four: assessment of teachers' perception regarding the effect of energy education professional development on students' understanding of energy concepts.

Figure 3.6 Survey item 15.

15. Please indicate the degree to which you personally agree or disagree with each of these statements. (Circle one number for each statement.)					
The KEEP In-service Course has affected my ability to...					
	Not at all	A little	A fair amount	A great deal	Don't know
increase student knowledge about energy.	1	2	3	4	5
help students understand energy flow through systems.	1	2	3	4	5
increase student knowledge about the development of energy resources.	1	2	3	4	5
increase student knowledge of renewable energy resources.	1	2	3	4	5
help students understand the positive and negative effects of energy resource development and use.	1	2	3	4	5
help students understand Wisconsin energy issues.	1	2	3	4	5
affect student attitudes toward energy.	1	2	3	4	5
encourage students to use energy more efficiently.	1	2	3	4	5
help students understand future energy resource development and use.	1	2	3	4	5

C. Subjects

The survey population was all of the teachers who completed NRES 603/730 from Fall Semester 1998 to Fall Semester 2006, or the complete NRES 603/730 population. Names and addresses were supplied by the KEEP participant database. The researcher and graduate committee chose to include the entire population for the following reasons.

- Participant mortality – the KEEP database contains records dating 1998. The number of teachers-participants who have relocated or retired is unknown. Therefore the number of surveys sent and the number actually received by the intended recipient is also unknown.
- Funding – the WCEE made the necessary financial resources available.
- Low return rate – teachers are committed to heavy workloads during the school year. Most teachers take full advantage of vacation breaks for just that reason. Convincing a teacher to take precious time to participate in research is not an easy argument to make.

D. Administration

Surveys (Appendix B) were paper format and included a cover letter (Appendix B) as well as a business reply envelope. The business reply envelopes were coded so individual responses could be identified. Therefore the surveys were completed with the knowledge that responses would be confidential but not anonymous. Recipients were given two weeks to complete and return the survey. The cover letter notified teachers of an incentive to participate. Three randomly selected respondents received \$100 gift certificates to SolarWorld, a Colorado company that sells solar energy educational kits.

The physical process of mailing the paper surveys was streamlined by the assistance of Tom Burkart at UW-SP Bulk Mail Services. Mr. Burkart ran the address list through software that identified incorrect or incomplete addresses. 200 addresses were removed for those reasons. Then Mr. Burkart sorted the addresses according to US Postal Service Bulk Mail regulations. With the assistance of his work-study staff, Mr. Burkart printed addresses on the mailing envelopes and participant codes on the business reply

envelopes. The actual stuffing of envelopes was completed by the KEEP staff in the Central Stores warehouse on the UW-SP campus. After two days of stuffing, the 2562 surveys were mailed in October 2007.

Approximately four days after the surveys were mailed; the researcher was informed by a survey recipient/co-worker that the mailing address had an incorrect last name. The researcher checked the mailing list against the original KEEP participant database. The researcher determined that in the process of sorting the addresses using Microsoft Excel, the last names were sorted independently of the other address fields. After consulting with graduate committee members, the researcher created and printed a postcard that served three purposes. First it thanked those people who had already completed and returned a survey. Second it apologized for the incorrect last name on the mailing address. Finally it reminded recipients to complete and return the survey within the newly extended deadline, Oct. 29, 2007.

After further discussion with graduate committee members over concern that a low return rate (based on the mailing address error) would invalidate the survey results, the researcher decided to pursue use of a web-based survey. The intended recipients were survey non-respondents with a valid email address in the KEEP participant database.

The researcher contacted UW-Stevens Point Information Technology (IT) Services regarding adapting the paper survey to html format. The task was delegated to IT work-study student Amiee Freston in November 2007. Once the format was finalized, 959 recipients received an email with a cover letter message (Appendix C), informed consent notification and a link to the survey (Appendix C). The number of recipients was

reduced from the total population by the number of viable email addresses in the KEEP database.

The next day, the researcher was notified by a staff member that the survey link in the sent email was not functioning properly. The researcher consulted with the IT Services Help Desk. The researcher discovered that the process of copying and pasting the link within Microsoft Outlook unintentionally created a requirement that survey participants log on to the survey using the researcher's and then Ms. Freston's UWSP user id and password.

To resolve the issue, the researcher created a Microsoft Word document containing cover letter message, informed consent notification, and a link to the survey. Then the researcher used the copy and paste functions in Microsoft Word to transfer the information to email in Microsoft Outlook.

Recipients had two weeks to complete the survey. Responses were anonymous and stored in the UW-Stevens Point secure server. Access to the response data was provided in a separate link given to the researcher.

The researcher hired work study student Marissa Keller to input the paper survey data. Ms. Keller entered the data into a Microsoft Excel Worksheet. The data was entered during November and December 2007 on a computer located in the Wisconsin Center for Environmental Education Resource Library.

A total of 2562 paper surveys were mailed in October 2007. The response rate was 17.45% (447 surveys). Of 959 electronic surveys emailed, 67 were completed and returned for a response rate of 7%.

The total combined number of surveys sent was 3521. Of 2562 teachers within the target population, 514 were completed and returned. The total combined response rate was 20%.

E. Analysis

Survey responses were tallied. Results were reported descriptively as averages and percentages.

V. POST-SURVEY INTERVIEW

A. Post Hoc Decision for Need

Noteworthy items emerged from several parts of the survey. After some discussion, the researcher decided to pursue post-survey interviews that focused on why teachers do incorporate energy concepts into classroom curricula.

B. Instrument Development

The post-survey interview guide was adapted from the format for the pre-survey interview. Only two items were included on the interview. The first question ascertained if the teacher practiced energy education. The second question asked why. The researcher's graduate committee reviewed the post-survey interview guide. No changes were made. UW-Stevens Point Institutional Review Board approval for this interview guide was included in the pre-survey interview approval. The researcher's graduate committee reviewed the instrument for validity. No changes were made. The researcher established a protocol when conducting interviews to increase reliability.

C. Sub-problems Addressed

The post-survey interview does not specifically correlate to the identified sub-problems of this study. The post-survey interview takes a step back from assessment of satisfaction to find the origination of the need for professional development in energy education. There is a dearth of information, anecdotal or otherwise, regarding the notion KEEP satisfies an external and existing need or that KEEP creates and satisfies the need for professional development in energy education.

D. Subjects

The participants for the interview (see Appendix D for Post-survey Interview Guide) were selected randomly from the whole population, with a goal of 10 participants in the sample. A list of random numbers was generated by the statistical program Minitab. The researcher matched the random number to individual members of the NRES 603/730 population.

E. Administration

110 teachers were called at their school phone numbers during April 2008. Ten interviews were completed.

F. Analysis

The researcher reviewed interview notes to be better familiarized with them. Post-survey interview data was integrated with survey data to address the overarching issue as to whether or not KEEP works. Responses were reported descriptively using quotes and statement summaries.

VI. SUMMARY AND IMPLICATIONS

This chapter described the strategies used to ascertain teachers' perceptions of KEEP's introductory energy education course. The most comprehensive and efficient method turned out to be a traditional survey. To provide supplementary information, interviews were conducted prior to and after the survey. This Chapter also shared the steps taken to ensure the survey's reliability and validity and to overcome challenges and barriers encountered during survey administration. The outcome of the survey and interviews resulted in a large number of teachers (over 400) choosing to provide KEEP with information about their perceptions of the KEEP in-service course. While these teachers are not representative of the entire population of teachers who have participated in KEEP courses, they do provide valuable information about perceptions of course outcomes and effectiveness. The next chapter provides the results of their perceptions and draws some initial conclusions. The final chapter answers the key research questions of the study and provides recommendations to KEEP for improving course outcomes.

CHAPTER FOUR RESULTS

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- II. SUB-PROBLEM ONE**
- III. SUB-PROBLEM TWO**
 - A. Results: Survey Item Seven**
 - B. Results: Survey Item Thirteen**
- IV. SUB-PROBLEM THREE**
 - A. Results: Pre-interview Survey Item Four**
 - B. Results: Pre-interview Survey Item Five**
 - C. Results: Pre-interview Survey Item Six**
 - D. Results: Survey Item Thirteen**
- V. SUB-PROBLEM FOUR**
 - A. Results: Pre-interview Survey Item Seven**
 - B. Results: Survey Item Fifteen**
- VI. POST-SURVEY INTERVIEW**
- VII. SUMMARY AND IMPLICATIONS**

I. INTRODUCTION

The purpose of this study is to assess teachers' perception of the quality of a professional development experience in energy education as it affects the practice of energy education and students' understanding of energy concepts. This chapter reports the results corresponding to the four sub-problems of this study.

II. SUB-PROBLEM ONE

Sub-problem one is identify a strategy to assess teachers' perception of professional development in energy education. The strategies identified and developed were a Pre-survey interview (See Appendix A), Survey (See Appendix B) and Post-survey interview (Appendix D).

III. SUB-PROBLEM TWO

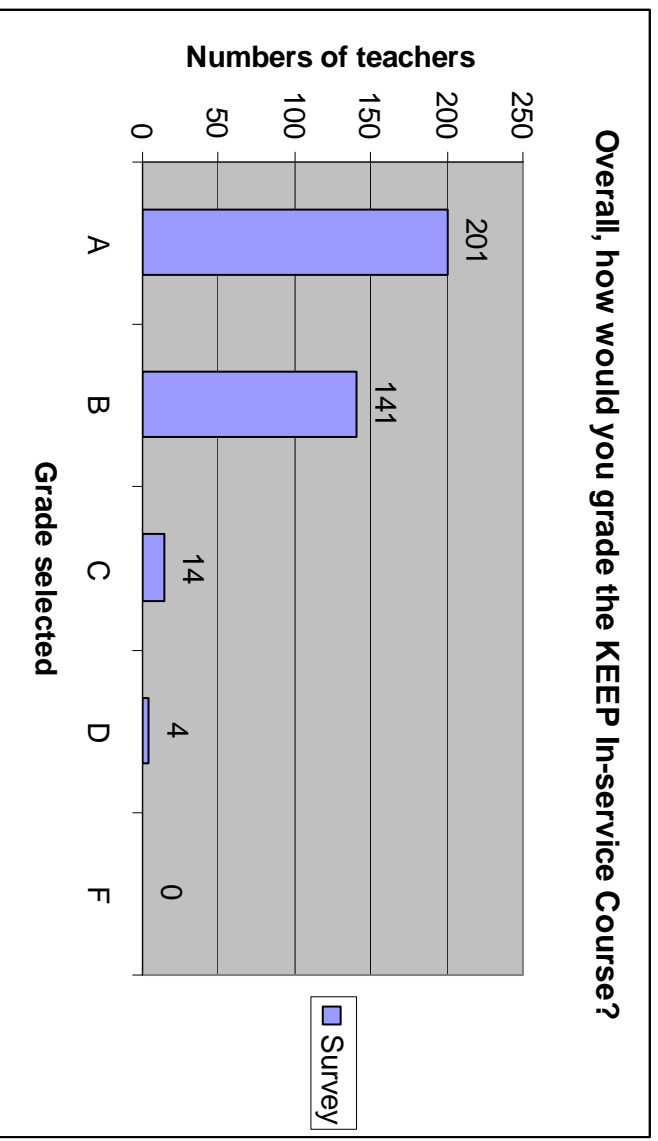
Sub-problem two is to assess teacher perception of the quality of a professional development experience in energy education. This sub-problem is addressed in survey items seven (Figure 3.4) and thirteen (Figure 3.5).

A. Results: Survey Item Seven

1. Survey

360 survey respondents answered Item 7 and 94 did not. Figure 4.1 graphically illustrates the teacher responses to Item 7.

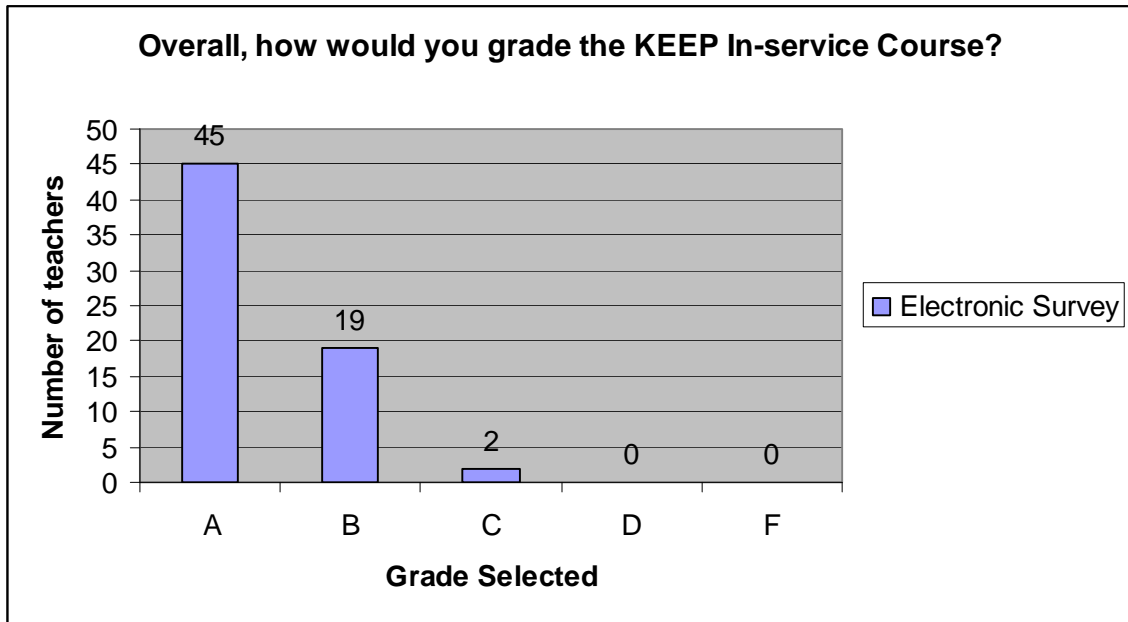
Figure 4.1 Item 7 Survey results



2. Electronic Survey

Sixty-six electronic survey respondents answered item seven and 1 did not. Figure 4.2 graphically illustrates teacher responses to Item 7.

