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What if an inexhaustible source of power could be tapped that created zero pollution, was kind to the environment, and would give humanity a large measure of independence from natural fossil fuels? Wouldn't you think any administration, any congress, any legislature and the IRS would jump through hoops to give its producers financial incentives to survive and prosper? Well, we have that source. It's now producing power from the sun in large quantities. But various recent administrations have barely lifted a hand to help develop it, and they should be ashamed of themselves (Guy Halferty, Daily Press, 1992).

As we move towards the 21st century, we must face the challenge of increased pollution and decreased resources. We all know that this formula equates to environmental disaster. Only through visionary research and experimentation will we be able to address the necessary transition from an oil dependent culture to the utilization of the limitless and non-polluting resource of solar energy.

The solution to problems such as these will grow from intelligent applications of technology and an understanding of new and emerging technologies. Achieving such applications and understanding will depend on a knowledgeable, well-educated work force.

To address these concerns the faculty, staff, students at Victor Valley College and a consortium have planned a long-term college commitment to a specific project applying solar energy technology. Faculty and students from vocational and liberal arts programs have developed a plan to design, build, test, and demonstrate a solar powered vehicle. This proposal includes curriculum revisions and additions in all vocational areas, special topics and projects for students, the involvement of technical industry personnel and high school students and faculty, fabrication of vehicle components, and the testing and demonstration of the vehicle.

Consortium Efforts

Within this broader context, we are requesting support for this consortium project to achieve the initial curriculum revisions for the project. The consortium includes: Southern California Edison, San Bernardino Air Pollution Control District, Apple Valley Science and Technology Center, Apple Valley High School, and Victor Valley High School. We believe that significant and creative curriculum revisions and partnerships with "cutting-edge" industry can prepare our students to deal with these issues. Partners will provide
for the sharing of valuable resources on an as needed basis, and will work together to develop solar energy technology, and share expertise. Considerable interest have been expressed by the consortium as evidenced by the letters of support in the Appendix.
Impact on Systemwide Need

[No information provided in this document for this section.]
The activities of this project will focus on the following priorities:

Section A  Eligible programs
2c  Program Development in innovative, cutting-edge technology vocational programs

Section B  Board of Governors Basic Agenda
  2.  Economic Development and Vocation Education

Make vocational education programs more relevant and work with industry and the private sector to prepare students for employment.

Update the vocational curriculum by incorporating modern industrial techniques.

Tie vocational courses to both intermediate and long-term labor market requirements.

Each area will be discussed separately in the sections that follow.

Improvements in traditional instructional programs are required to educate students on applications of new, energizing technologies holding promise of widespread applications. The intent of this project is to enhance the effectiveness of these curriculum revisions by both developing a new course on solar energy technology and by making specific applications in existing specialty courses of vocational programs. By utilizing both approaches we will markedly improve the integration of solar energy technology in a variety of vocational programs. Moreover, partnerships and cooperative working relationships with key energy technology industries and local high schools will markedly expand the impact and effectiveness of the project.

Considerable interest has been expressed by many of our vocational students in this proposed project. These students have contributed numerous suggestions and have assisted in the development of the larger project. To date, approximately 50 students have made significant contributions.
Student Preparation for Employment

Understanding of new technologies and skill at making new applications will significantly improve preparation for employment in 3 major ways. First, by providing special skills which employers desire in graduates; second, by increasing the understanding of realistic applications through working with industry technicians and scientists; third, by developing a broad understanding of the integration and interrelations of a variety of vocational areas.

Vocational Curriculum Update

Updating the curriculum by introducing the highly promising solar energy technology has been described in some detail. The integration of solar energy curriculum topics has utilized the planning of a variety of faculty in diverse discipline areas who have committed to the objectives of this project as listed below:

- Phrosene Chimiklis  Chemistry
- Nord Embroden  Drafting and Construction Technology
- Tom Faro  Electronics
- Ann Farrel  Computer Information Systems
- Bill Greulich  Public Information Officer
- Terry LaFontaine  Drafting
- Gary Menser  Welding
- Steve Paine  Electronics
- Dick Powell  Automotive
- Barbara Thornhill  Journalism

The project director has drafted a suggested course outline (attached) that will be further developed as the project proceeds. An integral part of the instruction will be laboratory work requiring supplies unique to the course such as solar cells and batteries. Accordingly, funds have been requested to purchase these needed supplies. Necessary tools and equipment such as computer aided design work stations, circuit testing and analysis equipment, photovoltaic sensors, and fabrication tools are currently available in existing programs.
Vocational programs are constantly faced with the problem of how to stay abreast of new technology applications. Up-to-date instruction on new technologies is absolutely necessary to insure that our graduates have the skills needed by employers and are knowledgeable about current developments. One such area is solar energy technology which holds great promise to alleviate air pollution, decrease dependence on petroleum production, and promote economic growth in a high technology area.

