Partnership Pathways to Higher Education for Utilities Workforce Development

University of Northern Iowa

Abstract

The University of Northern Iowa in partnership with a municipal utility, the Iowa Municipal Utility Association, and Iowa community colleges proposes to expand the University's 12-year 2+2 program to develop and deliver a Technology Management B.A. degree program to meet the significant need for an educated utility workforce in Iowa. The programs will be delivered primarily to non-traditional, location-bound, employed students at multiple community college sites through face-to-face, visually interactive distance courses, and online courses.

Nationwide, all utilities confront a critical shortage of qualified replacements for the significant number of retirements expected in the next few years. This workforce shortage comes at a time of major energy and environmental challenges. In Iowa one-third of the utility workforce will be eligible for retirement in the next 10 years.

The University will partner first with Iowa municipal utilities using an educational model (2+2) that has been self-replicated and proven to prepare B.A. graduates for jobs in the local communities. By year 3, all 15 of Iowa's community colleges as well as investor-owned and rural cooperative utilities will be active partners in the proposed 2+2.

This workforce development 2+2 project will use innovative educational components including curriculum developed specifically for utilities and taught by trained utilities instructors, semester-long internships with utilities, and instruction at multiple community college sites where students will be educated as a cohort throughout the program.

Students will earn a B.A. degree in this 2+2 pathway from community college to university to job in a project that can be replicated at other universities and will be sustainable through tuition and partners' shared resources.

Partnership Pathways to Higher Education for Utilities Workforce Development
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1. Project Need

The University of Northern Iowa in partnership with a municipal utility, the Iowa Municipal Utility Association, and area community colleges proposes extending UNI's12-year 2+2 program to develop and deliver B.A. degree programs to meet the significant need for utility workers in Iowa. The programs will be delivered primarily to non-traditional, location-bound, employed students at their community college site through face-to-face and distance courses delivered via the Iowa Communications Network's fiberoptic 2-way interactive system and via online courses. This project will broaden access to educational programs that are the same as the ones on the UNI campus and will be made affordable through the shared resources of all partners. Under the 2+2 program that currently offers six B.A. degree programs, students take two years of courses through their area community college and two years of face-to-face and distance-delivered UNI courses with support of their community college to receive a UNI B.A. degree.

Iowa utilities including municipal, rural co-operatives, and investor-owned (for-profit organizations) all face a growing crisis a workforce trained for this industry. This proposed project will first focus on helping Iowa municipal utilities solve the problem of having educated people to hire and the project will provide participating Iowans with a 4-year education for an industry where jobs are available.

A 2005 survey by the Iowa Association of Municipal Utilities (IAMU) showed that one-third of the utility workforce in the state will be eligible for retirement in the next 10 years. The survey lent some insight as to the issues facing each of the four main types of utilities – electric, gas, water, and telecommunications. According to IAMU President Bob Haug, these issues are common to utilities of all types across the nation and their complexity is increased as we address a host of emerging legal and environmental concerns (also American Water Works Association

National Conference, 2006; American Public Power Association National Conference, June 2006, Chicago).

Electric utilities confront a shortage of qualified replacements at a critical time. Substantial investment in transmission facilities is needed in many parts of the nation. New generation resources are also being added. Every new power plant, whether biodiesel, windfarm, or coal-generated, needs qualified operators. Each utility, whether investor-owned, cooperatively or municipally owned, draws from the same limited pool of eligible employees**.** The expansion of critical infrastructure not only requires specialized engineers, but a variety of skilled workers from line mechanics to project planners and managers. Utilities also face the task of reducing greenhouse gas emissions. That brings with it a similar need for engineers, planners and construction workers, but also a need for experts in energy efficiency, renewable energy technology, advanced metering, and program marketing.

Environmental challenges require educated workers who understand relationships among the various types of utilities. For example, in wastewater, an opportunity exists to combine municipal wastewater with other agricultural, industrial, and food processing waste streams to create and capture methane as an energy source and to reduce greenhouse gas emissions.

Many utilities are branching out to offer customers telecommunications services, but whether they provide services or not, they need new expertise in communications technology to operate their systems more efficiently. Changes in the wholesale power market, for example, require technology-driven protocols to ensure reliable operation. Water utilities face a growing need to replace and upgrade aging wastewater treatment facilities. And the IAMU study shows that gas utilities have the greatest proportional need for replacing workers.

These examples of the crisis in a shortage of Iowa utilities employees is at least 20 times as problematic on a national level for municipal utilities, according to Haug. More significantly, this is a national crisis and need. The lack of educated employees for hire is not just a problem

for municipal utilities. The rural co-operatives and the investor-owned are in the same position, anticipating a rash of retirements in the next several years with a decided lack of people to replace those employees. However, municipal utilities are in the least advantageous position because, as compensation studies done by the IAMU and America Public Power Association (APPA) show that municipal utilities offer the lowest salaries. Therefore, employees from municipal utilities often leave those jobs for higher paying ones in rural cooperatives or investor-owned utilities. Given the current state of energy affairs in the U.S. and the world, this is a problem and need that affects all of us.