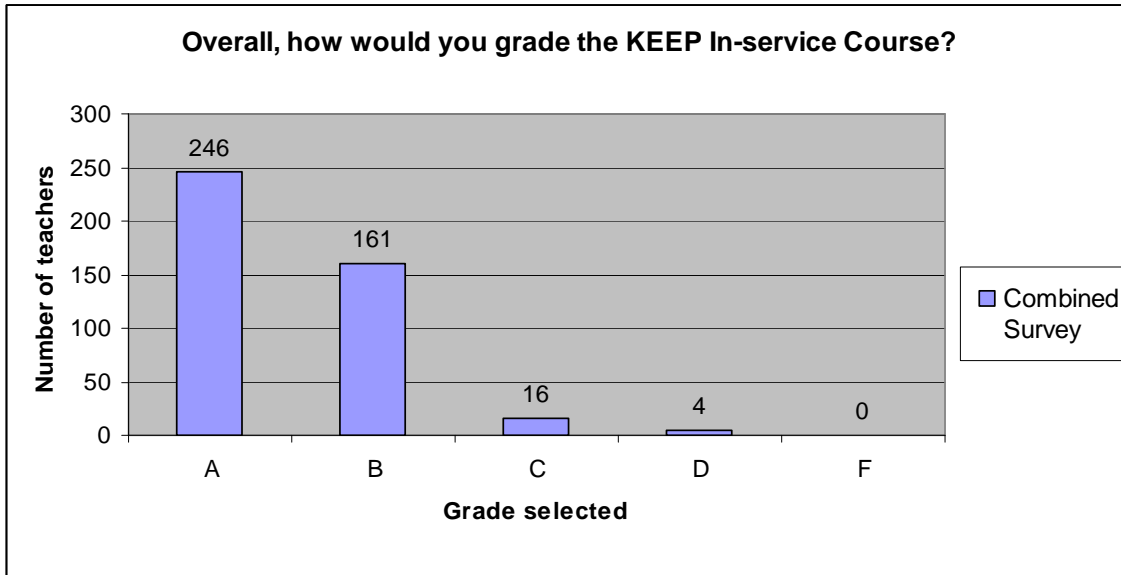
Figure 4.2 Item 7 Electronic Survey results



3. Combined Results

426 combined survey respondents answered item seven and 95 did not. Figure 4.3 graphically illustrates teacher responses to Item 7.

Figure 4.3 Item 7 Combined Survey results



When asked to grade the KEEP In-Service Course, 407 of 426 teachers or 96% gave a grade of A or B. This indicates that teachers are generally satisfied with the course quality as it is conducted, the setting, content and take-away messages/materials.

B. Results: Survey Item Thirteen

1. Survey

Figure 4.4 graphically represents teacher responses to Item 13. Each row heading indicates the number of respondents in bold italicized type. The number of responses is shown in the columns also in bold italicized type.

Figure 4.4 Item 13 Survey Results

Below are some statements teachers have made about using the KEEP In-service Course in the classroom.					
13. Please indicate the degree to which you personally agree or disagree with each of these statements. (Circle one number for each statement.)					
As a result of my participation in the KEEP In-service course, I am comfortable with...					
	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
the amount of training and experience I have to teach about energy. <i>n = 308</i>	6 1	9 2	43 3	172 4	78 5
the accessibility of published resources (e.g., teacher guides, videos, trade books) I can acquire to help me develop energy education lessons and activities. <i>n = 261</i>	5 1	12 2	43 3	137 4	64 5
contacting local, statewide, or national community resources (e.g., professionals and agencies) to support my efforts to teach about energy. <i>n = 255</i>	3 1	23 2	81 3	120 4	28 5
my ability to integrate energy concepts into my curriculum. <i>n = 258</i>	4 1	6 2	30 3	163 4	55 5

2. Electronic Survey

Figure 4.5 graphically represents teacher responses to Item 13. Each row heading indicates the number of respondents in bold italicized type. The number of responses is shown in the columns also in bold italicized type.

Figure 4.5 Item 13 Electronic Survey Results

Below are some statements teachers have made about using the KEEP In-service Course in the classroom.					
13. Please indicate the degree to which you personally agree or disagree with each of these statements. (Circle one number for each statement.)					
As a result of my participation in the KEEP In-service course, I am comfortable with...					
	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
the amount of training and experience I have to teach about energy. <i>n = 52</i>	0 1	2 2	7 3	36 4	7 5
the accessibility of published resources (e.g., teacher guides, videos, trade books) I can acquire to help me develop energy education lessons and activities. <i>n = 52</i>	0 1	2 2	5 3	33 4	12 5
contacting local, statewide, or national community resources (e.g., professionals and agencies) to support my efforts to teach about energy. <i>n = 52</i>	0 1	4 2	12 3	29 4	7 5
my ability to integrate energy concepts into my curriculum. <i>n = 52</i>	0 1	0 2	3 3	33 4	16 5

3. Combined results

Figure 4.6 graphically represents teacher responses to Item 13. Each row heading indicates the number of respondents in bold italicized type. The number of responses is shown in the columns also in bold italicized type.

Figure 4.6 Item 13 Combined Survey Results

Below are some statements teachers have made about using the KEEP In-service Course in the classroom.

13. Please indicate the degree to which you personally agree or disagree with each of these statements. (Circle one number for each statement.)

As a result of my participation in the KEEP In-service course, I am comfortable with...

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
the amount of training and experience I have to teach about energy. <i>n = 315</i>	6 1	11 2	50 3	208 4	40 5
the accessibility of published resources (e.g., teacher guides, videos, trade books) I can acquire to help me develop energy education lessons and activities. <i>n = 313</i>	5 1	14 2	48 3	170 4	76 5
contacting local, statewide, or national community resources (e.g., professionals and agencies) to support my efforts to teach about energy. <i>n = 308</i>	3 1	27 2	94 3	149 4	35 5
my ability to integrate energy concepts into my curriculum. <i>n = 310</i>	4 1	6 2	33 3	196 4	71 5

In examining the course goals, a majority of teachers responded that they were comfortable with the amount of training and experience teaching about energy (248 of 315 or 79%), accessibility of published resources (246 of 313 or 79%), contacting local, statewide or national community resources to support efforts in teaching energy (184 of

308 or 60%) and the ability to integrate energy concepts into their curriculum (267 of 310 or 86%).

Of the four course goals, teachers were most confident in their ability to integrate energy concepts in their curriculum. This perceived confidence may arise from in-course collaboration of teachers who represent K-12 and all subject areas or the final Unit Plan assignment that asks the teacher to create classroom-practical energy-integrated lesson plans. Teachers were least confident in their ability to contact local, statewide or national community resources to support efforts in teaching energy. Contributing factors may include a lack of knowledge of who to contact, how to contact community resources, specific areas of expertise and availability.

Overall, the responses indicate that teachers perceive that the NRES 603/730 course goals are being met to a satisfactory degree.

IV. SUB-PROBLEM THREE

Sub-problem three is to assess teacher perception regarding application of energy education professional development in the classroom. This sub-problem is addressed in pre-survey interview items four, five and six (Figure 3.2). It is also addressed in survey item thirteen (Figure 3.5).

A. Results: Pre-interview Survey Item Four

When asked about their plans for classroom application of NRES 603/730 at the course conclusion, the pre-survey interview sample responded with mixed results. The responses are as follows:

- A. Yes – apply to basic energy course and student projects
- B. Yes – apply to high school science
- C. Yes – apply use of speakers, field trips and Pedal Power
- D. No – energy concepts are already in use for high school biology and physical science
- E. No – energy concepts are already taught in chemistry and physics
- F. Not sure

The mix of responses may reflect both the motivation for taking the course and prior experience with teaching energy concepts.

B. Results: Pre-interview Survey Item Five

When asked in what ways the course currently applies to your classroom, the pre-survey interview sample responded with a majority of teachers recognizing at least one existing application. The identified class applications are listed below

- A. Construction
- B. Earth Science, state testing
- C. Family and Consumer Education
- D. Biology
- E. Chemistry/Physics
- F. Middle School Science

All of the respondents made a real world connection to the course and found some form of relevancy to their current practice of teaching.

C. Results: Pre-interview Survey Item Six

When asked in what way the applicability has changed over time, all the teachers responded that there hasn't been an application change. Three teachers indicated that in-school technology supporting education has changed. Teacher responses are listed below

- A. No
- B. No – schools have changed (solar lights as technology improves)
- C. No – at home use (conservation of energy) has changed
- D. No – personal lifestyles have changed but the curriculum is set
- E. No – understanding of energy flow and conversion hasn't changed
- F. No

The teachers in this sample have not experienced or observed a change in application of the NRES 603/730. One possibility is that the course adequately covers Wisconsin state academic requirements regarding energy concepts.

D. Results: Survey Item Thirteen

1. Survey

Figure 4.7 graphically represents teacher responses to Item 13. Each row heading indicates the number of respondents in bold italicized type. The number of responses is shown in the columns also in bold italicized type.

Figure 4.7 Item 13 Survey Results

Below are some statements teachers have made about using the KEEP In-service Course in the classroom.					
13. Please indicate the degree to which you personally agree or disagree with each of these statements. (Circle one number for each statement.)					
As a result of my participation in the KEEP In-service course, I am comfortable with...					
	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
the amount of training and experience I have to teach about energy. <i>n = 308</i>	6 1	9 2	43 3	172 4	78 5
the accessibility of published resources (e.g., teacher guides, videos, trade books) I can acquire to help me develop energy education lessons and activities. <i>n = 261</i>	5 1	12 2	43 3	137 4	64 5
contacting local, statewide, or national community resources (e.g., professionals and agencies) to support my efforts to teach about energy. <i>n = 255</i>	3 1	23 2	81 3	120 4	28 5
my ability to integrate energy concepts into my curriculum. <i>n = 258</i>	4 1	6 2	30 3	163 4	55 5

2. Electronic Survey

Figure 4.8 graphically represents teacher responses to Item 13. Each row heading indicates the number of respondents in bold italicized type. The number of responses is shown in the columns also in bold italicized type.

Figure 4.8 Item 13 Electronic Survey Results

Below are some statements teachers have made about using the KEEP In-service Course in the classroom.					
13. Please indicate the degree to which you personally agree or disagree with each of these statements. (Circle one number for each statement.)					
As a result of my participation in the KEEP In-service course, I am comfortable with...					
	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
the amount of training and experience I have to teach about energy. <i>n = 52</i>	0 1	2 2	7 3	36 4	7 5
the accessibility of published resources (e.g., teacher guides, videos, trade books) I can acquire to help me develop energy education lessons and activities. <i>n = 52</i>	0 1	2 2	5 3	33 4	12 5
contacting local, statewide, or national community resources (e.g., professionals and agencies) to support my efforts to teach about energy. <i>n = 52</i>	0 1	4 2	12 3	29 4	7 5
my ability to integrate energy concepts into my curriculum. <i>n = 52</i>	0 1	0 2	3 3	33 4	16 5

3. Combined results

Figure 4.9 graphically represents teacher responses to Item 13. Each row heading indicates the number of respondents in bold italicized type. The number of responses is shown in the columns also in bold italicized type.

Figure 4.9 Item 13 Combined Survey Results

Below are some statements teachers have made about using the KEEP In-service Course in the classroom.					
13. Please indicate the degree to which you personally agree or disagree with each of these statements. (Circle one number for each statement.)					
As a result of my participation in the KEEP In-service course, I am comfortable with...					
	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
the amount of training and experience I have to teach about energy. <i>n = 315</i>	6 1	11 2	50 3	208 4	40 5
the accessibility of published resources (e.g., teacher guides, videos, trade books) I can acquire to help me develop energy education lessons and activities. <i>n = 313</i>	5 1	14 2	48 3	170 4	76 5
contacting local, statewide, or national community resources (e.g., professionals and agencies) to support my efforts to teach about energy. <i>n = 308</i>	3 1	27 2	94 3	149 4	35 5
my ability to integrate energy concepts into my curriculum. <i>n = 310</i>	4 1	6 2	33 3	196 4	71 5

In examining the course goals, a majority of teachers responded that they were comfortable with the amount of training and experience teaching about energy (248 of 315 or 79%), accessibility of published resources (246 of 313 or 79%), contacting local,

statewide or national community resources to support efforts in teaching energy (184 of 308 or 60%) and the ability to integrate energy concepts into their curriculum (267 of 310 or 86%).

In terms of application of energy education professional development in the classroom, an 81% perceived comfort with the amount of training and expertise in energy education suggests teacher willingness to approach and accept energy concepts in a classroom setting. Furthermore, an 86% perceived comfort with the ability to integrate energy concepts into curricula suggests that application is occurring across subject areas and grade levels.

Overall, the data indicates that teachers positively regard application of energy education professional development as a result of the NRES 603/730 course.

V. SUB-PROBLEM FOUR

Sub-problem four is assess teachers' perception regarding the effect of energy education professional development on students' understanding of energy concepts. This sub-problem is addressed in pre-survey interview item seven. (Figure 3.3). It is also addressed in survey item fifteen. (Figure 3.6).

A. Results: Pre-interview Survey Item Seven

When asked how the course experience helped increase students' understanding of energy concepts, the teachers tended to respond with comments about how the course affected teacher knowledge or pedagogy.

A. Sure.

B. The course gives confidence to teachers, teachers can get up to date information, and teachers have access to the [KEEP] web site.

