DEVELOPING A CORPORATE FEEDBACK SYSTEM FOR USE IN CURRICULAR REFORM

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Abstract — The University of Cincinnati has been awarded a US Department of Education Fund for the Improvement of Postsecondary Education [FIPSE] grant to be used for the Development of a Corporate Feedback System for Use in Curricular Reform. The duration of the grant is three years during which the University is scheduled to receive a total of $555,133 (57%). The matching contribution of the University of Cincinnati will be $421,396 (43%). Including matching funds the University of Cincinnati will be investing $0.976 M in industry integrated curriculum development. The objective of the grant is to build a closed loop system that measures student performance while on co-op and directs this feedback into curricular development. This project develops methodologies to use assessment data of student work term performance in curricular development, thereby continuously aligning experiential- or cooperative-education based curricula with industrial needs. The proposed three-year project would focus on: a) identifying curricular activities exhibiting a strong correlation with student co-op work performance; b) designing and implementing processes allowing the systematic use of employer assessment in curriculum design; c) evaluating the impact of changes in curricular design upon student work performance; d) piloting and contrasting projects in both different academic fields and at different colleges; and e) developing a set of best practices to be used for further refinement and dissemination of the process. Initial collaborators include University of Cincinnati (UC) academic units as follows: the Department of Architecture (College of Design, Architecture, Art, and Planning); the Department of Civil and Environmental Engineering (College of Engineering); the Department of Civil and Construction Management (College of Applied Science); the College of Business Administration; and the Division of Professional Practice. The assessment data will be analyzed by the UC Evaluation Services Center. The Evaluation and Assessment Center for Mathematics and Science Education at Miami University will act as the external evaluator for the project. Schools accredited by, or subscribing to, the attributes of the Accreditation Council for Cooperative Education will act as a reference group, ensuring a transferable end process. The ultimate goal of the project is to move schools engaged in cooperative education to a new era of market alignment. The objective is to build feedback structures that keep the schools abreast of a rapidly-changing environment. The inclusion of a wide array of programs and a large, diverse reference group caters to building a process that can be effectively utilized in schools engaged in cooperative education within a diverse set of academic fields and educational levels. The Grant was filed by Cheryl Cates as PI and Kettit Cedercreutz as co-PI in a joint effort with the Accreditation Council for Cooperative Education. The three year pilot program will involve the Departments of Architecture (Prof. Anton Harfmann, College of Design, Art, Architecture and Planning); Civil Engineering (Prof. Richard Miller, College of Engineering), Construction Management (Prof. Benjamin Uwakwe, College of Applied Science) and the College of Business (Prof. Marianne Lewis, College of Business). Project Liaisons from the Accreditation Council for Cooperative Education (ACCE) include Professional Practice Executive Director Tom Akins from the Georgia Institute of Technology and Dr. Luther Epting from Mississippi State University.

Index Terms – University of Cincinnati, ACCE, co-op, curricular development, corporate feedback ABET, co-op performance data, assessment, FIPSE, grant

FUND FOR THE IMPROVEMENT OF POSTSECONDARY EDUCATION (FIPSE)

The Fund for the Improvement of Postsecondary Education (FIPSE) is administered by an office of the U.S. Department of Education with the purpose of supporting solutions that are meaningful and lasting to problems in postsecondary education. FIPSE awards grants for innovative educational reform ideas that shares the proven lessons with the larger educational community. FIPSE grants fund initiatives that have potential for national significance in resolving problems in postsecondary education. FIPSE grants are comprehensive and action oriented in that they focus on innovative ideas rather than basic research and they address a variety of problems at a wide range of institutions. FIPSE is bold in its resolve to support unproven as well as proven ideas. The University of Cincinnati was awarded a FIPSE grant in 2004 to develop a corporate feedback system for use in curricular reform.

