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Database development for community service.

Erin Cummings 1987-
University of Louisville

DATABASE DEVELOPMENT FOR COMMUNITY SERVICE

By

Erin Cummings
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DATABASE DEVELOPMENT FOR COMMUNITY SERVICE

Submitted by: _____
Erin Cummings

A Thesis Approved On

_____
Date

By the Following Reading and Examination Committee:

_____
D. J. Hagerty, Thesis Director

_____
Thomas D. Rockaway

_____
Rammohan K. Ragade

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ABSTRACT

At the University of Louisville, there is no continuous and dependable connection between the needs of the community for expert help in solving practical problems and the capabilities of the students enrolled in cumulating experience courses. Culminating experience courses are designed to provide students with experience in real and pragmatic problem-solving situations. Connecting these courses with community needs not only provides students with such experiences but also betters the community. A database instituted on the University of Louisville website would be a regular and continuous medium for such connections to be made.

In this research, a database created by computer engineering and computer science students was populated and a user's manual was created. This work describes the extensive background of the situation and anticipated research benefits in addition to the database programming and population and the procedure for finding matches.

The impacts of the implementation of this database would be invaluable. Once the database is made functional for Speed School courses, faculty members in the other colleges at the University of Louisville could easily add their culminating experience courses. The database will allow continual and reliable community connections, thus furthering the engagement of the university in the community.

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I. INTRODUCTION

The subject of this research is a problem that exists at the University of Louisville; that problem is a lack of permanent and reliable connection between the needs of community organizations for expert help in solving practical problems, and the capabilities of students enrolled in cumulative experience courses designed to provide experience for students in situations that reflect real and pragmatic problem-solving opportunities.

A. Background

"When President Ramsey spoke at his inauguration, he made a promise that the university would be a good citizen and a good neighbor," Dr. Ralph Fitzpatrick of the Office of Community Engagement has said. "The creation of Signature Partnership is one way he is making good on that promise (UofL Communications and Marketing 2007)." The University of Louisville is dedicated to being a valuable partner in the Louisville community, and the Signature Partnership Initiative is one of its most vital community outreach programs. At the core of the initiative is a coalition of community organizations, programs, and initiatives that seek to improve the quality of life and economic opportunity for the residents of West Louisville, especially those located from

Ninth Street west to the Ohio River and south to Algonquin Parkway. For several years, the University of Louisville has been working closely with community residents, Jefferson County Public Schools, Louisville Metro Government, Metro United Way, the Urban League, faith-based organizations, and many others to create and enhance programs designed to eliminate or reduce disparities that West Louisville residents experience in education, health, economic and social conditions. Faculty, staff, and students in every college and school have helped in the Signature Partnership Initiative effort (UofL Communications and Marketing 2007).

For over 200 years, the university has had a major impact on the economic and social welfare of the Louisville community. In fact, the University of Louisville ranked 12th in the "Saviors of Our Cities: A Survey of Best College and University Civic Partnerships" survey made public at the Coalition of Urban and Metropolitan Universities meeting in October of 2009 in Philadelphia. Conducted by Evan S. Dobelle, president of Westfield State College in Massachusetts and former president of the New England Board of Higher Education, the survey emphasized programs that "have demonstrated and documented long-standing cooperative efforts with community leaders to rehabilitate the cities around them, to influence community revitalization and cultural renewal, and to encourage economic expansion of the local economy, urban development and community service (UofL Communications and Marketing 2010)." This national study recognized the University of Louisville as one of the nation's top schools in community engagement. In regard to the survey, Dr. Daniel Hall, U of L Vice President for Community Engagement said, "This recognition affirms that UofL is truly

making a difference in our community-not just in one area, but across the board with many university/community partnerships that have a positive impact on K-12, health care, economic development and other quality of life factors (UofL Communications and Marketing 2010)." Hall also mentioned that the Signature Partnership Initiative has been a largely responsible for building the university's reputation as a good neighbor (UofL Communications and Marketing 2010).

Many instructors and students have participated in experiential service learning programs to assist Louisville community groups through the Signature Partnerships Initiative. The goal of this research is to provide a reliable and permanent system to connect University of Louisville instructors and students with community organizations in need of assistance through use of a database. This database for community service would help to foster university engagement in the community.

B. Objective

This research was directed toward developing and maintaining a connection between the University of Louisville and the community by satisfying community needs with student efforts. Many local community organizations and institutions who need professional or technical advice cannot afford to obtain such assistance; simultaneously, a large population of students lack pragmatic experience in situations that simulate professional practice. A connection between the two groups would enable students to work on real projects for the benefit of the community institutions; the institutions

would receive analytical assistance and preliminary design products for their project needs.