C. Teachers learn about resources and how to use them; they can track kilowatt hour usage in their own homes.

D. No.

E. The KEEP Activity Guide is a solid addition to my stock of lessons and activities.

F. We do more research and presentations about energy.

This sample of teachers responded as direct participants of the course. It suggests that there hasn't been reflective practice regarding the student use and outcomes of NRES 603/730. The course remains teacher-education and course outcomes will remain primarily with the teacher participants.

Chapter 5 outlines future research suggestions to better assess the affect of KEEP courses on student learning. For the current study, funding, time and logistical restrictions prohibited direct assessment of students. The motives of teacher respondents for program assessment are discussed in Chapter 2.

B. Results: Survey Item Fifteen

1. Survey

Figure 4.10 graphically represents teacher responses to Item 15. Each row heading indicates the number of respondents in bold italicized type. The number of responses is shown in the columns also in bold italicized type.

Figure 4.10 Item 15 Survey Results

15. Please indicate the extent to which you agree or disagree with each of these statements.					
<i>The KEEP In-service Course has improved my ability to...</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
increase student knowledge about energy. <i>n = 262</i>	1 4	2 2	3 13	4 181	5 62
help students understand energy flow through systems. <i>n = 260</i>	1 3	2 11	3 68	4 140	5 40
increase student knowledge about the development of energy resources. <i>n = 261</i>	1 4	2 5	3 50	4 162	5 78
increase student knowledge of renewable energy resources. <i>n = 261</i>	1 3	2 3	3 24	4 153	5 52
help students understand the positive and negative effects of energy resource development and use. <i>n = 261</i>	1 2	2 6	3 29	4 172	5 38
help students understand Wisconsin energy issues. <i>n = 260</i>	1 1	2 13	3 77	4 131	5 63
affect student attitudes toward energy. <i>n = 260</i>	1 3	2 5	3 37	4 152	5 96
encourage students to use energy more efficiently. <i>n = 261</i>	1 3	2 3	3 9	4 150	5 96
help students understand future energy resource development and use. <i>n = 258</i>	1 2	2 8	3 44	4 152	5 52

2. Electronic Survey

Figure 4.11 graphically represents teacher responses to Item 15. Each row heading indicates the number of respondents in bold italicized type. The number of responses is shown in the columns also in bold italicized type.

Figure 4.11 Item 15 Electronic Survey Results

15. Please indicate the extent to which you agree or disagree with each of these statements.					
<i>The KEEP In-service Course has improved my ability to...</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
increase student knowledge about energy. <i>n = 52</i>	0	0	2	37	13
help students understand energy flow through systems. <i>n = 51</i>	0	1	8	30	12
increase student knowledge about the development of energy resources. <i>n = 52</i>	0	1	4	36	11
increase student knowledge of renewable energy resources. <i>n = 51</i>	0	0	3	30	18
help students understand the positive and negative effects of energy resource development and use. <i>n = 50</i>	0	0	3	36	11
help students understand Wisconsin energy issues. <i>n = 52</i>	0	0	10	32	10
affect student attitudes toward energy. <i>n = 52</i>	0	0	8	35	9
encourage students to use energy more efficiently. <i>n = 51</i>	0	0	3	35	13
help students understand future energy resource development and use. <i>n = 50</i>	0	1	5	33	11

3. Combined results

Figure 4.12 graphically represents teacher responses to Item 15. Each row heading indicates the number of respondents in bold italicized type. The number of responses is shown in the columns also in bold italicized type.

Figure 4.12 Item 15 Combined Survey Results

15. Please indicate the extent to which you agree or disagree with each of these statements.					
<i>The KEEP In-service Course has improved my ability to...</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
increase student knowledge about energy. <i>n = 314</i>	1 4	2 8	3 15	4 218	5 75
help students understand energy flow through systems. <i>n = 311</i>	1 3	2 12	3 76	4 170	5 50
increase student knowledge about the development of energy resources. <i>n = 313</i>	1 4	2 6	3 54	4 198	5 51
increase student knowledge of renewable energy resources. <i>n = 312</i>	1 3	2 3	3 27	4 183	5 96
help students understand the positive and negative effects of energy resource development and use. <i>n = 311</i>	1 2	2 6	3 32	4 208	5 63
help students understand Wisconsin energy issues. <i>n = 312</i>	1 1	2 13	3 87	4 163	5 48
affect student attitudes toward energy. <i>n = 312</i>	1 3	2 5	3 45	4 187	5 72
encourage students to use energy more efficiently. <i>n = 312</i>	1 3	2 3	3 12	4 185	5 109
help students understand future energy resource development and use. <i>n = 308</i>	1 2	2 9	3 49	4 185	5 63

In examining the KEEP Conceptual Framework sub-goals, a majority of teachers agreed that the KEEP In-Service Course had affected their ability to increase student knowledge about energy (293 of 314 or 93%), help students understand energy flow through systems (220 of 311 or 70%), increase student knowledge about the development of energy resources (249 of 313 or 79%), increase student knowledge of renewable energy resources (279 of 312 or 89%), help students understand the positive and negative affects of energy resource development and use (271 of 311 or 87%), help students understand Wisconsin energy issues (211 of 312 or 67%), affect student attitude toward energy (259 of 312 or 83%), encourage students to use energy more efficiently (294 of 312 or 94%), and help students understand future energy resource development and use (248 of 308 or 81%).

Of the nine conceptual framework sub-goals, teachers perceived the least amount of ability in increasing helping students understand Wisconsin energy issues. This may be related to a previously cheap and abundant supply of energy in which individuals don't feel the need to question the status quo. Coupled with this apathy, current Wisconsin energy issues are changing at an increasingly rapid pace. Teachers may feel that they lack the technical expertise and adequate time to fully understand the past, present and future of energy in Wisconsin.

VI. POST-SURVEY INTERVIEW

All ten teachers interviewed responded positively when asked if they used energy concepts when teaching. No teachers indicated that KEEP was the reason for teaching energy concepts. Teachers gave reasons such as

- kids need to know about energy
- get kids interested in energy
- media attention on energy issues
- creation of well-informed consumers
- preservation of natural resources
- energy is of personal importance
- energy is a limited commodity issue that people need to address
- energy concepts are the topic of a given curriculum

When asked if KEEP had influenced the decision to use energy concepts when teaching, all teachers responded positively. Three of the teachers indicated that it was a general influence and seven indicated that it had a specific influence either on integration of energy concepts into curricula or building-wide awareness of energy use and conservation.

VII. SUMMARY AND IMPLICATIONS

The purpose of this study was to assess teachers' perception of the quality of a professional development experience in energy education. In particular, the study sought to gain insights into how teachers thought the course affected their practice and students' understanding of energy concepts. These insights were gained through interviews and a survey sent to all past participants of the course. The interviews helped design the survey and provided information about how teachers value energy education in general. Over 400 teachers chose to respond to the survey (513 of 2562 teachers responded or a response rate of 20.02%); chapter three outlined the reasons for the low response rate. Although not representative of all KEEP participants, these teachers provided useful information for the future programming of KEEP. (See Appendix F: Combined survey data for the compiled survey responses and comments.) The teachers who responded to the survey reported that the course goals are being met, the course is applicable to the classroom, and that students are learning energy concepts as a result of teacher participation in NR 603/730. Furthermore, the respondents indicated they were satisfied with the course. The next and final chapter shares how KEEP staff might use these results to inform stakeholders of KEEP's success. Finally, although teacher reports were positive, there were a number of teachers who chose not to respond to the survey for one reason or another. The next chapter concludes with recommendations for future research and for how KEEP can continue to improve its services to teachers to better achieve its mission.

CHAPTER FIVE DISCUSSION

- I. CONCLUSIONS AND RECOMMENDATIONS**
 - A. Problem statement conclusions**
 - B. Recommendations**
 - C. Suggestions for related or different research**
 - D. Reflections on the research**

I. CONCLUSIONS AND RECOMMENDATIONS

In the fall of 2008, a survey was conducted to assess teachers' perceptions of how a professional development experience in energy education affected their practice of energy education and students' understanding of energy concepts. To accomplish this assessment, an instrument was developed and sent to graduates of NR 730: Energy Education in the Classroom. NR 730 is a university-credited course offered to teachers developed by the Wisconsin K-12 Energy Education Program (KEEP) and offered through University of Wisconsin–Stevens Point Continuing Education. (NOTE: When the course was first offered it was categorized as NR 603.) This chapter presents conclusions of the study based on analysis of survey results and provides recommendations for better ensuring course effectiveness.

A. Problem statement conclusions

This study had a threefold purpose:

- To assess teachers' perception of an energy education professional development experience (Do teachers think the course was worthwhile?)

- To assess teachers' perceptions of the effect of the professional development experience on their teaching practices (Did the course affect the way teachers teach about energy?)
- To assess teachers' perceptions of student understanding of energy concepts as a result of their teaching (Do teachers think the course improved how they teach students about energy?)

Teacher perceptions for this study were primarily gained through a survey. Attempts were made to send a survey to every teacher who participated in NR 703/630. The analysis and conclusion for this study is based on the survey results, supplemented with information provided through interviews of select teachers conducted prior to and following the survey. It should be noted that for a variety of reasons there were a large number of non-respondents to this survey; these individuals' responses are not reflected in this study. The reasons for their non-response are not known but vary from never receiving the survey to opting not to respond for any number of reasons (time, attention, lack of interest, etc.). Perhaps with additional funding and time, efforts to reach these non-respondents could enrich this study and further assist KEEP with its energy education mission.

Teachers who responded to the survey and participated in interviews indicated that the course was worthwhile. They indicated that the goals of the course are being met and they believe it helps improve their energy-related teaching skills. It was interesting to note that, based on follow up interviews, the course itself did not explicitly encourage or discourage teachers to engage in the practice of energy education. The data suggest that the teachers in this study are compelled to teach energy concepts because of the subject

area/grade level model academic standards or because teachers perceive knowledge of energy concepts are important when transforming students into informed consumers.

For those teachers who do practice energy education, participation in the NRES 603/730 course provided a feeling of comfort in possessing or achieving the stated course objectives. To breakdown those objectives.....Confidence in energy education training and experience potentially leads a reluctant practitioner to become more willing and an increased satisfaction in doing so. When a teacher is confident that there are accessible supplementary materials and energy sector professionals, there is the potential for instruction to move from the mandatory material to in-depth understanding or awareness of locally relevant issues. For those teachers who aren't compelled by subject area or model academic standards, reported confidence in curriculum integration of energy concepts allows opportunities to examine political, cultural, historical, and social aspects of energy development and use.

When considering student understanding of energy concepts, again there is no explicit increase or expansion of student knowledge. From the teachers' perspective, the NRES 603/730 course positively affected their ability to convey both knowledge of and attitude toward energy concepts to students. To give it a sharper point, teachers were able to convey the sub-goals of the KEEP Conceptual Framework. Those students gained a general knowledge of energy concepts and how energy flows through systems. This has immediate relevance in the form of personal and public concerns about global climate change. Clearly individuals need an energy knowledge base to sift through scientific reports or popular media hype about an issue with global ramifications. Existing on this tension line between an expanding variety of energy sources, knowledge of resource

development and the associated positive and negative impacts is critical. The social, political, economic and environmental lines are being drawn across the country as energy resources fall in and out of favor. While new non-renewable energy resources may initially promise an answer to current energy problems, it's just as important to understand all the implications of their development and be able to make an educated decision about which one presents the greatest benefit and least risk. Knowledge of current and local Wisconsin energy issues gives a point of reference for how an individual life is affected day to day by energy availability and use. Understanding what is happening locally offers an opportunity to give greater context to regional, national and global energy issues. Finally, teachers were able to help students to move from knowledge to a change in attitude toward and more efficient use of energy. Both KEEP the State of Wisconsin have encouraged greater energy efficiency in school buildings. In turn the occupants of those buildings have been encouraged to affect a behavior change toward energy. The results are twofold. First schools have measured decreased energy expenses. Second, there is some spill over to home life of teachers and students. Students transfer those energy efficient behaviors to their families. Teachers may be encouraged to install energy efficient fixtures or renewable energy technology as well as transferring energy efficient behaviors to their families.

This study suggests that both the course goals and conceptual framework goals have been met in the process of teacher professional development of energy education. Teachers perceive the NRES 603/730 course as a positive influence on their practice of energy education and students' understanding of energy concepts.

B. Recommendations

While this study suggests that KEEP meets the NRES 603/730 goals and the Conceptual Framework sub-goals, it is recommended that KEEP maintain a critical gaze towards the course goals to keep them current and relevant. As the name implies, the Conceptual Framework provides stability to all of the KEEP program areas. Whereas the course goals for NRES 603/730 must address the framework as well as the more volatile nature of teacher education, educational policy and political interests. Enacting close evaluation of the course goals may take the form of the following activities:

- State-wide nominal assessment groups
- Reviewing the need for/interest in NRES 603/730 courses that are subject specific for secondary grades (i.e. Technical Education or Family and Consumer Education)
- Review of pre-service teacher education standards in energy education
- Review of similar energy education professional development opportunities (i.e. NEED)
- Adjunct faculty input as well as taking concrete action based on course evaluations
- Taking inventory what KEEP is, what it has to offer and what information is most important to deliver to teachers not already thrilled about energy education.

Because KEEP covers the entire geographic area of the state and has operated for more than 10 years, there is a definite need to encourage a greater percentage of the total population to participate in studies similar to this one. It is recommended that KEEP

invest additional the resources necessary to conduct more thorough and extensive research projects.

NRES 603/730 does not exist in a vacuum. It is one component of one program area in the greater context of KEEP. It is recommended that KEEP develop a comprehensive logic model. This logic model would more clearly define relationships between the existing components of the four program areas. A logic model will also help drive continued program evaluation in an orderly and systematic fashion. Finally, it is noted that as KEEP seeks additional funding apart from the current stakeholders, a logic model may be required and/or a useful tool for grant writing.