A second somewhat different problem, is the narrow focus of many vocational programs. Students may be highly skilled in their area of expertise, but can be unaware of relationships to other vocational disciplines. What is needed are relevant, interesting interdisciplinary projects that will involve vocational students from across the technical disciplines to reveal and demonstrate the integration of technical applications.

Both these needs can be effectively addressed by the proposed curriculum improvements described in this project. The ability to make a combined effort addressing both these problems is a significant opportunity. Moreover, incorporating the participation of industry technicians and scientists, high school faculty, and high school vocational students will be a major benefit to 2+2 program development with local schools and cooperative partnerships with industry.

It might be argued that instruction in new technology could be achieved by either absorption into existing curriculum or by simply creating a "new course". These along, however, do not achieve the desired degree of integration within and across vocational disciplines and certainly will be less effective at developing industry partnerships and 2+2 activities.
The population to be served is the vocational student who needs to develop an understanding and expand knowledge of solar energy technology. The vocational student will be able to integrate and apply this knowledge in their daily life and in the workplace. In addition, the vocational student will improve their understanding of air pollution and the practical technological solutions to pollution problems. The impact of this knowledge will increase their chance for success in a diverse workforce that is capable of meeting the challenge of the local community and global competition in the long term.
Victor Valley

Objectives

1. Develop instructional material on solar energy technology and utilize these materials into existing courses in automotive technology, electronics, drafting, physics, chemistry, and earth science.

2. Develop partnerships with industry/business by utilizing industry technicians and scientists to present 10% of course on material on solar energy technology.

3. Introduce local governments, business, industry, and the medical community to the feasibility and utilization of solar energy technology, especially for zero emission vehicle operation.
[Activities mixed with Outcomes]

ACTIVITIES

OBJECTIVE 1 Develop instructional material on solar energy technology and utilize these materials into existing courses in automotive technology, electronics, drafting, physics, chemistry, and earth science by 2/28/94.

1. Develop curriculum to serve educational and training needs of students in solar energy technology by 2/28/94. Project Director and Vice President of Instruction will be responsible for this activity.

2. Include presentations from other faculty and staff to outline training and educational requirements for campus offerings including other vocational fields, and student services by 2/28/94. Vice President of Instruction will be responsible for this activity.

3. Present a course on solar electric vehicle design and production to be offered to 40 vocational students by 2/28/94. Project Director will be responsible for this activity.

Expected Outcome - When the course is completed, offered, and evaluated, it will be a permanent part of curriculum to be offered periodically. We plan to recruit 40 students, enroll 30 and expect 20 to complete the course.

OBJECTIVE 2 Develop partnerships with industry/business by utilizing industry technicians and scientists to present 10% of course material on solar energy technology by 11/30/93.

1. Establish the Solar Energy Technology (SET) Advisory Committee that will meet monthly with representatives from Southern California Edison, high schools, industry/business, faculty/ staff of Victor Valley College, and community based organizations to provide input for curriculum for solar energy project by 11/30/93. Project Director will be responsible for this activity.
2. Develop five partnerships to include Southern California Edison, San Bernardino Air Pollution Control District, Apple Valley High School, Apple Valley Science and Technology Center, and Victor Valley High School to utilize industry technicians, scientists and staff to present 10% of course material on solar energy technology by 11/30/93. Vice President of Instruction and Solar Energy Technology Advisory Committee (SET) will be responsible for this activity.

3. Provide guest lectures on current and experiential applications in business and industry on solar energy by 11/30/93. Project Director will be responsible for this activity.

Expected Outcome - This objective will demonstrate relevance in developing solar energy technologies and illustrate modern industrial techniques. Close cooperation and involvement with local businesses and industry through development of five partnerships in presenting course materials on solar energy technology.

OBJECTIVE 3 Introduce local governments, business, industry, and the medical community to the feasibility and utilization of solar energy technology, especially for zero emission vehicle operation by 11/30/93.

1. Link with and advertise solar energy technology project through industry/business, high schools and community based organizations by 11/30/93. Solar Energy Technology Advisory Committee will be responsible for this activity.

2. Develop brochure for the public awareness of benefits of a zero emission vehicle and practical technological solutions to pollution Problems by 11/30/93. In collaboration with San Bernardino Air Pollution Control District, Project Director and Vice President of Instruction will be responsible for this activity.

3. Publicize and showcase Solar Energy Technology applications at College-Day, Job Fair, and college orientations by 11/30/93. Project Director will be responsible for this activity.

