

THE ADVANCED TECHNOLOGY ENVIRONMENTAL EDUCATION CENTER: A GLOBAL EFFORT

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BACKGROUND INFORMATION

The Advanced Technology Environmental Education Center (ATEEC, pronounced "A-Tech"), uses a globe as its logo¹ to symbolize the breadth of impact this center hopes to achieve in the field of environmental technology education. In the three years of its existence, ATEEC has reached hundreds of educators and others interested in creating a "national world-class network" of community colleges working to maintain the environmental technology workforce. The Director and administrators of this Center use a variety of different formats and programs to achieve their mission and goals. The following is a description of ATEEC and its importance as a resource to K-16 environmental technology educators.

ATEEC was established through a National Science Foundation (NSF) grant awarded in October of 1994. The Center's vision is to create a national network of educational institutions that are "producing and maintaining the environmental technology workforce, addressing the diversified needs of industries, and promoting the progression of transfer students to higher education."² Specifically, ATEEC's mission is to advance environmental technology education through curriculum development, professional development, and program improvement in the nation's community colleges and high schools.

Guided by a National Advisory Board, the Center's Director collaborates with three organizations in implementing and achieving the goals outlined in the NSF grant. For example, the Hazardous Materials Training and Research Institute (HMTRI) is an

association between the Environmental Technology programs at Kirkwood Community College and the Eastern Iowa Community College District. HMTRI produces and provides environmental technology curriculum and instructor workshops to community colleges nationwide. The Partnership for Environmental Technology Education (PETE) is a non-profit organization established "to provide leadership in environmental education and training through community and technical college partnerships with business, industry, government, and other educational providers."³ Their regional network provides the structure necessary to disseminate and congregate educators and business leaders in the field of advanced environmental technology. The University of Northern Iowa hosts the annual Fellows Institute and is the university of record for educational credits associated with the Institute. In addition, this educational institution provides programs for students, educators, and the general public about conserving energy and preserving the environment.

The work that has been completed to date, as well as its future directions, are driven by ATEEC's goals. These goals are:

1. To strengthen math, science, and technical curriculum and instructional materials that support environmental technology education for all students.
2. To strengthen the nation's environmental technology programs by providing professional development opportunities for community college and secondary educators.

3. To strengthen environmental technology education by providing support services for program improvement.

The ATEEC Director explained that one of the Center's jobs is to "empower schools at the local level to be the best they can be and give them some tools to be able to do that." She further described a "team" approach in the administration of ATEEC and how this approach has been essential to ATEEC's functioning and success. Finally, she stressed the importance of maintaining a national scope and emphasizing professional development for faculty at all educational levels. By examining ATEEC's goals and their subsequent implementation, one can better understand the impact this Center and its partners have had on educator's professional development in the field of environmental technology education, and the network's broader connection to School- to-Work.

ATEEC GOAL 1: To strengthen math, science, and technical curriculum and instructional materials that support environmental technology education for all students.

ATEEC FELLOWS PROGRAM

During those treasured summer months when educators could choose to take time off from education, the "cream of the crop" in the fields of math, science, technology education, and environmental education join forces to enhance the quality of environmental technology education. These thirty educators convene for the ATEEC Fellows Institute which occurs during two weeks in June on the University of Northern Iowa's environmentally friendly campus. These educators meet to achieve two general objectives of the Fellows Institute. The first is to achieve ATEEC's goal of strengthening math, science, and technical curriculum and instructional materials that support environmental technology education for all students. The primary outcomes associated with that goal are to:

- Continue developing model articulation programs
- Recommend exemplary math, science, and environmental technology instructional materials
- Identify and create instructional activities for teaching real-world applications in math, science, and environmental technology
- Evaluate and improve an instrument that educational institutions can use to assess their environmental technology programs.

The Fellows Institute was designed to achieve these objectives by relying on current high school and community college instructors' expertise curriculum development and implementation.

The Institute's second objective is to provide an intellectual activity which invigorates or renews the Fellows, enabling them to teach current environmental science objectively and enthusiastically. At each Institute, the Fellows critically analyze an environmental issue, each of which has been linked to a case study. The Fellows make group presentations focusing on the science, policies, and controversies surrounding each issue. The issues include:

- "The State of the Earth." A case study contrasting the views of Al Gore and Gregg Easterbrook
- "Environmental Disasters." A case study focusing on the Exxon Valdez oil spill
- "Risk Analysis and Assessment." A case study examining the peaceful use of nuclear energy
- "Environmental Health." A case study centering on emerging infectious diseases.