C. Suggestions for related or different research

This study focused on the issue of the short term course outcomes. The medium and long term outcomes are equally and maybe more important to getting at the reality of energy literacy and behavior change in Wisconsin. I suggest the logic model is a good place to start indentifying the evaluation of medium and long term outcomes. (Figure 5.1)

Inputs	Outputs		Outcomes		
	Activities	Participants	Short	Medium	Long
<u>Staff</u> -KEEP -Adjunct Faculty -Extension Continuing Education <u>Partners</u> -Focus on Energy -Energy Ctr. Of WI -Local utilities <u>Money</u> -Utility scholarships -Class fees -Adjunct Faculty salary <u>Materials</u> -Conceptual Framework -Activity Guide -Support Resources -Laptop computer -LCD projector <u>Facilities</u> -Course location	NR 730 curriculum Hands on activities Peer teaching Unit plan NR 730 web support page	WI K-12 teachers	Increased awareness of energy education Factual understanding of fundamental energy concepts Increased recognition of energy resource issues in Wisconsin, the nation, and the world Better use of energy education support materials	Curricular environment that fosters energy education promotion between teachers Enhanced integration of energy concepts into existing curriculum Expansion of state energy activities- Solar Olympics, Energy Bookmark Contest Improved energy literacy transfer to students Improved citizen actions based on personal energy literacy Additional KEEP course participation	WI energy educator network Energy competent teachers who assess and work to improve energy literacy Energy conservation at schools and homes Increased use of renewable energy technology Increased energy advocacy to family and community
		WI K-12 students	Increased awareness of energy Factual understanding of fundamental energy concepts Increased recognition of energy resource issues in Wisconsin, the nation, and the world	Increased participation in state energy activities - Solar Olympics, Energy Bookmark Contest Improved citizen actions based on personal energy literacy	Energy conservation at schools and homes Increased use of renewable energy technology Increased energy advocacy to family and community

Suggestions for other research

- How do KEEP teachers teach about energy in classrooms?
- What inspires teachers to go home and make changes in energy usage (install fixtures, implement renewable energy, adopt energy efficient behaviors)?
- What are the knowledge and behavior outcomes of school building energy efficiency and/or the SolarWise programs. Beyond the kilowatt/hour and budgetary savings, what other changes are occurring in schools? Do the occupants feel ownership or do they it is an additional burden?
- How are students answering the energy concept questions on the state standardized tests? What region, district, school or classrooms do they originate from? What factors contribute to the high score and the low scores?
- What are the long term student outcomes?
- Do high school seniors see renewable energy as the future (both as a resource and a job)? What inspires people to choose renewable energy technology as a career?

D. Reflections on the research

An ancillary outcome of this research experience was learning how to confront and manage limitations and challenges. There are politics and policies that limit and affect all program areas, even research. KEEP's funding agency, Focus on Energy, has strict policy and practices regarding evaluation; therefore, this project was titled a customer satisfaction survey to avoid conflicts with their protocol. If funds were available, a more extensive study could have been conducted that involved in-depth

surveys and statistical analysis. Information on teacher perception of course satisfaction is valuable; however it doesn't say much about what teachers or students are actually getting out of the courses.

Another challenge to this project was accessing the teachers. Teachers already have plenty to do, and professional development evaluation surveys aren't likely to be placed high in terms of priorities. Add that to a program with great longevity and the result is out of date contact information as well as being limited to a relatively slow form of mass communication.

This project involved the understanding and application of new terms, such as reliability and validity, conducting pilot tests and compliance human test subjects regulations. Fortunately, courses such as the applied environmental education program course were very valuable regarding instrument development. One feels a sense of accomplishment, when despite these barriers; it is evident that the efforts were successful when survey responses come in the mail.

A definite benefit of the experience was talking to teachers about the course. It gave me shivers to think about an informed public, making the critical decisions about global climate change and energy policy and our future. At every stage of the writing process, I was resistant to having to restate and repeat and be the very dry technical writer that the written thesis requires. Much later I attended a research symposium and felt a renewed excitement about what I had done. Although most of that excitement was about opportunities not offered at UW-Stevens Point (i.e. qualitative research theory and design, educational statistics and analysis, a group of people who showed actual interest in what I had done).

My advice to you out there, jump through the hoops. Make friends with the stakeholders of your project; because however frustrating it might be, they make a lot of good things happen. Be aware of all the stages of approval and review that go into collecting useful data on human subjects. Take the Applied Environmental Education Program Evaluation course and print out the whole course for current and future use. Even better, make friends with people in Sociology who know about writing surveys and interviews and analysis. When deciding to sort addresses in a spreadsheet, make sure to sort the entire field and not just one column. If you do make that mistake, be patient and calm and figure out what the next step is. In writing, sometimes forcing it makes it ugly. Better to give it room to breathe and befriend it when you are ready. Finally, remember that your tenure in graduate school is temporary. While there may be conflicts and upsets, they will be over soon. Your research experience also has a limited shelf-life – even if you do publish your work it will be outdated within a few years. Instead, focus on the long term benefits: gained knowledge, skills, and especially friendships. These benefits are what matter in the long run and will help you in your next steps in life.

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APPENDIX A: Pre-survey interview guide

Teacher interview guide
KEEP NR 730 Evaluation

Date_____

Interview subject name_____

Interview Location_____

Start time_____ End Time_____

School name_____

Grade and/or Subject_____

Course attendance dates_____

Grade level K-4____ 5-8____ 9-12____

Interview Protocols

The interview will be conducted at a time and place convenient to the teacher.

The interview will be conducted with one interviewer and one subject.

With the subject's permission, the interview will be recorded using an audio recorder in addition to the notes taken on the interview guide.

The interviewer will begin with an introduction that will include:

1. Information about the interviewer including credentials
2. Interview purpose
3. How the data will be used
4. Approximate length of the interview
5. Encouragement to respond candidly
6. Assurance of confidentiality
7. Importance of all answers

Objectives

A. Assess teacher perception regarding application of energy education professional development in the classroom

B. Assess teachers' perception regarding the effect of energy education professional development on students' understanding of energy concepts.

Interview Introduction

Greet the subject. Explain that the interview will go more smoothly if it can be recorded and ask permission to record. All of the information will be kept confidential. Explain that the information collected will be used to determine how useful KEEP is in the classroom setting. Encourage the subject to be candid and specific. Ask if the subject has any questions, and answer them appropriately.

Interview questions

1. Tell me about the energy education in your classroom this year.
 2. What was your motivation for attending the KEEP NR 730 course at the particular time you did?
 3. Tell me about your participation in the KEEP NRES 730?
 4. {A} When the course was over, what were your thoughts on how you would apply the course to your classroom?
 5. {A} In what ways does the course currently apply to your classroom?
 6. {A} In what way has the applicability changed over time?
 7. {B} How has the course experience helped you increase your students' understanding of energy concepts?
 8. Do you want to add anything not already covered in the interview?
- . Be sure to thank the subject for their time.

Informed Consent to Participate in Human Subject Research
Assessment of Teacher Satisfaction:
A Professional Development Experience in Energy Education

Theresa Ford, a graduate student at the University of Wisconsin-Stevens Point, and Dr. Jennie Lane, Director of the K-12 Energy Education Program in the Wisconsin Center for Environmental Education, are conducting a study to determine teacher satisfaction with the NRES 730 KEEP In-service course. This assessment will provide valuable information for the improvement of the NRES 730 course. We would greatly appreciate your participation in this study.

While this information could be obtained by interviewing you, we feel that the survey is the quickest and easiest method for obtaining this information.

We anticipate no risk to you as a result of your participation in this study other than the inconvenience of the time to complete the survey.

The information that you give us on the questionnaire will be recorded in anonymous form. We will not release information that could identify you. All completed surveys will be kept in the locked office of Theresa Ford and will not be available to anyone not directly involved in this study.

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.

Once the study is completed, we would be glad to give you the results. In the meantime, if you have any questions, please ask us or contact:

Theresa Ford
K-12 Energy Education Program
Wisconsin Center for Environmental Education
403 LRC
University of Wisconsin – Stevens Point
Stevens Point, WI 54481
(715) 346-4770

OR

Dr. Jennie Lane
K-12 Energy Education Program
Wisconsin Center for Environmental Education
403 LRC
University of Wisconsin – Stevens Point
Stevens Point, WI 54481
(715) 346-4770

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

Dr. Karlene Ferrante, Chair
Institutional Review Board for the Protection of Human Subjects
Academic Affairs Office
University of Wisconsin-Stevens Point
Stevens Point, WI 54481
(715) 346-3712

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

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

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

APPENDIX B: Survey Cover Letter

September 25, 2007

Dear energy educator,

My name is Theresa Ford and I am a graduate student working the Wisconsin K-12 Energy Education Program (KEEP). My graduate project is an assessment of teacher satisfaction with KEEP In-service Course (NRES 730—formally NR 603) and its outcome in the classroom.

You have a valuable perspective on energy education professional development because of your past participation in the KEEP In-service Course. By sharing your knowledge, the KEEP staff and adjunct faculty will be able to improve the KEEP In-service Course in the future.

The completion of the survey should take less than 30 minutes. All of your responses will be kept confidential.

Please return your response in the self addressed and stamped envelope by **October 19, 2007**. As an advance thank-you for participation in this study, I have enclosed a KEEP notepad. Teachers who return the survey will be entered into a drawing for one of three \$100 gift certificates from Solar World (<http://www.solar-world.com/Educational.htm>).

As a graduate student, I am grateful for your participation in my thesis research. Thank you for your insights. Your contribution is important.

Please don't hesitate to contact me if you have any questions or concerns. You can reach me at tford@uwsp.edu or 715.346.4770.

Thank you,

Theresa Ford
Graduate Assistant
K-12 Energy Education Program

APPENDIX C: Survey



KEEP In-service Course: Satisfaction Survey

Part I: Teaching Background and Experience

1. How many years have you been a teacher?

(Circle one answer.)

- a Less than 2 years
- b 2-5 years
- c 6-10 years
- d 11-20 years
- e More than 20 years

2. Which of the following best describes your present school setting? (Circle one answer.)

- a Urban
- b Suburban
- c Rural
- d Tribal
- e Other (please specify _____)

3. Which grade(s) are you teaching this school year? (Circle all that apply)

K 1 2 3 4 5 6 7 8 9 10 11 12

4. Please list the subject area(s) you are teaching this school year. (If you are an elementary school teacher and teach a variety of subjects please write "Elementary.")

5. How many students you will teach this school year?

_____ students

6. Which year did you attend the KEEP In-service Course?



KEEP In-service Course: Satisfaction Survey

11. Please indicate which ONE statement best represents the situation that would influence you the most to incorporate energy concepts in your classroom teaching. (Circle one answer.)

- a More support from my administration
- b More in-service classes on energy education teaching methods
- c Better access to resources and aids for teaching about energy
- d More preparation time
- e More funding
- f Other (please describe in the space below)

If you answered 'no' to question 9, you do not need to complete the questions 12 through 16.

Please return this survey in the enclosed envelope.

The last page is blank if you have any comments or suggestions for KEEP.

Thank you

If you answered 'yes' to question 9, please complete the rest of the survey.

12. Which of the themes of energy education will you teach students this school year? (Circle all that apply.)

- a **We Need Energy** - Defines energy, lists its sources and forms, and describes how energy is transferred and converted from one form to another, and explains how energy flows through living and non-living systems.
- b **Developing Energy Resources** - Addresses the sources energy and how humans, through technology, use energy to meet societal wants and needs. It also shows how humans have come to treat energy as a resource.
- c **Effects of Energy Resource Development** - Covers how using energy resources affect human societies and the environment.
- d **Managing Energy Resource Use** - Identifies strategies to help resolve many of the issues related to energy resource development. Also discusses how today's energy-related decisions and actions influence the future availability of energy resources.
- e **Other** (please describe in the space provided)



KEEP In-service Course: Satisfaction Survey

Part III: KEEP In-service Course Effects

13. Please indicate the extent to which you agree or disagree with the following statements.

<i>As a result of my participation in the KEEP In-service course, I am comfortable with...</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
the amount of training and experience I have to teach about energy.	1	2	3	4	5
the accessibility of published resources (e.g., teacher guides, videos, trade books) I can acquire to help me develop energy education lessons and activities.	1	2	3	4	5
contacting local, statewide, or national community resources (e.g., professionals and agencies) to support my efforts to teach about energy.	1	2	3	4	5
my ability to integrate energy concepts into my curriculum.	1	2	3	4	5

14. Please use the space below to provide further descriptions or evidence that support your responses to question 13.



KEEP In-service Course: Satisfaction Survey

15. Please indicate the extent to which you agree or disagree with each of these statements.

<i>The KEEP In-service Course has improved my ability to...</i>	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
increase student knowledge about energy.	1	2	3	4	5
help students understand energy flow through systems.	1	2	3	4	5
increase student knowledge about the development of energy resources.	1	2	3	4	5
increase student knowledge of renewable energy resources.	1	2	3	4	5
help students understand the positive and negative effects of energy resource development and use.	1	2	3	4	5
help students understand Wisconsin energy issues.	1	2	3	4	5
affect student attitudes toward energy.	1	2	3	4	5
encourage students to use energy more efficiently.	1	2	3	4	5
help students understand future energy resource development and use.	1	2	3	4	5

16. Please use the space below to provide further descriptions or evidence that support your responses to question 15.



KEEP In-service Course: Satisfaction Survey

Thank you for your help with this survey.

Feel free to write additional comments about your perceptions of the KEEP In-service Course on this page.

Please return this survey in the enclosed envelope.

APPENDIX D: Electronic Survey Cover Letter

November 29, 2007

To: Graduates of the KEEP inservice Course NR 730 (formerly NR 603)

Mea Culpa for this interruption of your busy day. This is a second attempt to gather data for a research survey regarding the assessment of teacher satisfaction with the KEEP In-service Course and its outcome in the classroom.