On a national scale, the American Public Power Association reports no other utilities collaborating with 4-year higher education institutions to begin solving this problem. At UNI, the 2+2 project director and liaison also are not aware of any similar collaboration projects between utilities, community colleges and 4-year higher education institutions. This is based on the director's familiarity by attending and presenting at the American Association of Community Colleges (AACC), National Association of Community College Teacher Education Programs (NACCTE), the Association for Career and Technical Education (ACTE), and the American Association of Colleges for Teacher Education (AACTE).

This proposed UNI/Utilities/Community College 2+2 educational project will bring together the intellectual and financial resources of higher education, community colleges, and the utilities industry to address Invitational Priority A to ensure student access to a quality four-year degree program that will prepare them for careers in supervision and management for the utility industry. This project is an expansion of the current UNI 2+2 Technology Management B.A. degree program that has graduated 25 candidates in collaboration with an Iowa community college. It is also an extension of the whole UNI 2+2 program that offers six B.A. degree programs with four Iowa community colleges and has graduated nearly 100 students who stay in their rural home communities. The utility program will follow this model of two years at a

community college and two years of UNI face-to-face and distance delivered classes at the student's area community college.

2. Project Significance

This project demonstrates the potential for large-scale impact to help solve a nationwide problem by increasing the knowledge of potential employees for the utility industry using a proven effective educational model. That is, UNI's 2+2 has already replicated itself, using the original model in elementary education teaching and applying it to an elementary education/special education and technology management degree programs. Therefore, UNI 2+2 staff and community college involved know this model works. 2+2 project staff have had 12 years working with the model and understand what works for specific education programs and what needs to be modified. In addition, UNI's expertise in community college collaboration was recognized in February 2006 when the institution received the AACTE award for Best Practice in Collaboration with Community Colleges.

Successful components of the proven UNI 2+2 collaboration model include:

- educating students as a cohort (group) throughout the degree program,
- involving students from more than one community college in a cohort,
- delivering courses in multiple methods of face-to-face at the community college, via the Iowa Communications Network interactive fiberoptic statewide facility and web courses,
- making 2+2 a university-wide effort that relies on expertise from many university service departments,
- jointly admitting community college students to UNI while they are still completing their technical program at community college;
- initiating collaboration between UNI academic departments to offer degree programs,
- offering academic success support services for UNI 2+2 students including reading and writing programs;

- offering student support services in Admissions specifically directed for 2+2 students, financial aid staff educated in 2+2 student needs,
- ensuring that 2+2 students feel part of the university through access to all university services including the library, MyUniverse on-line services, advising services, student IDs, eligibility for all UNI student activities, full participation in graduation ceremonies, eligibility for UNI scholarships, graduation into UNI's alumni family; and
- collaborating with local community advisers to help develop and support the programs for their communities.

The proposed project is based on the current Technology Management B.A. degree program through the UNI Department of Industrial Technology that has graduated 25 students through one central Iowa community college. The project will build and improve on these 2+2 efforts by expanding the model to include:

- development of 6 credit hours of courses with input from utility industry representatives that will be geared to prepare students for careers specifically in the utility industry.
- in-service a core of utility staff as faculty for these courses based on their curriculum knowledge and learned teaching skills;
- inclusion of a semester-long internship at a utility company near a student's community so each student has hands-on training in the industry;
- preparation of students for a variety of potential jobs in the utility industry, beginning with managers for technical applications.

Project results will demonstrate the successful collaboration of higher education and utility companies in solving a local and statewide problem. The successful replication of 2+2 programs provides evidence for the instructional and collaborative administrative efforts that can broaden access to high quality and affordable higher education for students who are bound to a specific location, usually a rural location, and are typically older, working students. UNI offers

six 2+2 programs with four Iowa community colleges. From the utility perspective, the IAMU estimates some 100 of its 550 member utilities might adopt a tuition assistance program for their new and current employees. Many utilities already have such a program in place.

3. Project Design

In general, our proposed partnership project seeks to provide a pathway to higher education for current employees of Iowa utilities and future employees. The University of Northern Iowa, project leader, will collaborate with the utilities industry, community colleges, and communities to develop, deliver, and disseminate a B.A. degree program in Technology Management from the University of Northern Iowa that will specifically prepare students for careers in the utilities industry. This program will help address the critical shortage of a qualified workforce in the next few years. In the 2+2 academic program students will take two years of courses at their community college earning an AAS degree (Associate of Applied Science), including courses in skill areas that UNI research has found helps ensure student success at the university. Students then take two years of UNI courses, including some utilities courses developed for this program, to earn a UNI B.A. degree program in Technology Management.

Project Goals, Objectives, Outcomes

The ultimate goal of this project is to provide the opportunity for a Technology Management B.A. degree that can be used by a utilities workforce. The degree will be provided through a 2+2 distance-delivered program that breaks down Iowa's place-bound barriers by increasing participation and graduation levels for all rural and small town residents including older workers as well as minority, low income, and disabled adults.