The Fellows are given readings related to a specific presentation and assigned to a group well in advance of the Institute. The two-hour presentations are

evaluated by two instructors for content and pedagogy using the criteria of “depth, understanding, related readings, quality of presentation, and stimulation of discussion.” The instructors discuss the evaluations with all the individuals in each group shortly after the presentation. Grades are based on the results of the evaluation and a follow-up written summary of all of the presentations.

The process of becoming a Fellow is a competitive one. ATEEC administrators established composition and selection criteria so that the resulting group would represent a variety and breadth of subjects and educational levels. For example, each of the six PETE regions are represented by five educators, providing a national scope of interest. At the same time, the total composition of the Fellows approximates one-third community college environmental technology instructors, one-third community college math and science instructors, and one-third high school math, science, or technology education instructors.

Other criteria used to choose the group of Fellows include:

- Master’s degree in a related field
- Current faculty member in a 2-year college or high school
- Six years of teaching experience or a combination of teaching and work experience
- Demonstrated experience in formal institutional assessment/evaluation
- Demonstrated articulation program leadership (e.g., School-to-Work, Tech Prep, 4+2+2)
- Demonstrated experience in selecting exemplary instructional materials
- Demonstrated experience in identifying and creating “real-world” instructional activities.

As mentioned previously, Fellows are asked to critically evaluate curriculum, program assessment instruments,

educational activities, and instructional materials during the Institute. Therefore, participation as a Fellow requires a broad background of experience. ATEEC ultimately decides the final composition of the group to meet the needs and goals of the subsequent Fellows Institute. Once chosen, a Fellow receives a stipend of \$1000 for working on grant objectives. Two graduate or undergraduate credits are awarded to each Fellow. In addition, ATEEC pays tuition and fees, dormitory housing costs, and transportation expenses.

Each of the three Fellows Institutes have used different schedules and have met different objectives during its two-week meeting at the University of Northern Iowa. In 1995, the Fellows worked concurrently on “The State of the Earth” case study and an NSF grant objective of identifying the math, science, technical, and critical thinking knowledge and skills needed in the field of Environmental Technology. In 1996 and 1997, the Fellows spent the first week working intensively on NSF grant objectives. After the first week, the Fellows moved into the more classic “graduate course” portion of the Institute— reading texts, writing, and presenting an assigned topic related to environmental education. In 1996, the Fellows recommended a model articulated “4+2” curriculum in environmental technology to link high school and community college programs. The 1997 Fellows recommended minor changes to the model program and incorporated the national math, science, and technology education standards. They also worked on the “Four-Year Program Articulation Project,” which was designed to link environmental education programs between community colleges and four-year institutions. A complete copy of the model program is on ATEEC’s Website (www.ateec.org). These Fellows also worked on the remaining outcomes of the four objectives listed earlier in this report.

Fellows Institute Reactions

The Fellows Institute has become a very prestigious opportunity among the community college faculty.

—ATEEC Project Director

ATEEC has provided many opportunities for development and growth both to the professionals in the field as well as to the environmental technology field itself. Benefits have also been noticed at the community colleges or high schools where the Fellows work. For example, a community college president was clearly pleased with the changes made at the institution following a faculty member's participation as a Fellow. A high school faculty Fellow established "credibility" when colleagues discovered his participation in the Institute. As a result of his participation, he was asked to join committees and participate in ways he hadn't before this opportunity.

The ATEEC Director describes the Fellows as the "innovators" in their respective institutions. They are:

The faculty who don't want the status quo. They are eager to bring something new back to their classroom, to their students, and to their institution. We have tried to build on that energy and have asked them to go back to the faculty in their area...and try to...get them interested.

The Fellows find the opportunity a very fulfilling chance to network with others in their field and find out about what other faculty are doing in their institutions. The Fellows are required to participate and help meet the objectives mentioned previously. As the Director of ATEEC notes:

[The Fellows] do a tremendous amount of work throughout the year...actually almost all of them have gone to their regional instructor conferences and have done workshops for us.

Possibly because the Fellows receive a stipend and are required to continue to "work" throughout the year, they may feel that this is a "summer job" unrelated to their individual growth. On the other hand, others

have recognized the continual networking and noted, "it's not just two weeks, it's professional development."

However, program administrators do not underestimate the value of this experience. Putting information, knowledge, and skills into the hands of the faculty Fellows was intentional. According to a PETE Regional Director,

this is where the rubber meets the road. It's on the front line, it's those instructors...who are doing the work. They are the people rolling up their sleeves and making things happen. And because of that, they keep rolling up their sleeves and they keep talking to each other after they leave. . . Looking back ten years from now at the effect this had on the community college environmental programs. . . It was the ATEEC center that brought people together.