A second attempt is necessary because the first paper survey did not reach all of its intended recipients. Operator error, my own, caused the KEEP participant data to rearrange itself into addresses of people who don't exist.

Therefore I am asking you to take 30 minutes to complete this online survey. Simply click on the link below and follow the survey instructions. You only need to complete the survey once and all answers will be kept confidential.

Please complete the survey by **December 18, 2007**.

Thank you for your insights. Your contribution is important. If you have any questions or concerns, please contact Theresa Ford at tford@uwsp.edu or 715.346.4770.

APPENDIX E: Electronic Survey

Part I: Teaching Background and Experience

1. How many years have you been a teacher?

- Less than 2 years
- 2-5 years
- 6-10 years
- 11-20 years
- More than 20 years

2. Which of the following best describes your present school setting?

- Urban
- Suburban
- Rural
- Tribal
- Other, please specify

3. Which grade(s) are you teaching this school year?

Please check all that apply.

- K 1 2 3 4 5 6 7 8 9 10 11
 12

4. Please list the subject area(s) you are teaching this school year. (If you are an elementary school teacher and teach a variety of subjects please write "Elementary.")

5. How many students you will teach this school year?

6. Which year did you attend the KEEP In-service Course?

7. Overall, how would you grade the KEEP In-service Course?

- A
- B
- C
- D
- F

8. If you answered D or F, please explain why in the space below.

9. How many KEEP courses you have attended?

Part II: Teaching About Energy

10. Is energy education part of your curriculum this school year?

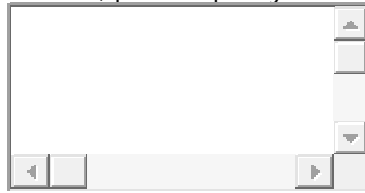
- No **(Please go to question 11)**
- Yes **(Please go to question 13)**

11. Why isn't energy education part of your curriculum this school year?
Please check all that apply.

- I do not have enough knowlege or background to teach about energy.
- I do not have the class time.
- I do not have enough preparation time.
- I do not have enough resources or funding.
- Energy concepts are not related to my subject area.
- My school setting does not contribute to teaching about energy.
- Education about energy is not appropriate for the grade level I teach.
- I am not interested in teaching about energy.

There are things other than energy that are more important to integrate in my teaching.

Other, please specify



12. Please indicate which ONE statement best represents the situation that would influence you the most to incorporate energy concepts in your classroom teaching.

More support from my administration

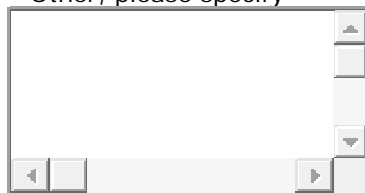
More in-service classes on energy education teaching methods

Better access to resources and aids for teaching about energy

More preparation time

More funding

Other, please specify



If you answered 'no' to question 10, you do not need to complete questions 13-28. Please go to question 29 if you have any comments or suggestions for KEEP. If you do not have any comments, press 'Done' at the end of the survey and thank you for your time. If you answered 'yes' to question 10, please complete the rest of the survey.

13. Which of the themes of energy education will you teach students this school year?
Please check all that apply.

We Need Energy-Defines energy, lists its sources and forms, and describes how energy is transferred and converted from one form to another, and explains how energy flows through living and non-living systems.

Developing Energy Resources-Addresses the sources energy and how humans, through technology, use energy to meet societal wants and needs. It also shows how humans have come to treat energy as a resource.

Effect of Energy Resource Development-Covers how using energy resources affect human societies and the environment.

Managing Energy Resource Use-Identifies strategies to help resolve many of the issues related to energy resource development. Also discusses how today's energy-related decisions and actions influence the future availability of energy resources.

Other, please specify



Part III : KEEP In-Service Course Effects

Please indicate the extent to which you agree or disagree with the following statements.

14. As a result of my participation in the KEEP In-Service Course, I am comfortable with the amount of training and experience I have to teach about energy.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

15. As a result of my participation in the KEEP In-Service Course, I am comfortable with the accessibility of published resources (e.g., teacher guides, videos, trade books) I can acquire to help me develop energy education lessons and activities.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

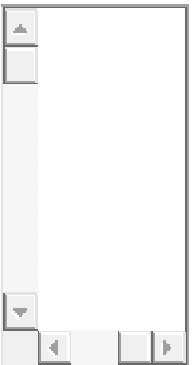
16. As a result of my participation in the KEEP In-Service Course, I am comfortable with contacting local, statewide, or national community resources (e.g., professionals and agencies) to support my efforts to teach about energy.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

17. As a result of my participation in the KEEP In-Service Course, I am comfortable with my ability to integrate energy concepts into my curriculum.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

18. Please use the space below to provide further descriptions or evidence that support your responses to questions 14-17.



Please indicate the extent to which you agree or disagree with each of these statements.

19. The KEEP In-service Course has improved my ability to increase student knowledge about energy.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

20. The KEEP In-service Course has improved my ability to help students understand energy flow through systems.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

21. The KEEP In-service Course has improved my ability to increase student knowledge about the development of energy resources.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

22. The KEEP In-service Course has improved my ability to increase student knowledge of renewable energy resources.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

23. The KEEP In-service Course has improved my ability to help students understand the positive and negative effects of energy resource development and use.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

24. The KEEP In-service Course has improved my ability to help students understand Wisconsin energy issues.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

25. The KEEP In-service Course has improved my ability to affect student attitudes toward energy.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

26. The KEEP In-service Course has improved my ability to encourage students to use energy more efficiently.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

27. The KEEP In-service Course has improved my ability to help students understand future energy resource development and use.

- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

28. Please use the space below to provide further descriptions or evidence that support your responses to questions 19-27.

A rectangular text input area with a scroll bar on the right side. At the bottom, there are four small navigation buttons: a left arrow, a square, a right arrow, and another square.

29. Please feel free to write additional comments about your perceptions of the KEEP In-service Course.

A rectangular text input field with a light gray border and a vertical scrollbar on the right side. The field is currently empty.

APPENDIX F: Compiled Survey Data

1. How many years have you been a teacher?

a	Less than 2 years	3
b	2-5 years	9
c	6-10 years	63
d	11-20 years	159
e	More than 20 years	199

2. Which of the following best describes your present school setting?

a	Urban	91
b	Suburban	120
c	Rural	199
d	Tribal	0
e	Other	25

adult education/technical

school

not currently employed

not currently teaching

retired

small city

small town

ymca

alternative

25% Nat. Am/Urban & Rural

not in a school setting, I write grants for

a Tribe

retired

urban - low socioeconomic demographic

retired

Retired one year, subbing at this time

Suburban-Rural

juvenile detention

small town

Small town of 20,000

3. Which grades are you teaching this year?

K	41
1	87
2	99
3	70
4	60
5	67
6	70
7	81
8	87
9	123
10	143
11	150
12	149

4. Please list the subject area(s) you are teaching this school year.
Answers given multiple times are indicated by the number in parentheses.

Agriculture and Natural Resources

agriscience

algebra, stretch algebra, biology, Adv. algebra/ Trig, and physics

all for first grade

All subjects

All. I now teach at a juvenile detention center.

AP Language and Composition

Applied Tech

art

art

art

at risk

auto

automotive and engineering

band

biology (5)

Biology and Environmental Science
Biology, Agriculture
Biology, Anatomy & Phys, Physical Science, Medical Terminology
biology, anatomy, physics
biology, ap biology, web design, computer science
biology, ecology
Biology, Ecology, Env Science, Anatomy, Physiology, Microbiology, Medical Terminology
biology, english, pre-algebra
biology, env. Sciences
Biology, Environmental Science
biology, environmental science
biology, environmental science
biology, physiology, psychology
biology/anatomy
biology/applied biology
Business Education
Business/Computer
CAD, drafting, woodworking, building const
charter school
chemistry (5)
Chemistry, Earth Science, Special Needs Science
Chemistry, Physical Science
chemisty, ecology, forensic science
chemisty, physics
comprehensive natural science human anatomy and physiology
Computer Applications
Construction
Construction 1, Auto Mechanics
counselor
developmental guidance, health careers
early education
Earth and Space Science, Anatomy and Physiology
Earth Science (6)
Earth Science - Astronomy
Earth Science, Ecology, Enu. Sci, AP -ES
education
electricity, electronics, auto technology
electronics, communications, into to media, engineering, construction
electronics, computer
elem art teacher
elem special ed
elementary (140)
elementary L.D. teacher
Elementary special education
elementary speech/language pathologist
Elementary, middle math, science
elementary, middle school EE
Engineering & Technology
Engineering and Technology
Engineering, Electronics, Economics, Architecture

English
English
English
ENGLISH AND NON-FICTION
English lit
environmental ed
environmental ed
environmental education
environmental issues, biology, physical science
Environmental Science
Family and Consumer Ed
Family and Consumer Ed
Family and Consumer Education Courses
Family/Consumer Science
foods, clothing, fashion, child care, parenting, housing and 7 th grade home tech
forestry, intro to vet skills, animal sciences, wildlife
geography, civics, WI studies, US history
geography, earth science
geography, global studies, history
Geography, World History, U.S. History
geology, chemistry, biology, integrated science
geology, weather & climate, astronomy, physics
Gifted and Talented
Gifted and Talented
gifted and talented coordinator
Graphics & Construction
Health education
HIGH SCHOOL ENGLISH AND NON-FICTION
history
history, earth science, civics, geography
history, environmental science, biology, english
homeschool and nature club
HS Science (chemistry and physics)
interactive graphics
language arts, math, science
library and computers
library and tech
Library Media
life science
life science and space science
life science, biology, ap biology
long term library assignment
long term sub in physical education(3mo) & LD(about 2 in spring) at High school, but also substitute in
middle and elementary some
Math (11)
math and science
math and science
math, geography, reading
math/science
Middle School
Middle School and high school

Middle School Science and Misc
middle/high school substitute--all
Music and Spec. Ed. Music k-12
NA
outdoor education
P.E. classes, elementary, K religion
PE, PreKindergarten Science
phy ed
physical ed
Physical Education
Physical Science (5)
physical science and biology
physical science, biology, advanced biology, environmental studies
physical science, chem, physics
Physical Science, Chemistry
Physical science, chemisty, physics
physical science, life science
physical science/biology
Physics
physics
Physics and Physical Science
primary inclusion classroom
psychology, american history
reading
reading , science
Reading Specialist
reading teacher
reading, language arts, math, science, social studies
reading, language arts, social studies
reading, science, and art
reading, science, and art
reading, social studies
reading/writing
retired
retired
S.S., HEALTH, SCIENCE, GOV'T, GEOGRAPHY, WORLD CULTURES
science (25)
science and agriculture
science and language arts
science and math
Science and Social Studies
science interpretation
science technology
science, communications
Science, LA, Religion'
science, math
science, reading, language arts
science, social studies, english
science, social studies, reading
science, world history

sciences (6)
 Soc St Lang Arts
 Social Studies
 social studies
 social studies
 Social studies(includes, geography, history,government, psychology and economics) rather integrated.
 social studies, guidance activities
 Spanish (3)
 Special Ed (6)
 Special Ed, Math, Science
 Special Education (3)
 special education senior high school
 Special Education Transition
 Speech Language Pathologist
 speech language therapy
 SS
 sub
 swimming
 talented and gifted
 tech ed (16)
 Tech Ed, Metals, Power and Energy
 Technical Education
 Technology and engineering
 Technology Education (4)
 Technology, Construction, Transportation, Manufacturing
 technology, engineering
 Technology, Experiential Ed, Environmental Science
 US History, World History, Geography

5. How many students will you teach this school year?

response	# of occurrences
0	1
4	1
5	1
7	3
9	3
10	3
11	2
12	3
13	5
14	12
15	12
16	10
17	6
18	6
19	4
20	10
21	6

22	8
23	8
24	8
25	12
26	5
27	2
28	2
29	1
30	3
32	1
33	3
35	2
36	2
37	1
38	1
40	3
41	1
43	1
44	1
45	3
46	1
48	1
50	5
51	1
52	1
55	1
56	2
57	2
58	1
59	1
60	3
63	1
65	3
70	4
75	9
80	4
81	1
84	1
85	4
87	1
88	1
90	4
92	1
95	3
97	1
100	24
104	1
106	1
109	1
110	9

114	2
115	2
118	1
120	12
125	6
127	1
130	12
135	3
139	1
140	8
141	2
145	1
150	11
155	1
160	4
167	1
175	2
180	1
185	1
189	1
200	10
208	2
220	1
225	1
230	3
240	3
250	8
260	3
270	2
275	1
280	1
300	9
320	2
335	1
350	2
360	4
380	2
400	3
425	1
450	1
500	4
540	1
550	1
600	1
1000	2
1100	1
1800	1
5000	1
8000	1

Other responses
 ~350
 12 to 25
 120-125
 125-150
 130 high school students
 15-24
 20+
 30+ , and another 60 during summer school
 30+ , and another 60 during summer school
 About 170
 Approximately 340
 I will have contact with over 175 this year.
 NA
 unknown
 varies

6. Which year did you attend the KEEP In-service Course?

response	# of occurrences
1995	4
1996	7
1997	6
1998	21
1999	17
2000	35
2001	20
2002	29
2003	22
2004	24
2005	42
2006	26
2007	41
2007-2008	1
19982000	1
?	2
??	1
??1999??	1
10 – 15 years ago	1
1980s	2
199?	1
1990 - 1998	1
1990's	4
1997 and 2006	1
1997 or 1998	1
1997 or 98	1
1997?	1

1997-1998	1
1998/1999	1
1998??	1
1998-1999	2
1999 and 2006	1
1999 or 2000	1
1999-2000	4
2000 (approx)	1
2000 or 2001	2
2000,2 2006, 2007	1
2000/2001	1
2001 or 2002	1
2001/2002	2
2001??	1
2001-2002	1
2002?	2
2003 and 2006	1
2003/2004	1
2003?	1
2004, 2005, 2006	1
2005-2007	2
2006 & 2007	2
2006-2007	3

2005 ? with Jack Finger

2005 and 2007

2005 or 2006 - not sure because I've taken several of these courses

2005, 2006

2005,2006,2007?