Goal 1: Develop a 2+2 higher education pathway with specific emphasis on utility careers with technology expertise.

Objective 1.1: **Identify** the education needs and career opportunities of the utility industry for locally-employed and/or location-bound students in partnership with the Utilities Curriculum Advisory Group (includes representatives from university and community colleges).

Objective 1.2: Expand the University of Northern Iowa's relationships with Iowa's community colleges to include the Technology Management/Utility B.A. program.

Objective 1.3: Develop the 2+2 program curriculum along with the course materials in consultation with the Utility Curriculum Advisory Group.

Objective 1.4: **Recruit** 5-7 high-quality adjunct instructors and internship field supervisors from Iowa's utility industry.

Objective 1.5: Strengthen sustainability of the pathway by building community, community college, and utility industry support infrastructures independent of grant funding.

Goal 1 Project Outcome: A self-sustaining community pathway for a locally accessible University of Northern Iowa B.A. degree in Technology Management for Iowa's utilities workforce will be available to meet the significant need for well-educated utility workers.

Goal 2: Deliver the 2+2 Technology Management B.A. degree program with specific emphasis in Utilities Technology.

Objective 2.1: Provide training for utilities adjunct instructors and UNI faculty in distance-delivery teaching methods.

Objective 2.2: Recruit 20-30 students from the targeted population providing them with reading and writing courses to strengthen basic skills needed for university success.

Objective 2.3: **Field-test** the 2-3 new courses for Cohort 1 incorporating ongoing short-loop external evaluation feedback regarding strengths and areas needing improvement.

Goal 2 Project Outcome: A high quality 2+2 UNI Bachelor of Arts degree in Technology Management with Special Emphasis in Utilities Technology will be fully supported by the University of Northern Iowa, Iowa utility companies, and Iowa's community colleges.

Goal 3: Disseminate the UNI/Utilities 2+2 program across Iowa and the nation

Objective 3.1: Presentations at national public power, community college and university professional meetings will be made by UNI and IAMU representatives.

Objective 3.2: Established utility nationwide structures including websites, utility association journals, and existing periodicals will be used to disseminate the program.

Goal 3 Project Outcome: The UNI/Utilities 2+2 Technology Management B.A. degree program will become a nationally recognized model for meeting the future workforce needs of the utilities industry.

The inputs, activities, outputs and (short, medium and long-term) objectives associated with these goals and objectives are summarized in the following logic model chart. The yearly major goals, objectives, and how they will be evaluated are included in the appendix.

UNI/Utilities 2+2 Project Logic Model

Pathway Goal: Develop the UNI/Utilities 2+2 education pathway Delivery Goal: Deliver the Technology Management BA degree with Special Emphasis in Utilities Technology Dissemination Goal: Disseminate the UNI/Utilities 2+2 program across Iowa and the nation			
Components (Goals)	Pathway	Delivery	Dissemination
	↓	↓	↓
Resources (Inputs)	The resources (e.g., materials, technology, administration, personnel) of UNI's current 2+2 infrastructure, Iowa's community colleges, Cedar Falls Utilities, Iowa Municipal Utility Association and other partners		
	↓	↓	↓
Activities	Form Utility Curriculum Advisory Group, build partnerships, develop and distribute materials, develop courses, identify adjunct instructors	Train utility adjuncts, identify and recruit students (currently employed in utilities and others), field test and refine courses	Expand program to all Iowa community colleges, at least one investor-owned utility and co-ops; present and publish program
	↓	↓	↓
Outputs	Updated articulation agreements, new courses, integrated program	Delivery to Cohort I using UNI faculty & utilities adjuncts	Deliver Iowa-wide UNI/Utilities 2+2 Program
	↓	↓	↓
Short Term Outcomes	Increased awareness of and knowledge of curriculum needs; under-standing and commitment to 2+2 articulation	Increased knowledge of both UNI and utilities adjuncts of curriculum and delivery	Increased motivation to program excellence; increased awareness of program's contribution to Iowa's workforce

	↓	↓	↓
Intermediate Term Outcomes	Increased full support (policies, actions, practice) of the program among UNI, community colleges and utilities partners	Enrollment of 20-30 students in Cohort 1; course delivery using technologies and face-to-face trainings; initial internships	Presentations at national utility, university and community college meetings; professional journal articles
	↓	↓	↓
Long-term Outcomes	Locally accessible B.A. degree for Iowa's workforce that will meet the significant need for utility workers	High quality 2+2 B.A. degree in Technology Management supported by UNI, utilities and Iowa's community colleges	Nationally recognized collaborative 2+2, future-oriented utility workforce B.A. education model
	↓	↓	↓
Impact	Increased diversification and education competitiveness in the utility workforce in Iowa and the nation		

Project Work Plan

If this project is funded, fall 2006 will be a busy start up time because the shortage of utility workers is a concern now. This fall, or before, 2+2 Community College Project Director Roger Kueter will meet with the first five community colleges to further UNI's affiliation with them for the additional involvement for AAS degree holders, to determine their interest in project collaboration, and to update UNI articulation agreements focusing on the technology management degree. Of the first tier of community colleges, UNI 2+2 is currently offering degree programs with three of them: Des Moines Area Community College, Eastern Iowa Community College, and North Iowa Area Community College. Regarding Hawkeye Community College/Waterloo (adjacent to UNI in Cedar Falls) and Kirkwood Community College/Cedar Rapids, 2+2 has previously established contacts with those institutions.