Fellows mentioned the changes in their teaching—not necessarily in their pedagogy, but in their feelings about environmental education:

The class changed me. . . you do self-reflection. . . and evaluate what you are doing.

I've taught less of the technical, hands-on material, and more of the "bigger picture."

I think the best we can do is teach them (students) critical thinking and problem-solving.

(The Fellows Institute) gave us a much more realistic view of the real problems out there.

The Fellows also identified problems within the field of environmental technology in which they received their education. By participating in the Fellows Institute, they hope to improve their own teaching to enhance the education of current students:

I think one of the problems in the educational system is the gap between what I learned twenty-five years ago and what's going on now. If you don't retrain...you don't have those types of liaisons between industry and education or government

and education. I started getting involved in other things because now I know a little bit more about what's going on than what I knew when I graduated from college. Now I know how I ought to be educating my students about what is happening right now.

It is apparent why this dedicated and motivated group of faculty were chosen to work as Fellows consequently representing ATEEC in conferences and in their institutions across the country. The experience has been invaluable to them professionally and to the field of environmental technology. Fortunately, ATEEC has developed a number of other ways to reach those unable to attend the Fellows Institute. The following sections describe these opportunities.

To address the second goal of ATEEC's mission, the following professional development opportunities have been established. Because of these professional development opportunities, over 600 educators in the field of environmental technology education are reached annually.

ATEEC GOAL 2: Strengthen the nation's environmental technology programs by providing professional development opportunities for community college and secondary educators.

FAST INTERNSHIP PROGRAM

The Faculty Associates in Science and Technology (FAST) internship program was part of the initial NSF grant to ATEEC. In the first year of implementation, this program placed 16 faculty interns in a variety of industries and laboratories. Due to the cost associated with this component, the project was spun off into a separate NSF grant the following year. Although the new grant is administered by the PETE organization, this professional development opportunity is very much linked to ATEEC and its mission. The goals of the FAST internship program are to:

- Provide educators with entry into industry to refresh and refurbish their knowledge and skills
- Develop a resource to identify industry's current thinking and needs regarding curriculum and skills.

In emphasizing the importance for participation in this program, a Regional Director for PETE stated:

The program takes faculty who in many cases have never worked in industry, and sends them out into local industry to help them establish a relationship. That industry then can become a resource (by contributing) adjunct instructors, curriculum, lab resources, equipment, chemicals, and student internship sites. So there is some real value linking that faculty member industry.

The six regional PETE directors facilitate corporate and educational participation. Each director selects six applicants to participate in the program based on the responses provided on the initial application and applicant's letters of support. The chosen applicants are then matched by the director with an industry sponsor. In the second year of this internship program, approximately 36 interns were placed across the nation.

The FAST Internship Program is based on a four to six-week summer experience. Educators spend 40 hours a week working on their assigned projects, observing and applying concepts learned during their work-site experience to the academic setting. The stipend for participation in this program is approximately \$3400. However, this stipend may vary based on the industry sponsor's agreement with the regional PETE organizations. Typically, industry partners support this professional development program by providing a work-site mentor, a project for the educator to be involved with, and at least \$1700 toward a stipend for the educator. The stipend is distributed in three equal installments: the first is given prior to participation to assist with travel and

accommodations, the second is given during the internship, and the third is given when all of the required documentation has been completed.

The program's impact is evaluated by an internship survey and an exit survey. The survey completed during the experience is a collaborative effort between the educator and the industry partner. The exit survey highlights how the intern intends to utilize the knowledge and skills obtained during this experience to impact other's education in the field of environmental technology education.

REGIONAL INSTRUCTORS RESOURCE CONFERENCES

Held annually in each of the six PETE Regions, these two-day conferences provide instructors with current information related to the effective implementation of environmental technology education. ATEEC provides incentives/stipends for participants, as well as financial support for presenters and keynote speakers. Individuals involved with the Fellows Institute often provide some of the presentations. Examples of topics covered at the 1997 South Central PETE Instructors Resource Conference included, in part:

- What Community Colleges Can Provide Small Business
- 2+2 Environmental Articulation Programs
- K-12 Environmental Education Models
- Developing and Nurturing Industry/Education Partnership
- Field trip to Pollution Prevention Program in Rocky Mountain National Park .