PROBLEM AND PROPOSED SOLUTION

The problem of matching curricular content with industrial needs has been, both nationally and internationally, approached on a variety of levels. The cooperative education paradigm has however been relatively successful when striving to combine industrial and scientific values. Co-op has in many instances made a single organization very competitive both with regards to its contribution to science, as well as with regards to its ability to integrate theory and practice. The University of Cincinnati (UC), the first university to introduce cooperative education in 1906 at the urging of Dean Herman Schneider, is a good representative of institutions in this category. Schneider, a contemporary of John Dewey, developed cooperative education to form a bridge between classroom theory and
industry practice. During its 100-year development, the concept has grown to become an underpinning of experiential learning programs worldwide.

Accountability concerns have created a focus on practical learning outcomes deemed important by industry. The Accreditation Board for Engineering and Technology (ABET) 2000 Criteria, developed in the late 1990’s, strongly emphasize an understanding of market needs. Measurement, feedback and continuous improvement form corner stones of the ABET 2000 philosophy. The thinking behind the criteria is largely based on the logistic concepts developed by Dr. E. Deming that revolutionized the manufacture of consumer goods during the last quarter of the 20th century. The establishment of ABET 2000 criteria constitutes a major step in the market orientation of the educational industry. The objectives are bold yet the fact that an educational institution represents a true multivariable system produces many challenges. Rightsizing the feedback information constitutes one major challenge; the sufficient level of processing of this information constitutes another. It is clear that this new market oriented approach is generating a debate that will likely shape every aspect of how universities operate. The challenge is to develop governance structures that allow a market adaptation, without encroachment on academic freedom and integrity.

Advances in information technology, the negligible price of telecommunications, and historically low transportation costs have resulted in shorter technology and methodology development cycles combined with ever increasing globalization. In this scene of rapid advancement of the workplace, the interaction between academia and industry inherent in cooperative education forms an asset that has a strong influence on the competitiveness and wealth of a community. Conclusively a modern curriculum can only be planned with regards to its composition. The actual content, especially the focus on applications, should be executed as an interactive process between the university and its stakeholders. With baccalaureate program through-put times at four to five years the work setting typically undergoes radical shifts between the time when any program is planned and the time the first student graduates. The significance of the project described in this paper converges upon further bridging the gap between academia and industry, which is increasingly important in today’s rapidly changing industrial environment. The University of Cincinnati is one of very few institutions to combine high impact research with a strong professional profile. With a research budget that exceeds $300 million and the largest and most diverse population of cooperative education students at any public institution in the United States, UC is in a unique position to provide an original solution to this national and international problem.

CO-OP AT THE UNIVERSITY OF CINCINNATI

The structure of the UC co-op program is based upon full-time, alternating quarters of study and co-op starting in the sophomore year and extending over three years. This format makes the realization of a bachelor’s degree at UC a five-year endeavor. Students must complete a minimum of four co-op quarters, although the majority of students complete six co-op quarters. Students are also required to remain with an employer for a minimum of two quarters in order to provide a realistic depth of experience with that particular employer.

Figure 1 shows a typical alternating University of Cincinnati co-op curriculum. Every co-op work quarter is evaluated through a three-party assessment process: by the student, by the employer, and by the faculty member. This alternation paces the development of the student’s frame of reference with the advancement of the curriculum. Employers are able to assign co-ops to significant positions due to the alternating structure, as these positions can be filled by students on a year-round basis.

FIGURE 1, STRUCTURE OF TYPICAL UC CO-OP CURRICULUM
The Division of Professional Practice (PP) at the University of Cincinnati (UC) is the centralized unit for the administration of all programs of cooperative education on the main campus and the Department of Professional Practice is the centralized unit for program administration on the Applied Science branch campus. Faculty and staff in Professional Practice work with about 3,600 co-op students annually and are responsible for programs of cooperative education in four colleges: Applied Science (a mandatory co-op program); Business (an optional co-op program); Design, Architecture, Art, and Planning (a mandatory co-op program); and Engineering (a mandatory co-op program).

The Cincinnati co-op model is based on alternating sections organized by quarter. (Figure I). The students enrolled in a specific major are divided into two sections. While one section is in school, the other is on a work assignment and vice versa. This alternating schedule is made possible through the University commitment to offer all sophomore, pre-junior and junior courses twice during each academic year.