UNI Admissions/Transfer Student staff person, Jo Loonan, will consult with the community colleges staff in Admissions and Academic Advising on UNI efforts to help community colleges update their liberal arts courses to ensure that students are better prepared when they come to UNI.

In collaboration with the Iowa Association of Municipal Utilities (IAMU), several activities will occur to begin educating students for utilities careers as soon as possible, given the

pending shortage of workers. IAMC President Bob Haug and his staff will recommend municipal utility representatives to work with the Utilities Curriculum Advisory Group to develop six hours of curriculum focused on utility needs in collaborate with Charles Johnson, professor of Industrial Technology, and other faculty who teach classes in the Energy and Power section. Haug notes that a number of his staff members have teaching experience at the public school or university level and several are full-time trainers with good academic credentials. Therefore, identifying utility representatives to help develop curriculum and to serve as UNI adjunct instructors will be an easy task. The Utilities Curriculum Advisory Group will work in the fall and spring to finalize courses. Then in the spring and summer 2007, Charles Johnson will develop training modules and conduct a series of in-service workshops in pedagogy to prepare the utility representatives to teach these University courses.

In parallel during year one, Kueter and the 2+2 staff will work with community college administrators and faculty to enhance their awareness of the utilities-specific courses they offer. This will include providing print/electronic materials to heighten their awareness of the coming crisis in workforce. This will also be an opportunity to promote the proposed educational program as well as recruit potential students, focusing efforts on students of Hispanic origin as state in the GEPA statement (Appendix C). In another fall effort, Kueter will work with IAMU and its member utility companies to identify current employees in participating geographic regions who would be interested in this program to advance their higher education. IAMU staff persons believe this educational opportunity will be embraced by 100 or so of its 550 member utilities, providing a ready number of potential Cohort I students.

When spring 2007 arrives, project staff will have Cohort I nearly identified so those students can be jointed enrolled at their community college and at UNI. These students may need to take additional community college courses in liberal arts or technology as pre-requisites for the UNI 2+2 program. With advanced admission and planning, these courses could be taken

during spring and summer semesters and continue during the Technology Management program time.

Timeline – University of Northern Iowa
Partnership Pathway to Higher Education for Utilities Workforce Development

Activity	Persons(s) Responsible	When
Year One 2006-07		
Form Utility Curriculum Advisory Group, identify education/career needs (1.1)	Kueter, Johnson, IAUM, 2+2 staff	Fall 2006
Build CC partnerships; update articulation agreements w/ 5 CCs (1.2)	Kueter, Johnson, CC administrators & staff	Fall 2006
Develop & distribute informational materials to CC staff & potential students (2.2)	Kueter, 2+2 staff, input from CCs and utilities reps	Fall 2006, Spring 2007
Develop 6 hrs. of utilities related curriculum (1.3); identify adj. instructors & internship supervisors (1.4)	Utility Curriculum Advisory Group/ Johnson/Kueter	Fall 2006, Spring 2007
Identify cohort of current utility employees for Tech Management BA degree (2.2)	Kueter, 2+2 staff, IAUM	Spring 2007
Admit students jointly to UNI and CCs(2.2); advise of pre-requisites; increase CC career/tech faculty awareness (1.5, 2.2)	UNI/CC Advising staff, Kueter, 2+2 staff, UNI Admissions, Financial Aid, Acad. Achievement	Spring 2007
Develop training modules & train utility adjunct staff (2.1)	Johnson, utilities adjunct instructors	Spring & Summer 2007
Evaluate course development	Shaw, Utilities Curr. Adv. Gr.	Summer 2007
Present project info. at state education & utilities mtgs. (3.1)	Kueter, Johnson, IAMU, CFU	Spring/Summer 2007
Year 2 2007-08		
Expand partnership & awareness to 5 additional Iowa CCs and investor-owned utilities (1.2, 1.5); update Artic. Agree. w/ new CCs	Kueter, 2+2 staff, IAMU, CC staff	Fall 07
Utilities Advisory Group, UNI, CCs identify and develop & implement Community Support Teams for advisory purposes and student support (1.1, 1.5, 2.2)	Kueter, CC staff, community leaders/advisors, Utilities Curriculum Advisory Group	Fall 2007