In the existing situation at the university, one segment of an ideal system is missing: a subsystem that matches the needs of a community group with an appropriate group of students in a cumulative experience course or class. Such matching has been done previously on the basis of personal contacts between university faculty and administrators with community organizations. In essence, this method of operation depends on the personal commitment of an instructor to service learning, the knowledge of that instructor relative to the needs of community organizations, and the willingness of community partners to rely on student assistance. Typically, a professor happens to find a group in need and introduces the project to his or her students. It is rare for a perfect match to be achieved, and it is particularly difficult to make connections on a regular and continuous basis. Thus, there is no guarantee that a connection will be realized in that system. A database for community service would solve this problem by providing an institutional system to connect community partners applying for assistance with instructors willing to introduce their students to service learning.

This research project involved collecting, assembling, and compiling information in order to make connections between university capabilities and community needs by populating a database, developing a system to use that database, and generating a user's manual for the utilization system. More specifically, the focus of this work was placed on engineering culminating experience capstone courses taught in the J. B. Speed

School in which design projects that satisfy community needs are required. The projects were visualized as being generated from community organizations in the Signature Partnership Initiative service area. The database, as developed, was used to organize and categorize all the characteristics of available Speed School culminating experience courses, in order to identify the types of projects that correspond to each course. When the portion of the database reserved for course information was populated, the stage was set for establishing a system to allow community organizations to request help from the Office of Community Engagement by providing information on community project needs that could be compiled in a second, comparable part of the database. The system for use of the database was designed to match courses and instructors to projects to satisfy community needs.

C. Anticipated Research Benefits

The implementation of the database developed in this research will assist the ability of students, professors, and the University of Louisville to be engaged in the community. Not only will the project realization give students the opportunity to help members of the urban community, but it will also enable students to work on real projects.

Students will be provided with opportunities to apply their developing expertise in addressing community issues through service learning. Service learning is "a form of experiential education in which students engage in activities that address human and community needs together with structured opportunities intentionally designed to

promote student learning and development (Tsang 2000)." Service learning is an integral part of effective professional education since it solidifies the academic content of prior courses in a constructive synthesis while providing real pragmatic experiences that should promote public service ideals among the students. Working on real projects is extremely valuable to each engineering student's education because these real situations differ from the hypothetical problems found in text books; these situations require critical thinking and innovation rather than routine calculations. Thus, this service learning experience will help students to be better prepared for their careers.

Studies have shown that a volunteer experience helps students develop greater compassion for others and a greater sense of the importance of community involvement. Studies of service learning show that students who engage in such learning become more helpful and effective, attain a deeper understanding of community issues, and gain confidence about using what they had learned. In engineering, service learning helps students gain the skills necessary for practicing engineering in a professional manner while fostering the importance of civic responsibilities (Tsang 2000).

On the other side, community institutions will receive free preliminary solutions to important problems. Of course, these solutions will not be formulated by a professional engineer and thus cannot be put into practice until they are approved by a design professional, but they show the client what sort of work, costs, and options he or she may have. This type of preliminary feasibility and scoping study is very valuable for organizations that lack the resources to develop their own evaluations.

D. Research Support

This research project was supported by the Office of the University Provost in the form of an Ideas to Action (i2a) Supporting Undergraduate Innovation (SUN) grant. These grants are meant to "promote a meaningful transformation of higher education (Bays 2010)." The i2a initiative grew from the university's commitment to fulfilling accreditation requirements set by the Southern Association of Colleges and Schools (SACS). The SACS Commission on Colleges requires its member institutions to develop a practical, university-wide quality enhancement plan to improve undergraduate student learning. The University of Louisville plan was called a Quality Enhancement Plan (QEP) for which the implementation phase was named Ideas to Action (i2a). The implementation plan is centered on building students' critical thinking skills in both the general education program and in major courses. Students receiving support from an i2a SUN grant are required to demonstrate their critical-thinking skills in a culminating experience project. Development of a database for community service falls within the parameters for the i2a initiative because the implementation of the database will build students' critical thinking skills through real-world design experiences and service learning.

E. Organization of Thesis

Chapter I has presented a brief statement of the focus of this research, and has described the objectives of the work. Chapter II describes the programming of the database. Chapter III examines how course data were collected and organized for

insertion into the database and how data on community project needs were organized for populating the second section of the database. Chapter IV outlines the method by which the database will be used to match culminating experience capstone courses in the engineering curriculum with requests for assistance from community organizations that will be processed by the Office of Community Engagement. An example to show how the system will function is included as Chapter V, while conclusions and recommendations are given in Chapter VI.