Co-op students are assigned to a Professional Practice (co-op) faculty adviser by discipline area. This faculty adviser is accountable for all aspects of the cooperative education program for their assigned disciplines. Students are required to meet with their faculty adviser both prior to and after each work assignment. The Professional Practice (co-op) faculty adviser plays an important role as a liaison of the University with industry and observes industrial changes that seem to be of significant interest to the colleges. The close relationship with the adviser helps the student to prepare for the work term, and gives the institution valuable feedback about the match between student aspirations and employer needs.

**CURRENT DATABASE INTEGRATED ASSESSMENT SYSTEM**

The University of Cincinnati relies on a three-party assessment system in its evaluation of cooperative education learning outcomes: a) faculty evaluate students; b) employers evaluate students; and c) students evaluate employers and the employment opportunity. Students and faculty have access to all reports, whereas employers, for reasons of confidentiality, are restricted to reviewing only their own submission.

The three-party assessment system was put online in 2003. Going online gave the University the opportunity to enhance the system from a tool used to assess individual students, to an evolving tool that could be used for programmatic assessment of entire academic programs. Students, employers and faculty form the principal user groups of the system, each subject to individual provisions with regard to data access and reporting.

Students enter registration, placement and job evaluation data through a specific Student Interface. This interface allows students to view both their personal evaluations of employers and positions as well as their complete evaluation history of employer assessment data on performance.

The Employer Interface has two sections, one for the student’s supervisor and one for the human resources officer responsible for the cooperative education program at the company. The faculty adviser and the co-op student both have access to the evaluation submitted by the company supervisor. The human resources contact person has access to the placement history of all students working in their company and can review individual reports submitted by their supervisors and add additional comments.

The Faculty Interface allows faculty advisers to both review individual student evaluations as well as to achieve aggregated reports of student performance. The reporting feature enables both co-op faculty advisers and college faculty to review aggregated student learning reports.

Through the implementation of the online, web-based system, faculty and administrators have the capability to access reports that would have previously required significant man hours to compile and analyze. One of the objectives of this grant is to refine the system to become an effective part of the University’s stakeholder-oriented continuous improvement process.

**GRADUALLY FILTERING ASSESSMENT PROCESS**

The complete feedback cycle (Figure 2) will be based upon an assessment process with a gradually-sharpening focus and consequently more accurate resolution. The feedback cycle will be repeated twice, the goal of the first cycle...
being the establishment of parameters for the project. The second cycle will focus on creating a system that will be transferable to other institutions during a dissemination process.

The mapping of student learning outcomes for each project team will be done using the standard co-op term evaluation instrument that is completed by both students and employers. This instrument is quantitative in nature and pursued electronically over the internet. The data will be analyzed with regard to program strengths and weaknesses. As the strengths and weaknesses are recognized, further assessment will be pursued regarding the characteristics of these using a customized assessment instrument. In order to understand the fundamental nature of strengths and weaknesses, the assessment data will further undergo filtering by employer and student focus groups. The purpose of this qualitative evaluation is to understand the nature of the strength or the weakness in order to allow an efficient mode of curricular upgrade. The assessment will deliberately focus on both strengths and weaknesses. It is obvious that deficiencies need to be corrected, but focusing only on deficiencies will remove the focus from strengthening the uniqueness of the program in the long run.

In order for the feedback cycle to produce added value, the remedial actions must be concrete, measurable, and implemented within a very short period of time. In addition to the redirection of application-oriented subject matter, the curricular modifications are likely to focus on the instruction related to professional tools, pedagogic applications and human interaction skills. It is important to understand that the focus of revisions might vary visibly from one feedback cycle to the next. The objective of the project is to develop an effective mechanism allowing continuous, measurable improvement.

The feedback cycle will be repeated twice during the project. The first curricular revisions will be determined by historic data, after which the observations will focus upon measuring the quality of specific strengths and weaknesses as defined by the above assessment procedure. The purpose of the first corrective action and the subsequent measurement is: a) to test the pros and cons of the approaches of different departments; b) to understand the technical and organizational constraints in implementing market-oriented change in an educational environment; and c) to establish best practices.