Expected Outcome - Completion of brochure. In addition, finished vehicle will be driven on main arteries between main campus and major streets throughout the High Desert. Vehicle will contain markings, depicting amount of noxious emissions avoided per day of operation. These figures will be presented periodically to the newspapers, and local television in a more specific format in order to improve public
understanding of air pollution and increase knowledge of the benefits of a zero emission vehicle.
Impact Of Project

As part of a much more broader endeavor—to develop curriculum to build test, and operate a solar vehicle (or vehicles), this project is the beginning of a campus and community partnership undertaking. We clearly see this project and the achievements of partnerships as the start of a larger, long-range activity. We believe that significant and creative vocational curriculum revisions and partnerships with “cutting edge” industry can prepare our students for the workforce.

This consortium project will provide vocational education and training on solar energy technology, and awareness to the public on the effects of air pollution generated by mobile sources. In addition, this project is entirely within the spirit of the state and federal clean air acts which mandate attainment of ambient air quality standards. California Clean Air Act mandates that by 1992, 2 percent of all vehicles must be electric. The year 2001 should see 5 percent electrified, followed by 10 percent in 2003.

This project not only provide a means of coordinating technologies and of making students aware of how scientific knowledge translates into modern industrial techniques, but it also captures the imagination and will attract students and staff alike who wish to translate their growing knowledge into a creative purpose. Enhancement of vocational courses through cooperative relationships with business, industry and high schools will be a major assistance to our 2+2 efforts and activities.

Potential For Continued Support After Expiration of-Grant

It is the hope and expectation that the consortium will continue to support this project. The College has a record of supporting successful programs when project funds are depleted. We expect the College in collaboration with the consortia to fund this project after the first year of grant monies.

Potential for Adaptation to Other Institutions

Curriculum materials, course outlines, and instructional demonstration material will be made readily available to any interested faculty and staff at other institutions, since the new course will be a "stand-alone" course yet closely interrelated with vocational programs, it can be easily utilized in vocational program groupings at other colleges.
The evaluation will be both formative and summative and tied to the successful completion of project objectives and activities.

Formative Evaluation

Formative evaluation will be done by the project staff including the Chair of Construction Technology and Vice-President of Instruction with assistance from the Solar Energy Technology (SET) Advisory Committee. The Solar Energy Technology (SET) Advisory Committee will meet monthly throughout the implementation of the project. At each meeting, the Project Director will report on activities, accomplishments, expenditures to date, and make on-going recommendations regarding procedures to assure successful development of curriculum and development of education/industry/business partnerships. The Director of Grants and Compliance will monitor project progress, budget utilization, and assure compliance of fund expenditures.

Measures of success to be evaluated will include:

1. The recruitment, orientation, and development of the solar technology curriculum will be assessed relative to the recruitment of 40 or more students and how many of those attend the program orientation and enroll in courses, and the development of the curriculum to meet the needs of the students.

2. Approval of new curricula by College Curriculum Committee.

3. Five partnerships with industry/businesses and high schools to present course material on solar energy.

4. Project marketing materials to include a brochure.

Formative evaluation will also include input from students on a regular basis through scheduled meetings and completion of questionnaires. Appropriate adjustments may lead to project or course refinement by answering questions about tasks, learning activities, materials, tests and productivity. Educational presentations will be evaluated by all attendees.
Summative Evaluation

The summative evaluation will be based on our recruitment of 40 students who can benefit from training in solar energy technology, the enrollment of 30 of the 40, and the ultimate completion of the solar class by 20 students.

Partnerships will be developed with Southern California Edison, San Bernardino Air Pollution Control District, Apple Valley Science and Technology Center, Victor Valley High and Apple Valley High School. Representatives of Southern California Edison and the technical faculty from the two high schools will provide technical and curriculum development assistance to this project including assistance with evaluation. A final summative evaluation report will be prepared by the Project Director for review by the Solar Energy Technology (SET) Advisory Committee and sent to the Chancellor's Office by 6/30/94.
The program design and curriculum materials in the form of a summary report, with approval of the Chancellor's Office, will be disseminated prior to 6/30/94 through: (1) presentations at state and national meetings, (2) vocational educational conferences, and (3) the chancellor's office will be mailed appropriate copies. Vocational program faculty, and especially Nord Embroden, Project Director, are highly active in state and national professional organizations for their disciplines. These faculty will make presentations at these meetings, demonstrate material, and make material available to interested instructors.

In addition, local media in the community plan to support the project through periodic news releases, radio and television announcements. A copy of news release dated August 7, 1992 is included in the Appendix as evidence of local news support.
[No information provided in this document for this section.]