II. DATABASE PROGRAMMING

The database to contain and segregate culminating experience courses and requests for assistance from community organizations was written by a group of computer engineering students in the CECS 550 course, Software Engineering, taught by Dr. Rammohan Ragade in Spring of 2009. The student group was made up of Roger Mendes, Crystal Woodard, Thaw Zaw, and Joe Bedan. Those students produced the database as their capstone, or culminating experience, project, thus reinforcing and illustrating the basic idea of the project which is to provide a vehicle for effective and meaningful culminating experiences.

The CECS 550 project was made up of several major tasks. The first task was to generate a web-based interface for different users to submit information and search for projects. The second task was to create a database to store capstone courses offered at the University of Louisville J. B. Speed School of Engineering. Database information included the characteristics that would make a requested project appropriate for study in capstone classes as well as basic project data submitted by different users of the web-based interface. The third task was to develop an algorithm to match a project request from an outside client with an appropriate course. Table I shows functional requirements included in the system to meet these tasks.

TABLE I

FUNCTIONAL REQUIREMENTS OF THE DATABASE (Mendes et al. 2009)

Number	System Function
1	System will allow for user to enter a new course into system.
2	System will allow for user to enter a new task within a course.
3	System will allow for user to remove a course from system.
4	System will allow for user to remove a task from a particular course.
5	System will allow for user to enter general description of course.
6	System will use algorithm to match course to a particular project.
7	System will intake description of project proposed by client.
8	System will be able to identify when no match can be made for a project to any particular course.
9	System will be able to relay to client that no match has been made for particular project.
10	System will be able to relay to client when a match is made to particular project.
11	System will be able to identify best possible match.
12	System will know if a capstone requirement has been met and should not offer project to capstone course.

The design pattern used to program the database is shown in Figure 1. From the bottom up, the design pattern begins with the database warehouse which is where the information for culminating experience courses and projects from community organizations is stored. The stored procedure involves programming the system by which this information will be deposited in the database warehouse. The business layer entails programming how data received will be processed in order to be shown on the web application which uses data from the presentation layer. The search algorithm

pulls appropriate data from the presentation layer to the web application when searched by a user or client.

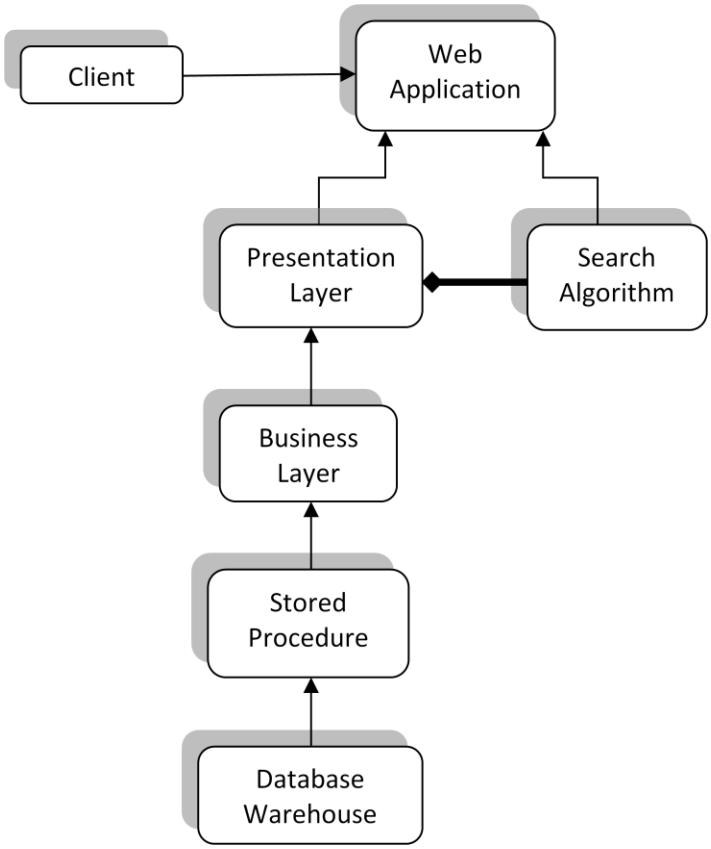

FIGURE 1 – Programming Design Pattern Diagram (Mendes et al. 2009)

Three types of users for the web-based application of the database were considered: the client, or community organization, looking to submit a project to the database; the course professor who would like to include service learning in a culminating experience course; and the system administrator who would control access to the system. The database was designed to enable the client to see the types of projects students in the course have completed in the past and submit new community

projects. The course professor user is able to browse the web application just like a client with the additional ability to enter information about a course. The system administrator will have all the rights of the instructor users plus the ability to modify the database and admit new client and instructor users. See the User's Manual in Appendix A.