2005/2006

2005/2006/2007

2006 & 2000

2006?

2006-07

2007/2000

2nd year it was offered

90's

94/95

A

about 5 years ago

about ten years ago

after 1978 before 1990

doable renewables

Early 90's

early spring 2007

First year it was offered

I believe it was approx. 98 or 99, I took it at Sabish in Fond du Lac.

I can't remember, sometime between 2000 and 2004

I CAN'T REMEMBER. IT MIGHT HAVE BEEN THE FIRST YEAR.

I don't remember.

I think 2006 Spring
late 90s
Late 90's
long ago
maybe 10 years ago
maybe 15 years ago
Not sure
not sure, I have attended several between 2002 and 2005
spring-2005 ? with jack finger.
summer 07
Summer 1999
Summer 2002
Summer 2006
THE FIRST OR SECOND YEAR THAT IT WAS OFFERED

7. Overall, how would you grade the KEEP In-service Course?

A	246
B	161
C	16
D	4
F	0

No response **95**

8. How many KEEP courses have you attended?

0	2
1	280
2	83
3	32
4	10
5	4

No response **158**

9. Is energy education part of your curriculum this school year?

a	No	124
b	Yes	279

10. Why isn't energy education part of your curriculum this school year?

a	I do not have enough knowledge or background to teach about energy	39
b	I do not have the class time	62
c	I do not have enough preparation time.	50
d	I do not have enough resources or funding.	46
e	Energy concepts are not related to my subject area.	74
f	My school setting does not contribute to teaching about energy.	29
g	Education about energy is not appropriate for the grade level I teach.	30
h	I am not interested in teaching about energy.	29
i	There are things other than energy that are more important to integrate in my teaching.	44
j	Other.	76

currently I substitute teach

energy is not a part of our curriculum. We have too many units in our science curriculum already and we struggling to get in what we are required to get in
I am a reading recovery teacher and teach only reading and writing

I have specific curriculum themes that I need to cover. Energy education isn't a specific unit but I do work it in as I can when I do environmental studies

my goal for this year it to set up Sp Ed science course for sp ed students that cannot pass biology

my lesson plans have been prepared for me. I incorporate small items of energy resourcefulness but it is not the main lesson

my students are very low academically and don't have an understanding of energy concepts. I have taught energy units in the past when I had a higher ability level of students.

new job

not covered in 1st grade curriculum - although I don't teach a direct energy unit - I do discuss energy/ways to save energy as it comes up throughout the year

not part of district curriculum but if I can fit in as an "ah ha" moment I do

not what I'm doing

our school has a science mapping and curriculum established and energy isn't part of the second grade science curriculum

retired

We realigned our curriculum K-12 we no longer have energy education as a learning target, as such I am not allowed to teach it this year. We are looking at ways to reincorporate it into

the new learning targets we must cover, but we will need to get c

Like hands on prepared things with all the props. I like the 3 ring binder etc

I teach energy as a chemistry teacher, but I do not devote time to energy at home, conservation, etc.

I'm not teaching science this year. Another teacher is teaching my class and I teach her Social Studies.

interactive graphics

it is not a standard I include it sporadically as I can

The science curriculum for 1st grade in MMSD is very limited and very specific.

based on curriculum we are filled up from start of year to finish

really did not think about adding parts

talk during earth week

the science department does energy all year

it does not match my current required benchmarks

retired

energy per say is not part of the curriculum. Energy education is part of the 6th grade curriculum

while we continually promote wise use of resources, we studied energy last year and we rotate curric on a 3 year cycle because I teach 3 grades in my classroom

I would only teach this if one or more of my students are studying energy issues in their regular classrooms

I work for CESA

I am retired.

I am no longer a full time teacher. I have retired and sub within the same district where I had taught. Energy concepts are included in a physical science class at the high school level.

We have so many other things to teach to meet NCLB and raise our test scores, there is time for little else.

I do not teach about Energy but some of my students research Energy Topics when learning how to research.

It is mentioned when the subject comes up in the areas I teach (a teachable moment.) otherwise the environment I teach in does not lend it self to a separate course offering, students come an go in a day, a week, or a month.

Not directly in the benchmarks for the courses I teach

With teaching sp. ed. it is not always appropriate for the types of disabilities I teach

11. Please indicate which ONE statement best represents the situation that would influence you the most to incorporate energy concepts in your classroom teaching.

a	More support from my administration	47	
b	More in-service classes on energy education teaching methods		33
c	Better access to resources and aids for teaching about energy		57
d	More preparation time	71	
e	More funding	52	
f	Other	46	

a different teaching position

A more unified building approach would encourage energy ed to be incorporated into all subjects, rather than just by individual teachers

better integration with what is already required to teach

changes in curriculum

I don't have the time to integrate energy into our existing curriculum

I don't teach science we do a 3 way switch with science social studies and math

I would love to teach energy concepts its not part of our curriculum

if it were part of the required curriculum

more class time

more time our curriculum is full of must cover material

more time to collaborate with regular education teachers that teach energy education

more time to teach

retired

the science teacher would need to answer this but I am sure it would take additional

planning time

the skill and ability level of my students is not at a level that they would comprehend the concepts

if part of curriculum

I'd need other units to be taken out of my curriculum responsibilities in order to do this topic full. I do what I can

If it was part of my curriculum but I teach math

online resources or websites

children: better/smarter usage, future needs for solar/wind

contact with current health teacher

we have so many teaching requirements it is difficult to find ways to incorporate a unit into the curriculum

The course I took was excellent - please keep them up - they were a great resource for me in previous years when I did teach energy education.

energy education could be a component for each grade level.

I am a reading intervention teacher

I won't because it is being covered at great length in science class

if I switched to a different subject area

if I were to teach science again I'd use it

more room in my curriculum

more time to incorporate activities into an already packed curriculum

retired

it if was part of my benchmarks

time in the day

switch to a gen ed classroom rather than a pull out resources prog where I focus on primary skills

we really do incorporate the info

materials with a strong connection to reading, writing, math skills

we have so little prep time now

Again, I am not a full time teacher at this time. I do think current resources and aids would be helpful to teachers to make it easier to include units and information about energy and alternative energy sources.

As an English Lit teacher who teaches British Lit, Drama and Composition, I can get it Composition

Being able to teach children things they are interested in instead of a very structured curriculum that is too full already.

Better access to resources and aids for teaching about energy

I would have to have a different job! :o)

More class time. There is just too much to get in. I have only fifty minutes with them, but that fifty minutes is often wittled away by announcements, modified schedules, pep rallies, testing, etc.

time and money is always and issue

12. Which of the themes of energy education will you teach students this school year?

a	We Need Energy	212	
b	Developing Energy Resources		165
c	Effects of Energy Resources Use		165
d	Managing Energy Resource Use		58
e	Other	40	

careers in energy

energy conservation

energy of sound, light and motion

energy pyramid in food chains/web

I support our classroom teachers effort in teaching science units

I support vocabulary and concepts used by classroom teachers in their units

I teach a lesson on energy conversion

recycle and energy conservation efficient energy use

thermodynamics unit - energy changes in chemical reaction. Also students do a

research project several pairs choose to write a paper and do a powerpoint on energy related topics

those energy topics that relate to my substitute duties will be incorporated. I cannot do an item analysis due to my substitute role.

My discussion/lesson are along the lines of a but simpler. We also talk a lot of how to conserve energy and our natural resources

recycling as it relates to energy conservation

interactions at earth/solar energy on dynamic earth systems; energy in the universe to study celestial objects

alternative energy

alternative energy, energy efficiency

energy of systems: heat, friction, etc. as a measure of particle motion

I teach a very short unit in Spanish 3/4 that deals with energy

taking actions to reduce global warming

we also follow solarwise for schools and attend the solar olympics

solutions to the energy crisis we are in. How we can live and work smarter with the choices given

safety, conservation

fossil fuel vs alternative energy

career options in energy and environmental concerns

students do research paper on "Earth's Physical Report" where are the doctor and prescribe what is necessary to improve the health of energy. Energy consumption research is done.

basic electricity awareness

energy conservation very basic: where energy comes from

energy efficiency

I would teach energy concepts if it were related to my subject area

discuss how energy flows through the human body

alterantive fuels

personal usage and conservation of energy; renewable US non-renewable resource development based on price, sustainability and Homeland security

alternate sources of energy

I have my students do a variety of brochures and websites related to alternative energy

and environmental issues.

How to build a home to Energy Star Standards. Compare normal building practices to what we do to make our home as a Energy Star Certified Home.

I bring in energy and environmental issues when we talk about current events. I often have students bring in info that they are interested in and then bring it into a mathematical, physics or biological issue.

We do the Bright Idea Fundraiser. Students learn a variety of aspects of energy conservation through this.;

13. As a result of my participation in the KEEP In-Service Course, I am comfortable with:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
the amount of training and experience I have to teach about energy.	6	11	50	208	40
the accessibility of published resources (e.g., teacher guides, videos, trade books) I can acquire to help me develop energy education lessons and activities.	5	14	48	170	76
contacting local, statewide, or national community resources (e.g., professionals and agencies) to support my efforts to teach about energy.	3	27	94	149	35
my ability to integrate energy concepts into my curriculum.	4	6	33	196	71

14 . Please use the space below to provide further descriptions or evidence your responses to question 13.

is not taking course until November

Would have like to spend more time viewing and studying the guide vs hearing "well you will understand that better tomorrow when we get to the guide"

I believe I will always seek new information and resources to include in my classes. The same is true about my participation in energy courses that include experiential learning/participatory learning.

Energy concepts are taught in units on the sun and our natural resources. Also mini unit on earth day.

I am a busy teacher and do not take time to do internet work that could improve my work. My difficulties are in refining my searches appropriately. I am pleased with what I have included in my work with students with respect to energy conservation

I can always use updates. I recommend that KEEP establish a variety of update sessions that would take place at the Wisconsin Elementary and Middle school science convention and the Wisconsin society or science association. You may also wish to consider the WAMLE (Wisconsin Assoc of Middle Level Education).

Using WE energies and focus on energy. Resources and help is overwhelming. Also UW Stevens Point (KEEP) curriculum and labs. I enjoy contact peers and colleagues to push the use of this curriculum at the high school level.

I incorporate keep into my science energy unit. I also invite WE energies in to do a class with my students every year.

I already had a good background in energy and energy resources

WPS makes contact for resources easy. Our school uses WPS for electric safety presentations. We have received resources from WPS before and after attending the KEEP course.

The KEEP manual had many great activities that I used last year in my classroom and will use again this year. I supplemented it with ideas from the internet.

Our current science curriculum integrates and supports the teaching of energy

I feel more confident with each class I take. I look forward to taking more

Many ideas and activities were acquired through the Keep workshop that I still use today. Many are relevant to the above statement.

I work closely with WPPI, as well often the lessons we use are from the KEEP program

In our construction we show an use alternative resources for projects as well as our energy we use in lighting showing a comparison between using different types of lighting. I auto we cover and use synthetic oil versus regular oil. The advantages of using alternative fuel. We also discuss and build a high mileage vehicle as well as a electrothion vehicle.

Could use more materials for lower elementary students

I team teach in 8th grade science and have been able to use information that I learned from KEEP to assist in teaching energy concepts

The course materials are designed for easy integration at numerous levels. Science and society emphasis is very important

The resource book was very useful

I wish we would have had more hands on learning about energy

very easy to use program. Fits into my curriculum. I don't have to create space for these lessons.

I felt the keep course was great. It provided resources and knowledge. I have used the pedal power display for the last 3-4 years.

I'll use some of the resources. I may contact WI public service for some of their materials. I sometimes have in the past years. Throughout the year we discuss energy topics as they come up.

The KEEP resource binder has been an excellent source for me. I use a lot of the activities in the binder and am always trying to fit more into my energy curriculum.

MREA is another great resource

The KEEP binder has more than enough resources for my needs

We have an energy club at school and the first year of encouraging lights and computers off when not in use saved thousands of dollars

I don't remember getting info about resources other than maybe MG&E

I use Spanish language posters in energy unit. They are laminated so students can locate certain grammar points and areas of content

The resource manual and lesson guides have been used in a number of classes with a variety of topics. They are easy to grab and stick into the curriculum as they fit.

re-evaluating our buildings for energy conservation with students

Keeping current is difficult technology is every changing How do you keep up?

I use my KEEP binder from the class and any on line support I can find when teach about energy resources and conservation

NSTA membership/opportunities also provides me with many resources

Since taking my keep course I have been able to use class material and integrate it in my teaching. The material given in class is so well organized all I have to do is find the materials and quickly find the information of class activity. The lesson plan can be developed in less than a 1/2 hour. Great resource that I have used throughout my teaching career.

the keep literature is great. I still use the keep binder with activities in my class the kids love them. I the Milw H2O and gas/electric co have been an excellent source of info

the materials given to use were exceptionally helpful

resources have to be more accessible time is an issue to get the resources and time to use them

I use the lesson developed for the course in conjunction with our science curriculum the course was very helpful in developing these lessons
resource books, lots of great ideas from other classmates,

The resources I received from the KEEP in-service are very user friendly and helpful. I was given a number of fun activities and good resources as well

There seems to have been so many recent changes with hybrids; hard to keep current for personal interests

Keep provided amazing resources! It was a fantastic course. My limitations are more a need for a fresher!