Begin pgm. delivery with utilities courses of Tech Management program (2.3)	Johnson, Utilities adjunct instructors, UNI faculty, CC support staff	Fall 07, Spring 08
Make 2 in-state and 2 out of state presentations (3.1)	Kueter, Utilities reps, students reps	Spring/Summer 2008
Develop writing teams for project dissemination (3.2)	Kueter, Johnson, 2+2 staff, utilities representatives	Summer 2008
Year 3 2008-09		
Continue expansion activities to final 5 Iowa CCs & rural co-operative utilities (1.2, 1.5)	Kueter, Johnson, 2+2 staff, CC support team,	Fall 2008
Continue delivery of Tech Management (Goals 1 & 2)	Johnson, UNI faculty, utility faculty, internship supervisors	Fall 2008, Sp./Summer 2009
Plan for program continuation in curriculum, finances, personnel, partners using ongoing evaluation loop (1.4, 1.5, 2.1, 2.2, 2.3)	Kueter, Johnson, utilities representatives, adjunct instructors, Shaw evaluations	Spring/ Summer 2009
Submit articles (3.2), presentations at national ed. & utility meetings (Goal 3)	Kueter, Johnson, 2+2 staff, utilities representatives, student representatives	Spring, summer 2009
Program evaluation	Shaw	Spring/Summer 09

In Fall 2007, UNI will launch Cohort I in the Technology Management/Utilities emphasis B.A. degree program field test. Six credit hours of utilities-specific courses will be offered and taught by utilities industry instructors. The methods of delivery will depend on geographical location of cohort students. The Iowa Communication Network (ICN) fiberoptic 2-way interactive system already connects all higher education sites in Iowa. Faculty will identify a first origination location and connect to the remaining sites; faculty will rotate for origination from site to site. This will be enhanced with on-line learning materials. Johnson will support the adjunct instructors and Kueter and 2+2 staff will collaborate with community college administrators to ensure smooth program delivery.

Sample Curriculum UNI B.A. Technology Management for Utilities Workforce Development

Students will come to UNI with:

- AAS degree from community college in one of the technical programs that is appropriate for the utilities profession.
- These hours transfer to UNI as part of 64 transfer hours allowed (varying by AAS major) and will be determined by the articulation agreements in place.
- 16 hours of Community College Arts & Sciences courses to satisfy part of the UNI Liberal Arts Core, in some cases the Technology Management major, and also provide basic skills that help ensure success in other UNI coursework. (AAS degree graduates will probably need to get some of this coursework for UNI BA degree. Suggested courses to be: Principles of Statistics 1, Transferable Chemistry, and Transferable Physics with Lab, English 2, and Fundamentals of Communication.)

UNI Component

- UNI Technology Management major coursework (18-19 credit hrs.) to include:
  - 330:020 Communication Systems,
  - 330:065 World of Technology (4-hr. option also),
  - 330:142g Statistical Process Control,
  - 330:143g Managing Manufacturing Systems or 150:153 Organizational Mgmt,
  - 330:187 Applied Supervision and Management,
  - 330:196 Industrial Safety

The balance of UNI's required Liberal Arts Core courses (29 hours) to be taken at UNI (on campus, correspondence courses, ICN coursers etc.), or at some 4-year accredited institution (on-line or in person). UNI program advisors will assist students in determining how to complete this requirement.

- University Program Electives (6 hours) will be the specifically designed utilities courses including internships

Total hours for UNI BA degree - 120

Also in the fall of year two, the Utilities Advisory Group with 2+2 staff and Community College staff will identify and develop Community Support Teams for each participating community. These groups will provide ongoing emotional, personal, and academic support for older students returning to the university or enrolling for the first time. The Teams will provide potential financial support through community-developed scholarship programs for these older, location-bound students who will become better education, better qualified workers and stay in their local community. Based on a spring 2006 survey of 2+2 graduates, these graduates will increase their annual income, thereby adding to the local community's economic base. Students will be integrated into their Community Support Team in the late fall to ensure their success through family and community support and recognition.

Additional year two activities will include building partnerships with five more community colleges and the investor-owned utilities. This will include updating articulation agreements. Project leaders will also make in-state and out-of-state presentations on the project in the effort to begin national recognition and use of the program. Writing teams will be organized so that in year three articles will be submitted to professional higher education and utilities journals. Year three also includes building partnerships with the last five community colleges and bringing rural cooperative utilities on board. Any students recruited after the Cohort I pilot project begin, will be programmed to start in year 4 when this 2+2 will be fully supported by student tuition. Repeat cohorts will then be developed on a 2-3 year cycle.

Program delivery continues throughout years 2 and 3, with continual evaluation to ensure a high quality program and access for students who are location-bound, non-traditional, and from diverse groups. Year 3 will also be the time when project leaders develop a strategic plan for project continuation to ensure that the UNI/Utilities 2+2 Technology Management B.A. degree program will become a nationally recognized model for meeting the future workforce needs of the utilities industry with well-educated utilities workers.

This project to educate location-bound, employed students for utility industry careers will be able to continue past the federal funding for the following reasons:

• This degree program is an expansion of UNI's current 2+2 Technology Management program that has graduated 25 students to date. We have learned from much about how to work with community colleges and non-traditional, location-bound, employed students to meet their needs and help them successfully graduate. Therefore, the proposed program emphasis for the utilities industry is a program transition from a successful foundation.

• UNI is known nationally for its success collaborating with community colleges and received the 2006 Best Practice Award for Collaboration with Community Colleges from the American Association of Colleges for Teacher Preparation.