While the computer engineering students created the database, they did not populate it or develop a system to implement it. After the database is made functional, the Office of Community Engagement will facilitate the matching process. When the database is used successfully for matches between community partner projects and students in Speed School courses, other units in the university can add information on courses in their departments to the database and benefit from its use.

III. POPULATING THE DATABASE

In this research, the most promising opportunity for a project connection was assumed to be the culminating experience courses taught in the Speed School of Engineering. These courses are based on the idea of students applying knowledge learned in prior courses to real problems. Speed School capstone course descriptions and keywords were collected from the professors who teach culminating experience courses through individual interviews and then revised to fit the database input format. Table II shows a sample of the descriptions and keywords to be used in the database. The complete descriptions of all capstone courses can be found in Appendix B.

TABLE II

CAPSTONE COURSE DESCRIPTION AND KEYWORDS SAMPLE

Department	Capstone Professor	Capstone Course	Course Description	Keywords
Civil and Environmental Engineering	Dr. Louis Cohn	CEE 680-01: CEE Capstone Design	A capstone civil engineering course which includes elements of geotechnical, structural, transportation, and water resources engineering in a comprehensive design project.	civil engineering, environment, structure, building, construction, soil, rock, foundation, geotechnical, geology, highway, street, traffic, water, groundwater, stream, river, water quality, channel, culvert, bridge, water supply, sewer systems

IV. PROCEDURE FOR FINDING MATCHES

The future system administrator of the database has been determined to be the Office of Community Engagement. Due to the security issues involving allowing university outsiders to log on to the database, the client user in the database explained in Chapter II will be omitted in the procedure for finding matches until such security can be obtained. Instead, the Office of Community Engagement will also act as the intermediary between the database and the community organization requesting a project.

The method used to connect requested projects with capable course instructors is simple. It is assumed that the community institution has been informed of the opportunity for interaction with Speed School students through publications and newsletters of the Office of Community Engagement that are distributed throughout the Signature Partnership Initiative service area. Presumably, members of community organizations will call the Office of Community Engagement as directed to enquire about possible assistance. Staff members of the Office of Community Engagement will receive these inquiries and will complete a form, shown in Appendix C, describing the community partner project. This form will help the Office of Community Engagement staff members in submitting the necessary information to the database. After the

project is submitted, the database will use an algorithm to match the keywords that describe the project needs with keywords and descriptors of applicable courses. These applicable courses will appear in list form, from which the Office of Community Engagement staff member will choose the courses that he or she thinks applies best to the project. Then, a message will be sent to the identified instructors asking if they are interested in working with the community partner on the project described in the information submitted to the database by the Office of Community Engagement. The professor may accept or reject the request. In either event, a message will be sent to the Office of Community Engagement informing them of the decision. If the request was accepted, the Office of Community now has the opportunity to accept or reject the course offer. Upon acceptance, a match is made and instructor(s) can engage in a dialog with the community organization contact about the project to discuss the possibilities. Finally, work can begin.

The database also allows users to view the previously completed projects. This is valuable to the Office of Community Engagement because it makes their task of data collection simple. This data collection is vital to enhancing the University of Louisville's reputation as a good neighbor.

V. EXAMPLE

As an example, assume an elementary school called School X in West Louisville is in need of an expansion due to increasing student enrollment. A member of the faculty or staff involved in the expansion, say the principal Susie Smith, calls the University of Louisville's Office of Community Engagement. An employee of the department, say Jim Johnson, completes the project request form (shown in Appendix C) including the date, name of organization, and contact person information. The Office of Community Engagement helps to choose the appropriate division of engineering and assists in the description and keywords needed to describe the project. In this case, the description is similar to, "School X is in need of expanding to support increasing student enrollment. The expansion needs to house classrooms, teacher offices, and meeting rooms. There is a stream in the preferred location of the expansion. The parking lot will need to be expanded as well. School X is looking for design options and cost estimates." Civil engineering is the most applicable field, and suitable keywords are structure, building, construction, parking, water, and stream, all of which would be marked on the project request form. This completed example form is shown in Appendix D.

Next, the Office of Community Engagement uses its user name and password to login to the database website shown in Figures 2 and 3.