The objective of the second feedback cycle will be to create a procedure that can be transmitted and piloted in other institutions (primarily those accredited by ACCE). As it is likely that the first cycle will not produce the needed result in every field, it is the investigators’ assumption that the second cycle will be a more refined adaptation of the first one. The second cycle will equally end with a comparison of approaches of the various departments to elicit best practices.

The project will primarily concentrate on enhancing direct learning. Once the system is well in place, and long-term studies are available, the impact upon the incidental learning environment might be included. The objective of this project is, however, to focus on specific parts of curricula having a high potential for a positive influence on student learning.

In market-oriented assessment, the filtering of data is of primary importance. As the University of Cincinnati works with 1,500 employers, it is obvious that this group includes both front runners and companies that are lagging in
their internal methodologies. To complicate the issue further, companies often lag in certain areas even though they might be trend-setting in another. Thus, the removal of misleading indicators will require professional judgment. This process will engage professional practice faculty that have a long track record of working closely with both students and industry. Employer data will be disqualified in any instances in which the employer does not demonstrate adequate professional practices in specific areas. In this case the signal to the University might be to move away from using these particular employers within the co-op program.

**OBJECTIVES AND OUTCOMES**

The first objective of the project is to analyze historic data to determine a baseline for the project. This activity will take place in the first quarter of the project under the guidance of ESC and should take approximately 2 months. The analysis will be based on data gathered using Assessment Instrument I. With this baseline in place all further project activities will have a reference point upon which to measure incremental changes. The baseline will show the apparent strengths and weaknesses of each program. Assessment Instrument I has been developed as a joint endeavor between academia and industry to measure key student learning outcomes having a strong correlation with student work performance. With the baseline in place, each project team will focus on key parameters affecting student performance in that specific program. Each team will identify weaknesses as well as strengths that they wish to address. The focus will be to enhance both parts of the spectrum. In specific situations, resources might be moved from sufficiently performing parts of the curriculum to alleviate sectors were the need is compelling. Ultimately, the developed feedback process will become an effective tool for institutions when reallocating their resources. In the second quarter of the project, a second assessment instrument (Assessment Instrument II) will be designed to target a detailed evaluation of the curricular strengths and weaknesses identified for review. PPIT will then develop this assessment instrument as a part of the online database system. This will allow data collection that targets those specific curricular strengths and weaknesses to be added to the traditional assessment of student skill development already in use. The UC Evaluation Services Center will be instrumental in designing these targeted questions to ensure their statistic validity. The EAC external evaluators will review the questions as part of a six-month written report and provide formative feedback to the steering committee. A report will also be provided to the ACCE project liaisons to solicit their formative feedback for the steering committee’s review as well as the feedback of the ACCE board and accredited institutions through the project liaisons. In the third quarter of the grant, we will assess student work term performance using both the targeted instrument that has been developed by each project team and the standard instrument that focuses on key skills and abilities that students need to be successful in the workplace. Our goal will be to obtain at least a 90% response rate in each of the four project areas to ensure that our data will be sufficient for meaningful analysis. This may require multiple attempts to reach supervisors and elicit their cooperation in completing these surveys. By the final quarter of the first year of the grant, we will have gone through the first evaluation cycle and will be working to analyze the assessment data using multiple filtering mechanisms. The UC Evaluation Services Center will be working to provide statistical analysis while the faculty members involved in each project will use their expertise to properly filter that data. Groups of employers including supervisors who have submitted individual data will be brought together to discuss the analysis and provide an important perspective on what that feedback means from the perspective of industry. Carefully selected student focus groups will also be brought in to give their perspectives on the relationship between the curriculum and their skill development. The project teams will now be able to focus on specific educational targets and plan for curricular upgrade goals for their individual programs. The external evaluation team from Miami University will be invited to come to UC for a site visit to review written material and meet with key personnel in the project for qualitative research on project outcomes. The project representatives from ACCE will also be invited to campus to discuss the project’s progress and to provide critical input to ensure that the second phase of the project will be leading the team toward a system that is highly transferable to other institutions with similar co-op structures in place.