I have used some of the ideas in college courses.

Last year I felt my class benefitted from the use of KEEP materials and activities. I have not pursued acquiring many videos but I do have a few articles and books in my classroom now. PTO has been helpful in supporting me, but still don't have them on board for changing fundraising

I have used the binder we received in class as reference as well as the internet

I have to admit I have forgotten quite a bit since I took this course so long ago.

My training was for K -12 educators. I suggest breaking it down K - 5, 6-8, 9-12. Some of it was too difficult for the age I teach

I know how I could but the only thing I use them for is the "Path to Ground" presentation that WPS does. I'm comfortable with it but time limits how much I can do

For me it was more an awareness issue helping me to integrate energy issues into many curriculum areas

Going to the keep classes helped. It opened me to the keep guide and help me focus on school stuff when I am at the energy fair. I still have not use the keep guide to the fullest potential

This year I have 177 students assigned to me I get 47 minutes per day for preparation and assessment and paperwork. There are no additional minutes in a day to develop lessons or to seek out existing lessons. New ideas must come to me completely prepackaged and affordable. We have reduced our budget by at least 10% per year for the past 5 years

We created our curriculum during the class and investigated many resources

I have written WEEB grants for photovoltaic [panels] and fuel cells. For years renewable energy has been a priority in my teaching. The doable renewable course was well done and a great addition to what I do

Green building reused material

I teach world geography every other year and I have a big comprehensive project devoted to the US developing a sustainable long term energy policy. It really has worked well. Also in my US history class I start the second half of the course by looking at the present and then working backwards. We spend a lot of time looking at the current problems and trying to understand how these problems of today came about

No matter how much training with out personal motivation & desire to inform youth training won't matter. How to motivate is the key.

I refer back to my KEEP manual/lesson plan book when I need ideas for activities or straight forward facts. The material may need updating, however since our energy needs are accelerating rather than staying as they were. The tables and graphs could now be updated and extended

Because I have not incorporated the KEEP curriculum into my curriculum due to the amount of time I have and the type of subject areas I teach, I have let the concepts and activities "slide" so my familiarity with these activities has faded that the reality

The binder I have is full of lessons/ideas to teach about energy

The KEEP course that I took was a good introduction but probably would have helped me more if it had focused on secondary education instead of elementary. Also, there is a lot I don't remember because the course I took was several years ago

The materials I received from my KEEP course are great! I used them with my high schoolers when we were home schooling. She wrote a paper on wind energy and the book that we had was perfect. In my current 7th grade CD science class, we are talking about how people use plants and animals and also in health we talk about energy. I do feel comfortable contacting our power companies for updated information

The binder of lessons has been integral in me planning lessons and completing them with my students

In 2000 our school sponsored an in-service for KEEP at our school. The Denmark School Dist was part of that in-service.

I use Wisconsin Public Service Resources - speakers, programs for Grade 2

I do not have or know where to access information about energy education appropriate for second graders

with the internet this has become especially easy

Energy fair participation in Evansville, lab activities related to heat, energy, electricity, video presentations

I learned so much in the course and still use it today.

I help students understand what is presented in their science classes - usually and help them and projects

The curriculum provided has so many good activities that are easy to incorporate

As an environmental education minor, I have the skills but I tried to separate/remember what was specifically taught at KEEP

I would like to take more courses through KEEP to increase my level of training. Timing and funds are critical

The KEEP binder provided me with many energy related

I find myself incorporating more ideas that are related to consumption or or creating new energy resources.

Although I no longer teach summer school science (the reason I originally took the class) I have always been proactive about energy conservation and alternatives. I use my business class programs to create materials about the topics I learned in the KEEP course.

I teach chemistry, so energy is a major component of the course.

I have integrated energy education into a curriculum that really didn't include it. I have used energy education to teach some other important natural resource concepts. I have integrated energy education into units on Minerals and Rocks. I also have a better understanding of nuclear energy and its resources so that I can explore topics on pros and cons of this energy source as well as alternatives.

KEEP did pay my expenses to the Better Building Conference a few years ago. At that conference, I made the contact with energy star people. The class I took has not directly helped me in my construction class but the conference has. In answering the questions, I am counting the conference as a class.

I feel that Keep does a nice job keeping the course at a low key but informational aspect. I feel that the resources that have been developed are ok but often need tweaking to fit what I am teaching. (this is true for most things)Because of the multiple courses I teach it is sometimes difficult to add new material to the class that isn't part of the curriculum.

I use the materials I was given at keep.

I'm neutral on this because this is not my strong suit. I should have more professionals in my class but I just don't get to that.

Environment issues and energy issues co-exist

Keep courses have helped a lot in providing lessons and ideas for my classes.

I don't spend a lot of time on energy education but over the course of the year it might be 5-6 days in the classroom as we study government or Asia. It has been 7 years since I took my last KEEP course but I still use some of the lessons with updated data in my classroom.

I do teach energy topics, but as I teach first grade, there are limits to what they understand!

I have used many of the resources available from my local energy provider.

The awareness of resources available and a review of many concepts were good from the class. The resource book is still an excellent reference.

I have implemented and developed an entire unit for the advanced el course on energy

I use it when we learn about God's world and how we are asked to take care of it and use it wisely.

We received very cool hands on kits to have students work with alternate sources of energy

Because I attended the Keep course a few years ago I use some of the lessons and simulations and have gotten away from much of the material. I guess it is time for an update especially with global warming

I begin my unit with an inconvenient truth the CD's and books I have from KEEP allow me to provide alternative energy information. I have resources to visit in field trips learned in my classes. We enter approx 4 art competitions related to environmental issues.

The keep program may have contributed to these 4 areas but I don't think they happened as a direct result of attending one keep class

I need ready to use standard based materials that are free due to funding cuts and as our staff is reduced I have to take on more teaching responsibilities. Same old story - do more with less resources

Energy education is provided through the direct curriculum Keeps website is also available for additional information

I took this class my first year teaching. I enjoyed the class very much; full of a huge amount of information to use in class. I used that into during that year - but I didn't teach env resources again until this year. I plan to use the resources I received again this year but I haven't looked at the resources yet this year.

The keep resource manual provides more resources than anyone could possibly use. The lists of outside resources the manual and instructor provided have led me to contacts with energy companies from whom I acquired video resources about oil exploration and energy use

The resources and information I have helps me keep my curriculum current and up to date

Using keep materials I was able to develop a unit on solar and fuel cell technology. It is a great way to combine concepts learned in physical science with the broader topic of energy

Through networking with other e-science teachers and professionals, I have great confidence in my understanding of current energy issues and of methods to bring that across to my classes an effective manner

I cross reference my Keep book and use a lot of activities from there and incorporate it with the current PLTW curriculum

I have updated and improved my building construction and energy and power courses from what I have learned from KEEP. Also the resources provided saved me hours of time that would have been spent researching

I still use some KEEP materials, but it has been so long since I attended the workshop I'm not sure of KEEP's influence on my teaching presently. It definitely was a beginning.

I use my KEEP energy binder with lesson plans every year. Kids love the lessons so do I

Though I'm not able to use what I've learned in my current position, I know it would be helpful should I change my area of teaching

I was able to do the above to a higher degree before the KEEP course. The course did not assist me in these areas.

I like the green idea and promote it as much as I can. I give students as many ideas as I'm able to help them understand the meaning of conservation

I can use materials available through various resources on energy use and how it can be used in the tech ed curriculum

Local businesses are very supportive many teachers took the course and we help teach other when needed. Put together a nice packet to use in class to teach about alt. energy

thanks keep

I use the info from the Keep course for only one purpose - a research project we do every year on conservation. It has been a valuable source for that.

With the materials keep supplies I am very good at integrating energy concepts into my classroom. However, if I could get more names, contacts for professional support we could bring more real life alternative energy equipment and technology into schools.

before taking the class, I was unaware of the golden opportunities to incorporate energy ed into our science unit on electricity or our study of WI's natural resources in social studies

I know I can contact the course instructor with questions. I have some background in energy use and electricity from my job as an lec.

I need more in-services; I signed up for the October class but school stuff got in the way

I know where and who to contact to get further resources

We had to run an activity on energy loss thru windows. The activity was poorly written and I rewrote it making it more pertinent to students

The training, guides, books, lessons and activities have made it possible for me to integrate the energy concepts into my art curriculum. Community resources have help to support tracking about energy. Art projects.

Thanks for the KEEP energy guide hands on interactive learning collaboration with other teachers and a fabulous professor I have the confidence knowledge and tools to make energy awareness permanent life time of the children I teach.

We developed a binder and share resources/ideas in the class.

I do not have the opportunity to teach energy education. I work in an outdoor ed program and focus on nature education with an emphasis on the environment

15. The KEEP In-service Course has improved my ability to

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
increase student knowledge about energy.	4	8	15	218	75
help students understand energy flow through systems.	3	12	76	170	50
increase student knowledge about the development of energy resources	4	6	54	198	51
increase student knowledge of renewable energy resources.	3	3	27	183	96
help students understand the positive and negative effects of energy resource development and use.	2	6	32	108	63
help students understand Wisconsin energy issues.	1	13	87	163	48
affect student attitudes toward energy.	3	5	45	187	72
encourage students to use energy more effectively.	3	3	12	185	109
help students understand future energy use.	2	9	49	185	63

16. Please use the space below to provide further descriptions or evidence your responses to question 15.

In the spaces circled 3 it is mostly because I am/was very knowledgeable in these areas already

Will be using a few of the lessons designed for my homework with my students

I do not go into much of the above because of the age of my students. I want them to know

where energy comes from and what they can do to protect our natural resources and to save energy

Keeping up on the changing info is challenging.

It is difficult to change some opinions and attitudes of students especially in a fairly wealthy district. But with the curriculum provided through KEEP the impact a teacher can make on a student with proper material is amazing.

I am stronger in this area in science and I integrate more outside services to connect to the curriculum.

This course helped update my information in this area

Discussions about wind energy and alternative energy have broadened my knowledge and allowed me to instruct my students better on these issues. The tour of Weston 3 and Weston 4 were very informative.

In our district the local power/light company has a play come to all the schools. This is a wonderful way to educate younger students.

Once again a teacher comes away with resources and ideas that are easy to incorporate in a variety of settings. I attempt to use teachable moments to enforce energy concepts especially as they relate to the real world in chemistry class

program is very kid oriented easy to understand

The most valuable resource/lesson I use in the English classroom occur during our career unit where students participate in several activities I learned at the KEEP inservice.

Earth week is a time when energy will be discussed too.

With the knowledge and resources I have gained through the courses I have been able to incorporate projects and activities that allow students to explore and research energy resources, both nonrenewable and renewable.

We look at forming practices, landforms, weather patterns, logging in Wisconsin to support our energy studies.

I find that the type of student enrolled in my power and energy classes work best/learn best when we have as much hands on as possible. I have used several hands on activities in the keep guide but I wish there were more

At elementary what we have and how to save it is better taught, negative effects can be scary to young kids

Taken too long ago

This only pertains to my small class of students

The courses have changed my interest in renewable energies and other sources through my own mental changes. I'm influencing students in discussions frequently. I've seen change in

my husband who refused to take the course with me and now he attends the energy fair

The student group is looking into alternative energy sources

Maybe I need a refresher course

going green initiative at my school

through pre and post testing I am able to gauge the amount of knowledge that the students came with and what they leave with

some of this is not as applicable to my grade level as it would be to older grades so I haven't looked into it as much

Its been a long time since I've taken the course. Many things, ideas and concepts have changed. It's very difficult to keep up to date along with other multiple responsibilities

I don't care what content we teach we all have an opportunity we can choose to take or ignore to influence kids about energy we are all in this together

The in-service was well worth my time. I learned a lot of interesting ways to teach energy concepts to my sixth graders!

The students enjoyed the activities dealing with energy flow - especially using the Energy Ball but I ran out of time and do not feel I was able to go beyond the basics.

All the 4s I was pretty good at already

I am already knowledgeable with energy resources. Going to the class help expanded my horizon to more activities for the student

I hold me back from strongly agreeing

We included all of these areas in our curriculum

I plan on using some of the resources in the climate change unit in my weather course

green building

First, I feel teachers have to model what they say. I try to walk or bike to school everyday. We are constantly talking about the importance of recycling. Lastly, the two units mentioned in 14 are devoted getting the kids to think about their future and the problems our current non-energy policy is causing our community nation and planet

Only because I'm motivational and concerned about the future

Lessons in the binder are set up in an easy to use format that provides a clear picture of how to teach the concepts

Though the materials have improved my ability to teach these themes, I will need to approach them with the smaller most important bits of information.

We talk about energy sources in social studies so I don't have a lot of opportunities but I do try when I can

Most of our energy info is 1st grade concerns efficient use of energy

Have used several KEEP activities in my classroom. Plan on trying to include more in future

My whole class is much more aware of conserving resources. We reuse napkins at snack time turn off lights more etc.

The information specific to Wisconsin is so thorough - and very helpful! Our nature club has always tried to focus on Wisconsin as well as the world

Although my position is currently out of the classroom the energy classes offered benefit to everybody

The hydroelectric dam and weston power plant tours were so educational that I've been able to better relate those concepts to my 6th, 4th and now 2nd grade students

When I run into former students they tell me they have recommended my courses to their friends. They also say the course really helped them understand energy issues. Although my course was not entirely based on KEEP materials the background info, activities, and network provided grounding

discussions with students looking and talking about environmental concerns when I talk to classes. No hard evidence

I chose 4 only because I use KEEP and other programs to increase the awareness of energy and the environment to my students

My students really enjoy the Amusement Park format in the CD rom that was provided through the first energy class I took. One of the student initiated jobs in our classroom is power patrol - students check for unnecessary energy use

Again it is probably time for an update

I wish I could do more but besides talking about it

I have the knowledge base just not the available teaching time or current materials

I am sure the keep program has changed over the years with new and improved energy information. However when I took the course it was excellent it also provided projects for students to partake in.