FIGURE 2 – Database Website Welcome Screen

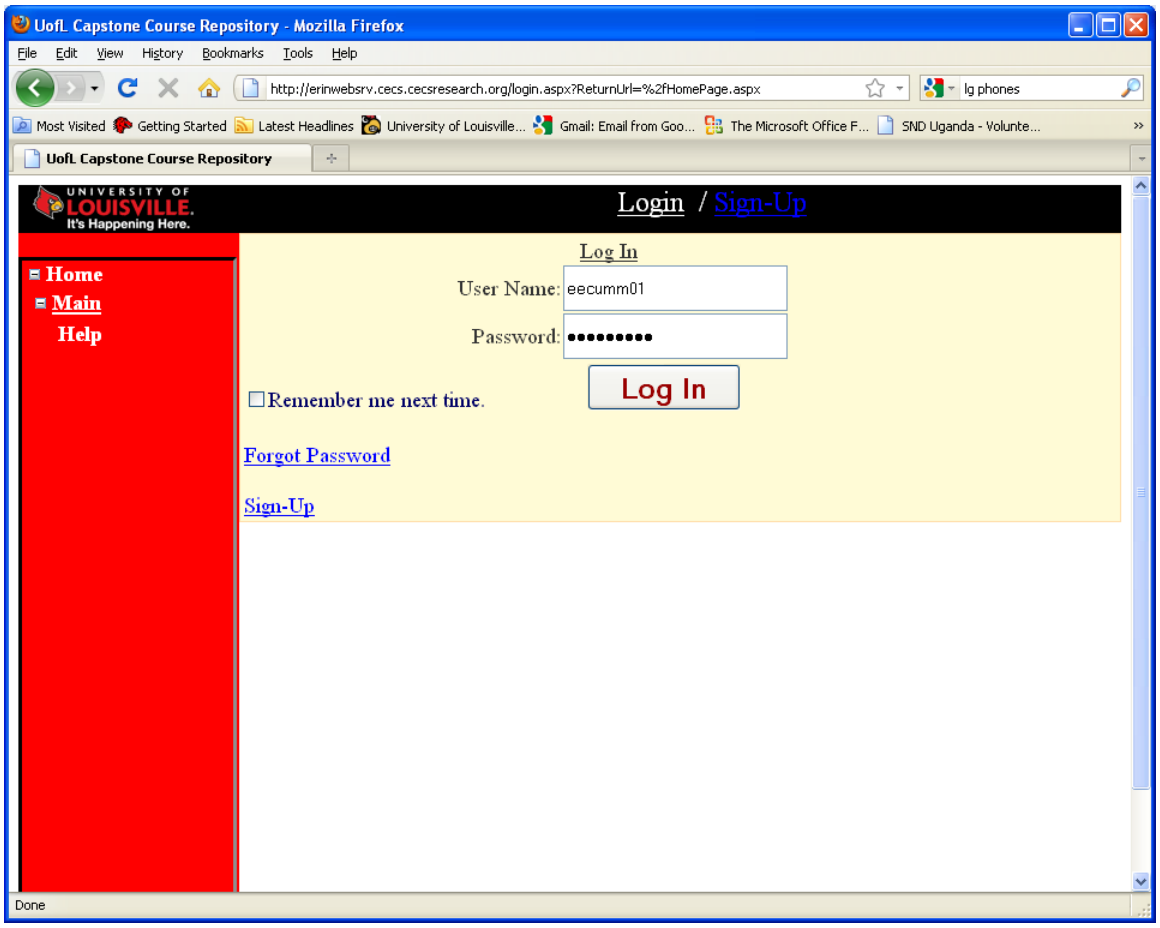

FIGURE 3 – Database Website Login

After the Jim has logged on to the website, he will see the homepage as shown in Figure 4.