As the second year of the grant begins, the groundwork will be firmly in place to make targeted adjustments to the curriculum based upon sound analysis of corporate feedback regarding co-op student work term performance. At this point the curriculum project teams and the faculty in each program will agree upon specific changes in the curriculum that form the basis of this year’s analysis. The teams will work out syllabi for specific courses that incorporate these changes. The steering committee will be meeting to both oversee the project and to provide a vehicle for cross fertilization of ideas from the various college perspectives. Courses taught in the winter quarter of the second year of the grant will provide the vehicle to implement curricular changes. Classroom feedback and student performance on various course assignments will provide one mechanism to measure the impact of curricular
changes. These classroom measures will enjoy a closer level of scrutiny than most courses to fulfill the grant’s need to systematically measure changes. The UC Evaluation Services Center will provide suggested course evaluation questions that coincide with the goals of the grant and teaching faculty will be asked to measure those parameters along with the traditional quarterly course evaluation process. A written report will again be submitted to both the external evaluation team at Miami University and the Accreditation Council for Cooperative Education to ensure that their formative input is a guiding force in the project. The measurement of corporate feedback will again take place in the spring quarter to ensure a consistent targeted measurement. While the Division of Professional Practice is gathering data each and every quarter of the year, it will be the evaluation data from the spring quarter each year of the grant that will be specifically targeted to measure changes related to grant objectives. The questions asked will remain consistent throughout the grant to ensure that those changes will be visible. In the final quarter of the second year, a thorough analysis of data will again take place using a similar process as that of the first year with any enhancements designed to aid the project. The assessment data will be analyzed by the UC Evaluation Services Center. The objective will be to attain a 0.125 point increase in strengths and a 0.25 point increase in the grading of weaknesses on a 1 – 5 point scale. (Research shows that deficiencies are typically easier to impact as compared to strengths). Faculty will again filter that data with the help of focus groups of employers and students to ensure that their expertise is used to put the data into the proper context for action. The data will be analyzed to assess the impact of curricular changes in relation to set goals. In this iteration, particular attention will be paid to compare the results of different curricular teams, validate practices and search for best practices. The steering committee will make decisions about the approach taken for the final year of the grant to ensure that this last refinement of data will be highly reliable and transferable to other institutions. The Steering Committee will also begin to develop formal instruments that will ease transferability to other institutions. The ACCE accredited institutions that form the key target group for dissemination will be invited to Cincinnati for a face-to-face update on the progress of the grant and a discussion about transferability to their institution. This meeting will provide critical feedback to the steering committee to enable them to develop a highly transferable system in the final year of the grant. The external evaluation team from Miami University will again be asked to come to campus and review the process to verify that we were meeting project goals and provide formative feedback to ensure the same.

In the third and final year of the grant, the second cycle of curricular changes and measurement will take place with a higher level of refinement based upon what was learned in the first cycle. For the second year in a row, curricular changes will be planned in the fall and executed in the winter quarters. Measurement by way of corporate feedback will take place in the spring quarter and analysis of that data will take place in the summer. The key difference in the third year of the grant will be the focus on institutionalization of the process at the University of Cincinnati as part of the annual curriculum planning process. To ensure the reliability and validity of the data for grant purposes, changes will be implemented in a consistent cycle and measurement followed in a similar pattern, change every winter and measure every spring. Since adjustments may need to be made at various points of in the curriculum, institutionalizing the process will require the steering committee to focus on developing processes and instruments that can be implemented flexibly in a variety of institutions. Additionally, the steering committee will focus on disseminating results of the first cycle to other programs at the University of Cincinnati with a co-op component and invite their curriculum committees to look into this methodology for their own use. Another written report will be filed with the Accreditation Council for Cooperative Education and the external evaluators from Miami University and their feedback will be requested at the mid-point of the third year. In the final quarter of funding, the steering committee will develop a written document instructing others on developing a Corporate Feedback System that can be used in Curricular Reform. The document will be shared with the institutions that are part of the target dissemination group in a final face-to-face meeting. This meeting will also be open, at a nominal fee, to institutions that have not been involved in the project to date in an effort to expand the dissemination group to the widest possible audience. The external evaluation team from Miami University will be asked to provide a final summative report of the project in the final quarter of funding.