The keep materials and knowledge along with the extra community resources that I've been made aware of through keep have had a huge impact on my teaching of energy resources and conservation and efficiency

Teaching general science and biology I am daily making at least mental reference to information I get through the keep course

The course I have taken has helped me become more knowledgeable of energy uses and the need to conduct more research for energy in the future

The keep binder has so many resources placed at our disposal so as to deluge the student appetite for renewable energy sources. The online guide and links help to connect with current information and opportunities to learn as well

Again all the information obtained has been given to the students

A better topic at this point might be sustainability, energy footprint, and carbon purchasing

because special ed students are limited they can understand some concepts but they are an important part of our society and need to learn the importance of energy

I instruct a building construction course and we talk about energy resources and conserving energy in home construction. In my drivers education class we discuss how to conserve energy while driving

As an example we now have a lesson about possible sources of electrical energy and the pros and cons of each. I think this really helps younger students begin to appreciate that energy can't be taken for granted and must be preserved protected and used wisely

I try. It is hard with 7-8 year olds.

besides the one act, Walden and enemy of the people, are there any plans that address environmental issues? I can not find much of anything

The activity in which we calculate our classroom energy usage is a good way to show students the monetary costs of electrical usage

Like I said we did not learn anything we just had to present an activity from the book

before taking the course I did not have any energy education in my art curriculum. Now I use what I've learned in the classroom but also in my personal life

The resource guide and lesson plans are the foundation of energy awareness and usage grade 2 students are excited to bring home the knowledge and teach parents

Through the research my students do they learn and then discuss topics related to energy use and alternatives. The brochures and webpages provide a focus for their research.

The course was so long ago, that I forgot what I learned there vs. what I learned elsewhere.

KEEP courses reinforced my strong beliefs fostered from the 1970s.

I have integrated energy conservation as well as thinking green into my curriculum. I use energy use inventories and relate energy use and reduction to pollution output.

I have students do projects that relate concepts to their daily lives.

Social issues are about energy

Evidence would include students' interest and studies we've done using 68Watt's Up68 meters as well as reading their own electric meters before and after conservation methods and calculating savings.

I don't do a lot of Energy education but I think the resources I have been provided in a small way has helped me to help my students.

17. Please feel free to write additional comments about your perceptions of the KEEP In-service Course.

The assignment was too much and too soon considering this is only a one credit class. I would love to take another credit either to build a "window quilt" or two and also to go more in depth in the KEEP curriculum. Not sure the energy audit portion was worth all of the time spent on it. Might help some teachers personally but does not transfer to the classroom. I don't feel comfortable completing this survey since I have not yet been graded on course work. Did not feel comfortable completing initial course evaluation with instructor in the room watching over what class members were writing. Otherwise it was an excellent class and I would recommend it to others!

I have attended MWRE Fair for approx 10 years. Each time I attend I gain some knowledge or insight that improve the quality of my classroom instruction. The KEEP in service course offers local, regional, national and international programs and speakers in a learner friendly environment. I encourage my co-workers to investigate this option and strongly consider participating in a KEEP course.

I have made some great window quilts since attending the workshop!

I'm sorry I can't remember the name of my KEEP instructor, I took the class in Oshkosh, and the teacher was not from Oshkosh. He was phenomenal! Class was great and I will take additional KEEP classes.

I have taken 2 KEEP courses and I have found they were very well organized and the instructors were very knowledgeable. The expectations were reasonable for 1 credit and the courses offered practical material for the classroom. I have not used much of the lessons provided only because my curriculum is already set by the district and I have a difficult time finding enough classtime to incorporate energy education. I hope to incorporate more with my current curriculum in the future.

I appreciate the KEEP course. The content is relevant but will be more so as energy costs rise and energy resources become scarce. I would like to develop a course just on energy that would be an elective offering at our school but to create a course we need to remove a course

The course was wonderful and I came away with a lot of resources. The teacher was very knowledgeable and managed to pack in a lot of activities and info during each class. I appreciated the funding to help pay for the graduate credit very much

I have been retired for 5 years please take me off your mailing list. Kathy Hermann

Retired teacher. Good luck with your survey.

Please take me off the e-mail newsletter list. Also, note that I'm now retired, so you don't need to send me anything having to do with actively learning.

Address change Patti Isherwood 1505 County Rd U Sturgeon Bay WI 54235

An online version would be better

I really enjoyed the KEEP inservice I attended and I just got done taking a KEEP on-line class which I thoroughly enjoyed.

I still have the resource file I developed during the course and occasionally refer to it when something comes up where I can integrate something about energy education into my existing curriculum. So I am glad I took the course even though I seldom teach it in any kind of a formal manner

I have retired and the teacher filling my spot has not taken the KEEP course but does have my materials - it's a good program - Barb Griffin

have done the energy bookmark with 4th and 5th grade and will do it again this year. Thanks for the notepad.

thanks for putting together a valuable program

The survey does not apply to the population I am currently teaching. Have not used KEEP materials for over 8 years.

I have never attended a KEEP course that I didn't appreciate. I pursue looking for full time work, I anticipate using many concepts gained from KEEP. Keep up the good work. I have always been impressed by your staff's dedication and quality work

I am presently working on building a type of energy bike we have made solar ovens and wind turbines. I have found plans but if I knew they were tested by keep that would be nice. I try to give my students a positive energy experience hopefully they will be open minded consumers because of it.

I thought the class was a little too light weight and that one of the teachers not well enough informed

I think you provide an excellent resource for teachers, however, time is so limited and we have so many other requirements to fulfill

I liked the course when I took it - but it was very broad for K-12. I'm in kindergarten and there were science teachers from the high school in my class. Need to be more grade level appropriate

I really enjoyed the 2 day course offered in Mke at the Wehr Nature Center will you be continuing with this? kmaertz@wi.rr.com

it would be great if you could prepare a 4-6 hour one day course in order to present to an entire staff during a professional development day

I teach graphic arts three levels. Auto service 1, small gas engine repair, electronics, and home mechanics. I try to get the students to tell me how to use concepts from keep. My graphic arts classes make posters and presentations on alternative energy. Small engines and autos talk about biodiesel and ethanol fuels. Home mechanics will list and research as many alternative and energy efficient ways to include in planning a home

not currently employed

I enjoyed taking the classes and think Pat Arndt is doing a great job in berlin. Please keep offering classes

at a nature center

since my transfer of teaching assignment from the Waunakee school district, I was rejected as a participant in the summer 2007 Keep class. I even had 3 other teachers from the CcF district ready and excited to get involved. Could you get McFarland involved this year 2007-8 or at least registered for summer 2008 class.

Most challenging part is all of our curriculum is determined at a district level- energy topics and issues aren't a direct part of my required curriculum.

I really liked the course. I learned a lot especially about using math (algebra) to calculate \$ savings for electricity. Great!

I strongly believe that you should offer this in service to President Bush

Keep doing what you are doing and get the word out to teachers. Doing the class where you get teacher familiarization to the keep activities is good. Follow it up with a class by attending the energy fair good combination

I love the keep courses. They are a wealth of informative information. I have energy as an enrichment activity. Please keep up the great work!

A surgery gone bad has left me permantely partially disable in 2004 and I haven't taught PE or anything since. I have units called: EE Concepts through PE activities where energy ed was just one of them. I loved teaching sustainable energy when I was teaching KEEP and other workshops

I taught for 5 1/2 years after taking this course. (One of the best workshops with outstanding materials and resources) As a 6th grade science teacher I used this rich resource often.

The labs that are presented in the KEEP course are well done and absolutely useful

I am sorry I couldn't help you more. I liked the course. If 2 wre teaching high school math still, I would definitely incorporate energy themes wherever applicalbe. I love my students to see real-life math

I'm glad I found KEEP. Keep up the good work

Please continue to offer the keep courses. Our students are in need of the information and opportunities to explore energy options. Our kids are the nations future.

KEEP was a very good opportunity for me and my students in past years when I taught different science classes. I still refer to some of the material from the class on occasion, but not regularly due to the curriculum of my particular class assignments. Other teachers in my school, who experienced KEEP with me use the material regularly in their classrooms. Thanks for the opportunity. Also, we have since become a solarwise school and have been very successful at the solar olympics.

KEEP classes are very informative and beneficial

I have also offered ideas for activities to other teachers that I learned in this class and from the KEEP manual

The science involved in energy education is presented in a very hands on and easy to understand way for all grade levels. I found the KEEP course very user friendly, but was impressed with the depth of covering this topics. This a very good thing for all teachers. All US Students should be required to have energy education. Thank you for providing a high quality curr and training

The course instructor I inserviced under was skilled, knowledgable and experienced. During the demonstrating of course activities he infused content (from the KEEP guide, fact sheet, and additional materials) at the beginning and throughout the activity. This has helped me plan my own courses for I see teachers need basic content as well as activities and both are provided in the KEEP 730 manual and handouts. The network of support KEEP 730 connected me to is outstanding. The frequent communications by email, paper, telephone, and in person have given me new ways to grow and contact throughout the state. KEEP really rocks!

* the inside sheet was missing

I retired in June 2007

I retired last year after 45 years of teaching. I taught energy savings whenever I could. Thanks for all your help. Please remove my name from your list.

Thank you for your time and energy

I wasn't sure if I could take the course again and still get credits that count

The professor I had was awesome

Good luck - this is a very important area. I feel badly that I have not included in the recent curriculum. The Waukesha schools I teach for had many hits on its EE program a very sad statement for a city with water quality issues and land management issues.

One of my favorite parts is the keep newsletter that comes on line monthly

I think it's a great idea to incorporate energy into the curriculum I'm just not sure how to do it.

I really enjoyed the class I attended that was offered at a school in my district. I also took 2 course on line the price for all these course was great. But the on line courses were incredibly hard to keep up with. Commenting weekly on others comments while reading what everyone wrote seemed to be an endless task

I refer to the big 3 ring binder often! Pat A was great instructor.

This has been one of the best set of courses I have ever taken and I have taken a lot of them in 30 years

I taught in a community college for 2 years, worked as a teachers aide for 1.5 and have been a substitute teacher. I was eligible to teach full time after completing an alternative certification course, but my local schools were unfamiliar with it and wanted to wait for more information before interviewing me. So I went into grant writing for our tribe instead. While I am not in a teaching position I have found opportunities to use my keep knowledge while volunteering at a campaign community ed situations. I am now in a green team and see some of my keep instructors on a regular basis. My energy education knowledge has been useful in promoting community recycling and energy conservation project and in writing grants. I wrote and received a first steps toward renewable energy grant for my tribe. We will now complete an energy audit of our reservation and find ways to meet the standards in the Kyoto protocol.

These workshops were great in helping me become more energy conscious. I have time for 1 mini unit on resource conservation in my geography class

The KEEP classes I took were great! Keep up the good work of teaching teachers. My K-5 students are clueless about where energy comes from and why it is important to save energy. They are disconnected from the big picture. I think the classroom teachers maybe as well thus keep teaching. Here is an example after one of the keep classes I went into one of our elementary schools and tried to explain to them the cost associated with keeping 3 refrigerators 6 pop machines coolers etc running just in case someone wanted a cold soda. I tried to encourage them to unplug the pop machines and have one fridge on to cool the beverages needed each day...the rest of the story is...they could not unplug anything. It was just too scary to think there wasn't a pop machine available in the building and 3 fridges to keep stuff cool.

I really enjoyed the class and found some of the activities particularly memorable. I have encouraged coworkers of this great opportunity.

I appreciate the opportunity to have access to resources I wasn't aware of until recently. The push to write curriculum has helped enrich the course I teach. Also, a big thank you for the access to WE energies funding to help supplement the cost.

I read the newsletter about a keep certificate so that program still going? How about a keep K-2 class?

Teachers want up to date info on energy. Give us the books, we can read. With biodiesel, wind, and alcohol energy in one news we want to know more facts...so we can pass this on. Print information contains old facts website that is current might be better resources. I took the course to learn not for an easy credit. It was an easy credit and I did not learn

I enjoyed the class and used it when I was a classroom teacher. I now work as a Title I reading teacher

The course I took was the Renewable Energy Fair one this summer. A lot of great and interesting topics covered in the days I was there. I always share my KEEP mailings with the science teachers at my current school district.

I enjoyed the courses when I took them.

I very much enjoyed the KEEP course and materials. Kelly did a gret job. It would be nice to be able to use the materials more int he classroom.

Our instructor, Pat Arndt, was wonderful and brought in excellent resources.

The online survey was much better.

I'd love to take another class as a follow up.

These are worthwhile courses that provide hands-on curriculum.

I think the KEEP inservice course was extremely valuable and did provide me with additional background in which to draw activities for the classroom. It would be beneficial to provide the KEEP course in local areas to make it easier for teachers to access the course.

The KEEP courses have been a tremendous resource and a wonderful gift in learning, teaching and sharing with my students.

When I get a chance to talk about culture I have tried to update my information to include information on poverty, access to resources, education systems. I would like to include information on energy as well but only if there is time.

I think that the KEEP In-service Course is very valuable. Even if you can't always teach your students about energy, you can at least be energy efficient.

It was a lot of work for 1 credit.

I have enjoyed the KEEP courses I've taken....they are professionally presented in a relaxed atmosphere with peers who share the same concerns. I hope that you are able to continue with courses already presented and add others as material becomes available.

Did not really need the Power plant tour. too loud to hear anything.

Energy education was covered when I taught on staff but since I now only sub I usually don't have an appropriate place to insert it into the lessons I follow.

Excellent courses and curriculum. KEEP it up.

68KEEP68 them coming.....!

What I now need is something that would help me know more what is current in the field of alternative energy sources, and if there are any great field trips that i could take elementary aged students to in the area of energy.