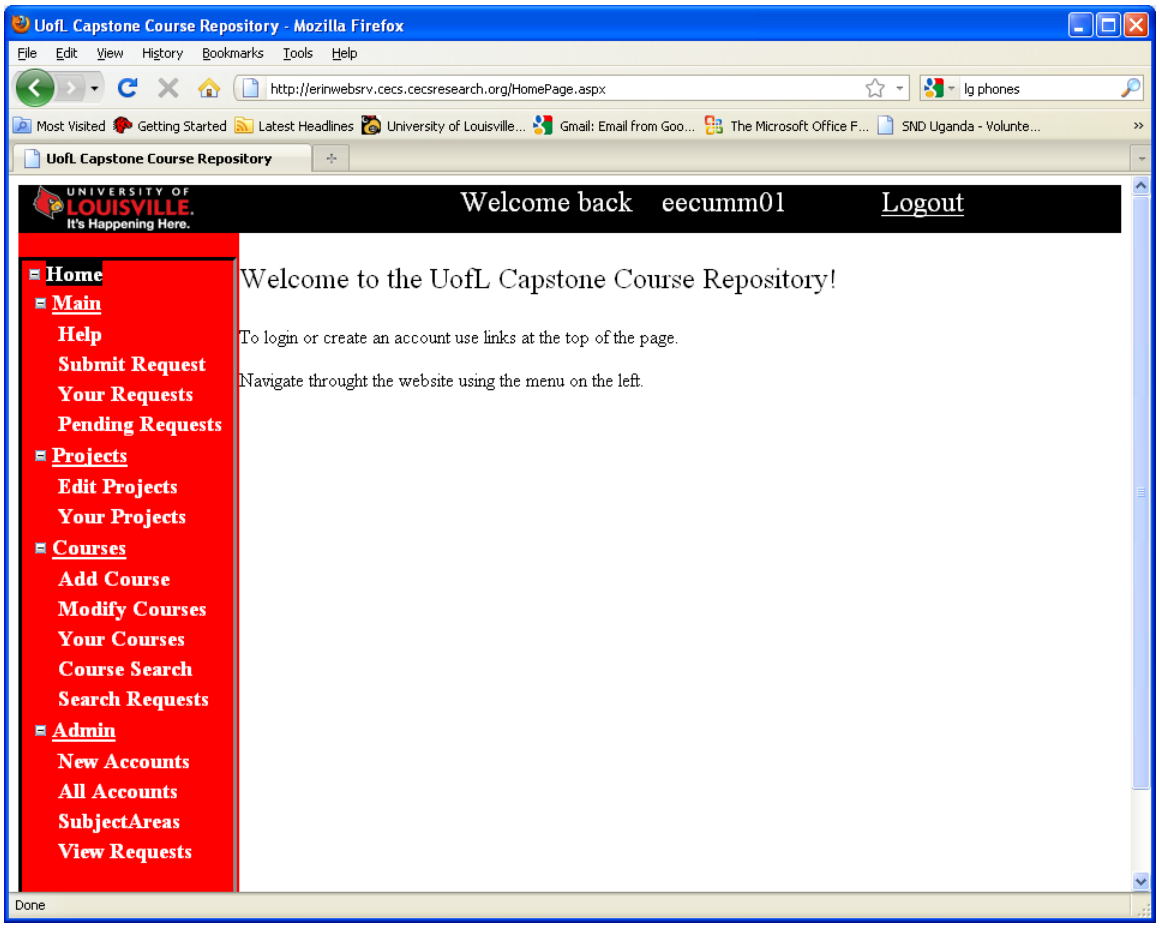

FIGURE 4 – Database Website Homepage

Jim will then select “Submit Request” from the list of options on the left, and enter the information of the project request form into the database as shown in Figure 5.