**DISSEMINATION PROCESS**

The principal target group for the dissemination of the project will be those institutions who have received accreditation through the Accreditation Council for Cooperative Education. In addition to the University of Cincinnati, accredited institutions currently include Case Western Reserve University; Georgia Institute of Technology; Georgia Southern University; Mississippi State University; North Carolina State University; Southern Methodist University; Stevens Institute of Technology; University of Central Florida; University of North Texas; and University of West Florida. These universities were selected because they have met accreditation criteria that
demonstrate similar processes and conclusively have these processes in place to take advantage of the proposed development process. The secondary dissemination group will be those programs who have joined the Cooperative Education Network and are subscribers to the attributes of cooperative education. While this group has not undergone a peer-review process for accreditation purposes, they do agree to a common definition of cooperative education that is found in the attributes and that form the basis for accreditation criteria. By targeting these two groups the investigators think that the project will have the highest chance of duplication on other campuses due to common belief systems and structures. A project web site will be developed to quickly disseminate project milestones to these target groups, to ensure a transparent process, and to invite formative feedback from other cooperative education programs throughout the life of the grant.

As ad hoc members of the Project Steering Committee, ACCE officers will have an important role in developing the processes for dissemination that will ensure that they are highly transferable to other ACCE accredited programs. In addition, the project will involve these institutions through information sharing activities at key stages in the evolution of the process. Representatives from ACCE accredited institutions will be invited to the University of Cincinnati campus at the end of the second year of the grant to review the progress of the project and to provide their input for the final stage of the grant. At the end of the project, representatives from these institutions as well as other institutions will be invited to attend an information dissemination seminar at the University of Cincinnati that will include a complete breakdown of all project outcomes.

Dissemination of the project and its lessons learned will also be accomplished through documentation of the project in the form of a user’s guide that will be developed at the conclusion of the project. This user’s guide will be available through the Division of Professional Practice web site as well as the project website. This will be promoted to the 97 institutions who are subscribers to the attributes of cooperative education. Should sufficient interest exist within this group to duplicate the information dissemination seminar, the University of Cincinnati will host additional sessions for a larger audience on a fee basis. The user’s guide and other relevant information will be published via the project web site at the conclusion of the project.

**IMPACT OF PROJECT**

As cooperative education is a major strategic asset of the institution, the project will support an activity that is central to the core mission of the University of Cincinnati. To ensure the viability of the grant beyond the period of funding, the project budget includes the assumption of ongoing costs by the institution. This will be phased in over the three-year period of the grant and will be complete in year four, after the termination of grant funding. While we anticipate that the major developmental costs of the grant will diminish with time, the outcomes of the project will be well worth any added expense that will come from implementation of a new corporate feedback system. The project personnel at the University of Cincinnati are committed to this idea and look forward to developing this new feedback system and using it for years to come to benefit the institution through an enhanced curricular reform process that is thoroughly grounded in industrial needs. Deans and upper administration at the University of Cincinnati at the provostal and presidential levels also view this as a significant step forward for the institution and are fully committed to ensuring its success. The University of Cincinnati is poised to bring some of the best minds in the field together to tackle this important problem and develop a recurring, statistically-valid feedback process that will enable post-secondary institutions to develop their operations in harmony with both academic criteria and employer demand.

The concept enhances values supported by administrators, accreditation bodies, employers and students. The need for a systematic process flexibly matching academic offerings with employment needs is evident. The strength of the project at hand rests on the synergies between the involved academic programs, the unparalleled track record in cooperative education of the University of Cincinnati, and the involvement of the ACCE accredited co-op schools. This constellation has the potential to build a critical mass that will truly make the difference. Being a high impact research university offering co-op based programs on an associate, baccalaureate and graduate level, the University of Cincinnati is uniquely positioned to develop a curricular alignment procedure attractive to both community colleges and institutions offering four- and five-year baccalaureate degrees. We see our ultimate objective as the development of an effective process that becomes the industry standard of professionally oriented educational institutions.
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