Each regional conference draws approximately 100 participants annually. Participants are primarily community college faculty in environmental technology, chemistry, and allied health, as well as college administrators. A PETE regional director stated that:

It's a great opportunity to network and share common concerns. . . because they are close enough that they have many of the same geographic concerns.

In addition to the larger regional Instructors Conferences, smaller train-the-trainer workshops are held within each region to train instructors in areas such as green chemistry and minimizing chemical waste.

Because certain individuals are unable to attend the regional conference and workshops, ATEEC and PETE regions will conduct a national satellite teleconference in April 1998 on environmental technology careers. This event was developed to help a greater number of K-12 educators access the professional development opportunities and resources of ATEEC and PETE. This national teleconference will be received at sites located at area community colleges who will, in turn, invite and encourage their feeder high schools to participate in this event.

ATEEC GOAL 3: Strengthen environmental technology education by providing support services for program improvement

ATEEC NEWS & WEBSITE

In just over two years, it is apparent that through its newsletter and website ATEEC has become a clearinghouse of support services for environmental technology education. *ATEEC News* is a quarterly publication with a circulation of more than 6,500 individuals, including administrators and staff from community colleges, high schools, universities, business and industry, and federal agencies. This publication provides information on issues affecting environmental education, a review of educational and career opportunities in environmental science and technology, and updates from each PETE region regarding activities, conferences, and workshops.

The ATEEC website (www.ateec.org) has become one of the organizations' greatest avenues for disseminating information. The menus on this site include: Curricula/Programs, Environmental Links, Faculty Development, and Publications.

As access to the Internet increases, especially at the secondary level, this site is capable of providing current resources and support to environmental technology educators.

FUTURE DIRECTIONS

The National Science Foundation recently renewed the ATEEC grant for three more years. Therefore, ATEEC will be able to continue its mission, assisting the nation's high schools and community colleges in evaluating and improving environmental technology curricula. Presented below are the specific goals and objectives for 1998 through the year 2000.

ATEEC GOAL 1: To strengthen math, science, and technical curriculum and instructional materials that support environmental technology education for all students.

Objectives:

- Develop a model for program success, incorporating an assessment instrument and a "how-to" manual for use by two-year college instructors.
- Provide model high school and college curricula and a directory of resources that incorporate national math, science, and technology education standards.
- Continue to identify and validate the science, math, technical, and critical thinking knowledge and skills required in environmental technology occupations.
- Continue to develop/collect, evaluate, and disseminate activities for teaching "real-world" applications, as well as a list of recommended

instructional materials in the disciplines of math, science, and environmental technology.

- Continue, through the ATEEC Fellows Institute, to bring together high school and two-year college instructors selected as curricular advisors.
- Develop an environmental technology training module emphasizing a strong knowledge/skill base in science and math for secondary and two-year college instructors.
- Assess the needs of high school faculty regarding environmental instructional materials and professional development opportunities.
- Develop a resource document listing professional certifications and standards for environmental technology occupations.

ATEEC GOAL 2: Strengthen the nation's environmental technology programs by providing professional development opportunities for community college and secondary educators.

Objectives:

- Continue to conduct regional professional development instructor conferences for high school and two-year college environmental educators.
- Continue to provide professional development for high school and two-year college instructors selected to participate in the ATEEC Fellows Institute.
- Conduct national forums of high school and two-year college educators, developing products to enhance environmental instruction.
- Conduct a national satellite teleconference for high schools and colleges on environmental technology careers.
- Identify successful business/industry and education partnerships as potential sites for two-year college faculty internships.

**ATEEC GOAL 3: Strengthen environmental
technology education by providing support
services for program improvement**

Objectives:

- Continue publishing ATEEC News and maintaining the ATEEC Website.
- Develop an environmental careers chart for high school students and counselors. The chart will be based on the Defining Environmental Technology report
- Develop a Website database of environmental jobs to assist students, graduates, and employers.
- Develop an environmental technology careers video for high school students. The video will emphasize the need for science and math skills.
- Develop a marketing plan for ATEEC's products (e.g., career video, "How to" manual).
- Inform under-represented populations and two-year college environmental technology instructors in select areas (i.e., Brownfields) about ATEEC support services.

For further information, please contact the authors or:

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ENDNOTES

- [1] ATEEC homepage: www.ateec.org
- [2] *Advanced Technology Environmental Education Center* (1997). [Handbook.] Bettendorf, IA: Author.
- [3] *Partnership for Environmental Technology Education*. [Brochure.] Pleasanton, CA: Author.