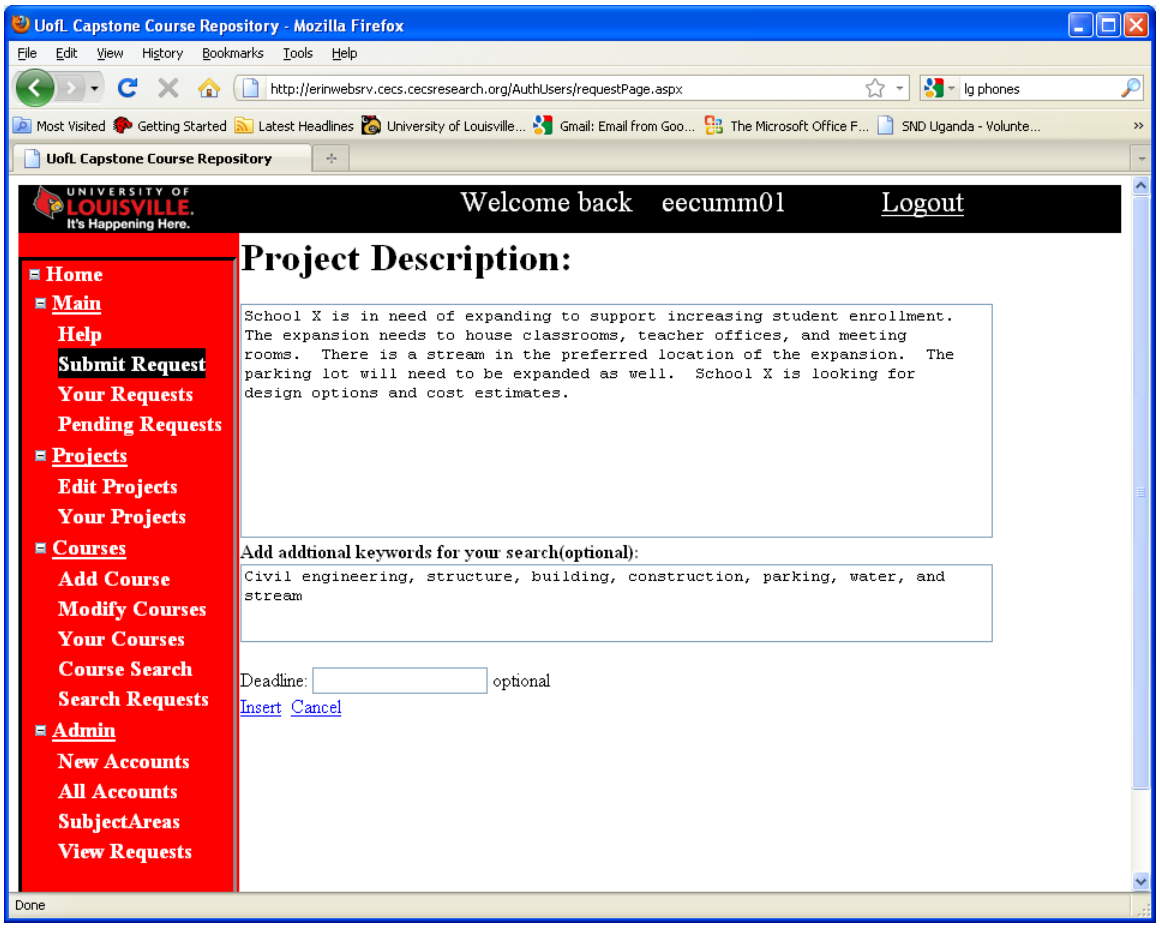

FIGURE 5 – Entering a Project Request in the Database

The database returns a list of possible matches, and Jim chooses the most applicable courses from the list and then clicks “Send Request.” In this case, he chooses the Civil and Environmental Engineering Capstone course, as shown in Figure 6.