• Representatives of the utilities industry are partners in the planning and development process. They are committed to providing support through personnel and some shared resources.

• The need is now for educated utilities employees in the statewide and nation.

4. Project Evaluation

The external evaluation of this project will be the responsibility of Dr. Rose Shaw of Metrica. Gene Lutz, Center for Social and Behavioral Research, University of Northern Iowa will assist Dr. Shaw with collection of some of the evaluation data and will be responsible for three case studies of individuals impacted by the project. The External Evaluator will provide oversight of the evaluation, analyze and summarize data, provide short-loop feedback by email and telephone, write quarterly formative evaluation reports, and write the annual evaluation report.

The project's logic model of Pathway, Delivery and Dissemination goals, inputs, activities, outputs and outcomes (short-term, medium-term and long-term) will provide the framework for the external evaluation[6]. The evaluation of the major goals and objectives for each of the project years is included in the appendix.

The purpose of the formative implementation evaluation is to collect a combination of qualitative and quantitative measurements and judgments during the implementation of the project to control, assure, and improve the quality of performance, implementation processes, and outputs. Some of the formative evaluation findings (short-term outcomes, effective strategies, multicultural inclusion, strengths and weaknesses of materials and activities, lessons learned) will inform the summative evaluation. The summative evaluation will determine the overall project effectiveness and attainment of outcomes.

Formative progress evaluation will assess the project's progress toward meeting its annual goals and work plan and will evaluate unexpected developments as well as the project's strengths and weaknesses. These recommendations for project improvement will benefit from an external

view strengthened by adherence to the four evaluation standards: utility, feasibility, propriety, and accuracy[4].

Qualitative and quantitative data will be used in a mixed methods evaluation[5]. Qualitative data (observation, interviews, surveys, document analysis, records, and debriefing sessions) will be collected, analyzed, and reported along with evaluation recommendations and this implementation evaluation information will help the project's leadership team refine plans, characterize the extent plans were implemented and identify barriers along the way. Standard qualitative methods (organization, meaningful reduction, cross-case analysis, themes, and trends) will be used to analyze the qualitative data. Quantitative data will be analyzed using descriptive statistics and frequency distributions charts (with bar and line graphs illustrating disaggregated data) and association tests (e.g., Chi-square and correlation). Formative evaluation feedback will be reported to the Director through emails, phone calls, and written quarterly reports.

Participatory evaluation[1, 2, 3] will be the gateway to culturally competent evaluation since this model ensures that the beliefs, norms, values, priorities, perspectives, and insights of a diverse group of people are included. The process of self-assessment, collective knowledge generation, and collaborative action will create a learning process for the project leadership team and the Utility Curriculum Advisory Group that will help build capacity, sustainability, and institutionalization and assist in structuring the dissemination model. Surveys and interview protocols will be developed by the External Evaluator in consultation with the project's Director.

5. Adequacy of Resources

In this educational collaboration project, commitment is strong from all partners. The University of Northern Iowa has demonstrated its commitment to the 2+2 program in the following ways:

- moved the program from a College to the Provost's office, indicating it is an institution-wide effort;
- established an Admissions officer specifically for transfer and 2+2 students to understand their specific needs;
- involved the offices of financial aid, continuing education, and academic achievement services in support roles for 2+2 students.

Support letters from University of Northern Iowa Industrial Technology Department, Cedar Falls Utilities, Iowa Association of Municipal Utilities, Des Moines Area Community College/Carroll Campus all indicate strong support and willingness to participate in this partnership to begin educating a qualified workforce for the utility industry. Additionally, tuition assistance from municipal utilities and a scholarship program from the APPA will provide other resources to ensure access to this program for interested students.

In the area of sustainability, this project can be ongoing after federal funding ends for these reasons:

- UNI students pay tuition which will generate resources for the Technology Management/Utility emphasis program;
- Programs become part of institutions so the grant will be used to raise awareness of educational opportunities and career possibilities with community college advisors/staff. Once these people know the need and opportunities, they will suggest students for the program;
- IAMU will regularly promote programs through its established statewide network of partner utilities;
- The program will be part of UNI's catalogue of Technology Management options;

- CFU has committed to pay 100% of the tuition of an employee taking classes at UNI and Hawkeye Community College under this program. Other Iowa municipal utilities have similar commitments;
- APPA has funding to provide scholarship monies to currently employed utility workers for higher education;
- UNI's strategic plan speaks to the university's directive for outreach through the state and this project will help UNI fulfill this mission; and
- There will be a continual need for utility employees that will motivate continued B.A. degree program candidates.

We will know if this project is successful when the utility companies continue to offer their personnel as adjunct instructors, continue to support current and new employees in higher education pursuits, ongoing cohorts are enrolled and begin taking classes, and students graduate and become employed in utilities near their home geographic area.

Principal Writer of Proposal:
Carole Shelley Yates, Project Documenter
UNI 2+2 Community College Projects

References

[1] African Development Foundation (1995). *Participatory evaluation in practice*. ADF Evaluation Report Series, v. 1, Washington DC: United States Government Printing Office.

[2] Barandon, R. P. (1998). *Stakeholder participation for the purpose of helping ensure evaluation validity: Bridging the gap between collaborative and non-collaborative evaluations.*American Journal of Education, 19(3), 325-337.

[3] Cousins, B. & Earl, L.M. (1992). The case for participatory evaluation. Educational Evaluation and Policy Analysis, 14(4), 397-418.

[4] Joint Committee on Standards for Education Evaluation, The (1994). *The program evaluation standards: How to assess evaluations of educational programs*, Thousand Oaks, CA: Sage Publications.

[5] National Science Foundation (1997). *User friendly handbook for mixed method evaluations*. NSF 97-153. Arlington, VA: NSF.

[6] Stufflebeam, D.L. (2001) Evaluation models. *New directions for evaluations*, 89 (Spring):7-99.

Appendix A - Project Evaluation Chart

Annual major goals and objectives	How Evaluated
Yr 1, (1.1): The Utility Curriculum Advisory Group is in place, has identified utility-related education and career needs of place-bounded Iowans with specific needs of minority, low income, disabled and place-bound adults.	Names of Advisory Group members, their expertise and demographics; disaggregated demographic breakdowns of targeted population and corresponding needs; feedback (interviews) of Group members.
Yr 1, (1.2) Project leadership team has made contact with all IA community colleges and have (at a minimum) first drafts of articulation agreements and assessment of which AAS programs are appropriate matches for the B.A.	Interviews of project leadership team members regarding progress, obstacles and key elements to be documented for dissemination of the implementation of this program to other states.
Yr 1, (1.3 and 2.3) The courses needed have been identified and development of the courses has begun. Multiple sources of information are being incorporated.	Check to make sure that course syllabi have been drafted; interview the individuals involved in the development of the courses (time spent, how assessing feasibility, quality).
Yr 1 (1.4) Adjunct instructors and internship field supervisors qualifications have been agreed on by the Advisory Group and the recruitment and application process is in place.	Review of documentation with interviews of Advisory Group members regarding strengths and concerns related to adjunct recruitment and retention.
Yr 1 (1.5) UNI identifies and brings community college and utility industry leaders together to build partnership and sense of mission.	Documentation; interviews of key stakeholders regarding attitudes toward sustainability as well as perceived strengths and barriers.
Yr 1 (2.1) Research-based training modules developed along with training assessment component.	Evidence that training modules are based on research "best practices"; review of assessments that are embedded in the modules.
Yr 1 (2.2) Brochures and electronic materials have been developed and distributed to educate community college staff and potential students about the utility industry need and to promote 2+2 higher education opportunities.	Copies and web-addresses of the materials; evidence of distribution.
Yr 1 (2.3) Evaluation findings have been used.	Report from the course development team on how evaluation findings have been used.
Yr 1 (3.1) Two presentations within IA	Documentation of presentations
Yr 2 (1.1) UNI and the Advisory Group conduct community-support needs analyses and work with communities to identify and recruit members of each Community's 5-7 member Support Team.	Lists of names of individuals with demographics and letters of commitment from Support Team members. Lessons-learned interviews of project's Leadership Team.
Yr 2 (1.2) Articulation agreements are all in place	Documentation from UNI; interviews of Leadership Team on lessons learned.
Yr 2 (1.3) Course development complete and policies in place for the 2+2 program and its courses.	Documentation from UNI on obstacles and retrospective evaluation of the processes, policies, actions and practices.
Yr 2 (1.4) All adjuncts and internship field supervisors selected and in place.	Names, demographics, letters of commitment signed by adjuncts and supervisors.
Yr 2 (1.5) Community college and utility industry leaders foster partnership with analysis of key infrastructure needs and funding.	Interviews of key stakeholders regarding status of partnership and level of commitment to sustainability.
Yr 2 (2.1) All adjuncts and faculty trained	Levels 1 and 2 (reaction, learning) Kirkpatrick

	Model evaluation of training using survey
Yr 2 (2.2) Students identified with mentoring and tutoring completed and coursework started	Email student reaction interviews.
Yr 2 (2.3) Courses field tested	Courses evaluated by students and faculty (strengths, weaknesses, reaction, learning)
Yr 2 (3.1) Two in-state and two out-of-state presentations	Titles, presenters' names and where presentation was
Yr 2 (3.2) Writing teams in place and journals targeted for articles	Documentation
Yr 3 (1.1) Curriculum Advisory Group has written a 5-year strategic plan for maintaining and updating the 2+2 program.	Copy of plan
Yr 3 (1.2) All community colleges on board and 2+2 available at all sites.	Student enrollment in program.
Yr 3 (1.3) Courses fully developed and plans for incorporating technology updates in place; evaluation being used to improve courses.	Course quality evaluated by participants.
Yr 3 (1.4) Instructors and field supervisors retained and using evaluation feedback to improve instruction.	Student feedback on instructional quality and internship quality.
Yr 3 (1.5) Budget lines necessary for self-sustaining program funded at community college, UNI and utility industry levels.	Documentation
Yr 3 (2.1) Process in place for maintaining high quality trainings when new instructors and faculty come on board.	Review of the project's strategic plan for continuing program after funding.
Yr 3 (2.2) 20-30 students enrolled in the program and doing well.	GPAs, interviews of students, adjuncts and faculty.
Yr 3 (2.3) Field testing complete and processes in place for ongoing evaluation loop.	Strategic plan for sustaining a high quality program that uses evaluation feedback.
Yr 3 (3.1) Multiple presentations	Titles, presenters and where presented
Yr 3 (3.2) Articles being submitted by collaborative writing teams	Titles and authors of submissions and which ones were published
Yr 3 Goals 1 and 2: 2+2 B.A. degree in place with enrollment of diverse groups of students	Case studies (anecdotal evidence) of utility students on how the coursework and internships have impacted them in the workplace.
Yr 3 Goal 3: Complete dissemination "package" written and being distributed	Summative SWOT analysis (strengths, weaknesses, opportunities, threats) of project

Appendix B
Qualifications of Key Personnel

Principal Investigator: Dr. Roger Kueter, Professor and Community College Project Director, Office of the Vice President/Provost will continue as Project Director of the UNI 2+2 Programs. Kueter helped start the 2+2 program more than 10 years ago and has been key to the success of the Carroll/DMACC/UNI partnership and the expansion of the 2+2 teacher education and community need degree programs offered at other Iowa community colleges. He is responsible for making contacts with community colleges to determine their needs and interests in UNI 2+2 programs. He consults with UNI faculty in the development of degree programs. He also collaborates with community advisory groups, the DMACC/Carroll 2+2 coordinator, and is familiar with all 2+2 students and their circumstances. Dr. Kueter's time involvement in 2+2 efforts is 100% with 25% devoted specifically for this new initiative with a utilities emphasis.

Co-Principal Investigator: Dr. Charles Johnson, Professor and Coordinator of Technology Education and Training and UNI Community College Liaison. Johnson coordinates and oversees the program operations of UNI's 2+2 partnerships in industrial technology. Johnson also teaches ICN and onsite courses for the technology management and technology education programs as well as community college teaching endorsement courses. Approximately 35% of Dr. Johnson's time will be spent on grant activities.

Community college persons responsible for implementing project activities include: Mr. Steve Schulz, UNI/DMACC provost, other administrators and faculty from the involved community colleges.

Evaluator: Rose Shaw

The external evaluator, Rose Shaw, Ph.D. in Applied Statistics, has extensive experience as the external evaluator of over 60 projects in 10 states in addition to other contractual work. She evaluated the UNI 2+2 program during the three years it was supported by FIPSE and has made external evaluation site visits the last two years. She is highly skilled at conducting

qualitative, quantitative and mixed-method evaluations. She is the owner of Metrica, a company that specializes in statistics, evaluation and assessment. She has evaluated various U. S. Department of Education projects including Teacher Quality, Title III, Title VII and FIPSE grants. She is the statewide external evaluator of Colorado's Reading First. In 2004 she was a member of the NSF/DOE team that made the critical Phase I site visit to evaluate UNC-Chapel Hill's MSP. She is currently working with Norman Webb from WU to develop an evaluation framework for evidenced-based findings on NSF's EPSCoR program.

Project Documenter/Public Relations: Carole Yates will serve as the project documenter and public relations coordinator. She currently works with the UNI 2+2 project in these capacities. With a degree in journalism, she is responsible for media relations, press releases, newsletters, other print materials, and the 2+2 web site. She also has some background in the utilities industry having produced and directed a 24-part radio series on "Energy in Iowa" in 2001-02 for KUNI Public Radio. In addition, she is project coordinator for several grants from the Iowa Energy Center to educate UNI students about behaviors and attitudes to reduce their energy usage in residence halls.

Appendix C

GEPA Statement

This project to expand the UNI 2+2 technology management B.A. degree program will include steps to reach out to potential students of Hispanic origin. Iowa experienced a 97.4% increase in its minority population between 1990 and 2000, ranking it eighth among states in minority population growth. Specifically, census data indicates the Hispanic-Latino population increased 152.6% during that period and persons of Latino ethnicity now make up 2.8% of Iowa's population (U.S. Census, 2000). Persons of Hispanic ethnicity are in Iowa's workforce or will be. Efforts will also be made to increase awareness among community college and university admissions advisors about this potential group of students by providing materials appropriate to help identify potential students of Hispanic origin. The Iowa Association of Municipal Utilities' career opportunities brochure already has a version in Spanish.

Title Page Abstract

The University of Northern Iowa with municipal utilities and Iowa community college partners will expand and deliver the UNI 2+2 Technology Management B.A. degree program to meet the significant national need for an educated utility workforce in Iowa. Responding to a workforce shortage due to retirements, students will be non-traditional and location-bound. They will take 2 years of community college courses and 2 years of UNI courses in their local community. Delivery will be at multiple community college sites through face-to-face, visually interactive distance courses, and online courses.