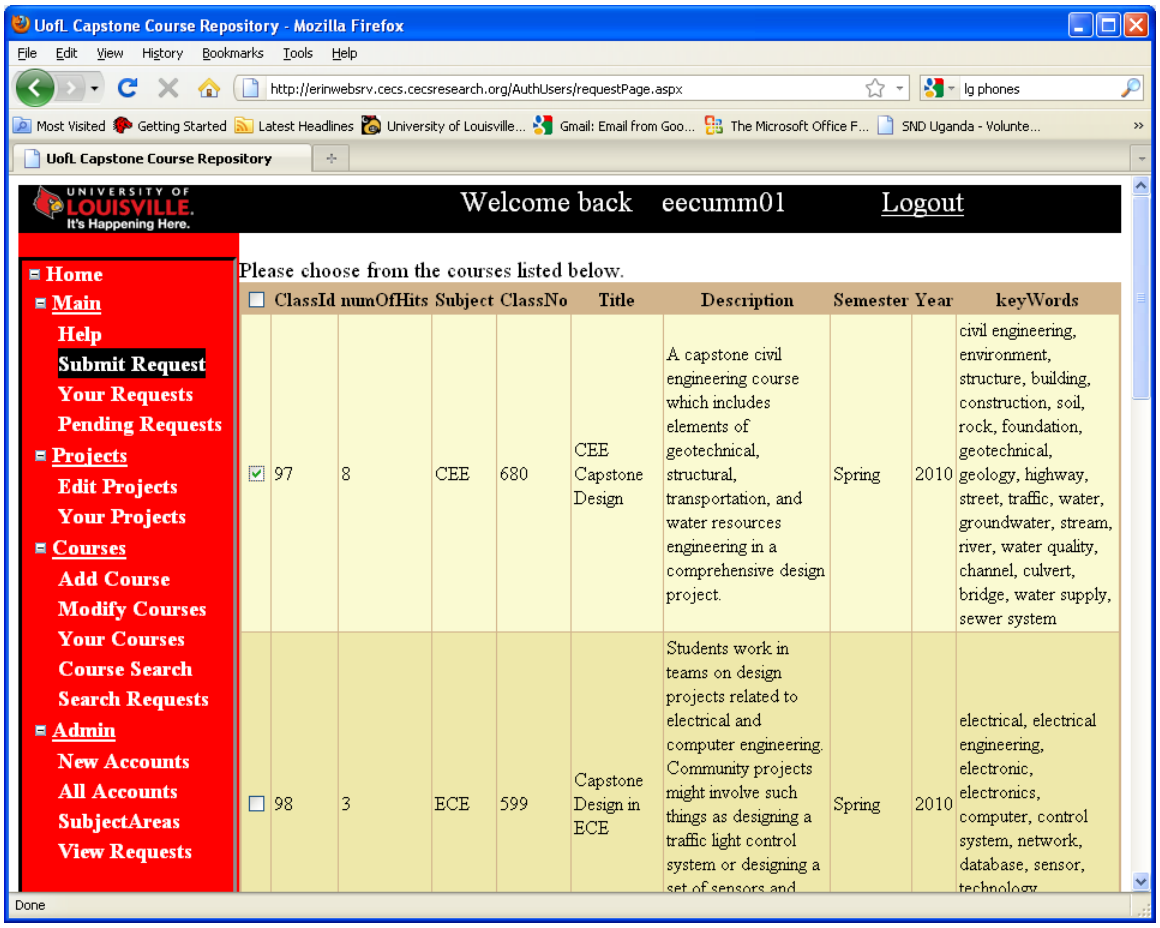

FIGURE 6 – Database Returns a List of Applicable Classes upon Project Request

Once the project request is made successfully, the screen shown in Figure 7 is shown and the database sends the professor of the civil engineering capstone course notification of the match.

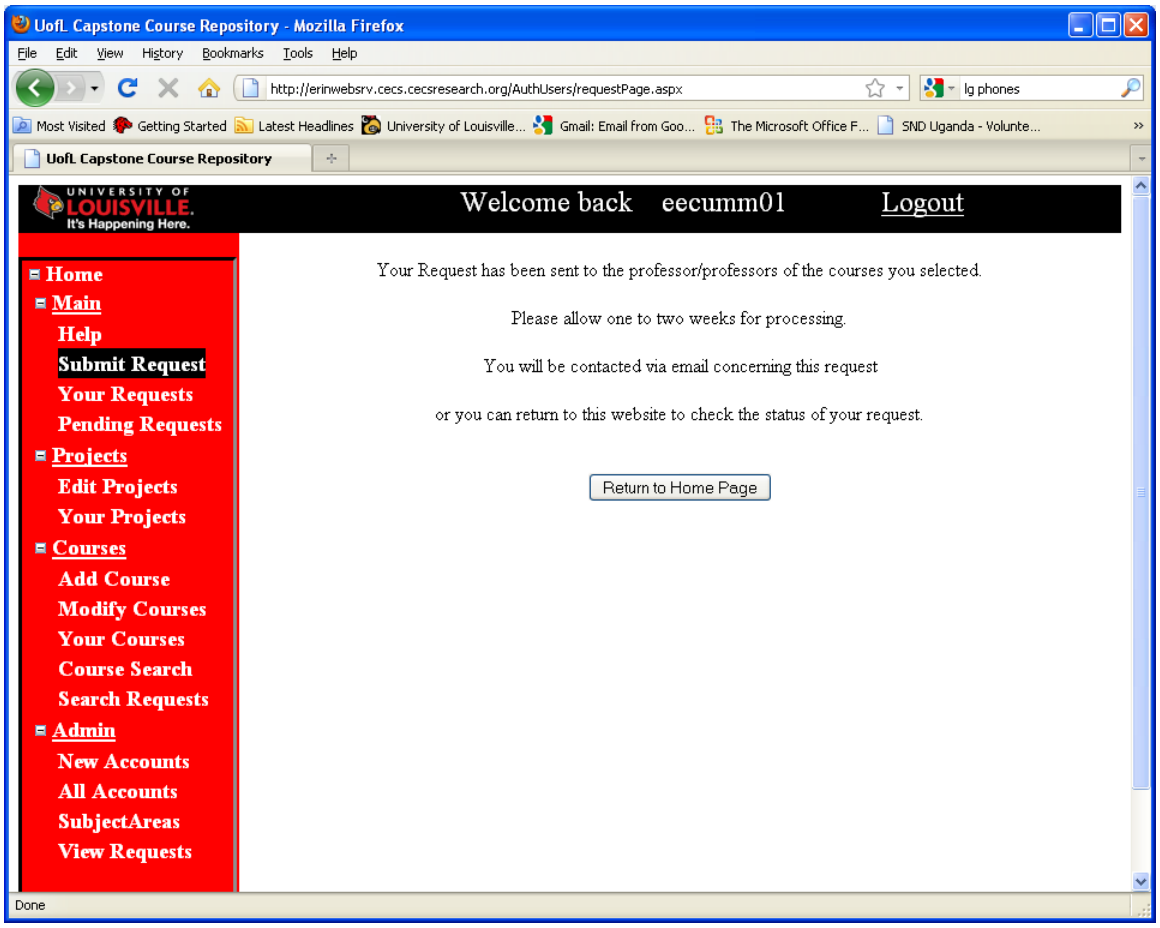

FIGURE 7 – Database Website Screen upon Successful Project Request

The civil engineering capstone professor is interested in learning more about the project, so he logs on to the database website and clicks “Accept” from the “Pending Requests” option on the left as shown in Figure 8.

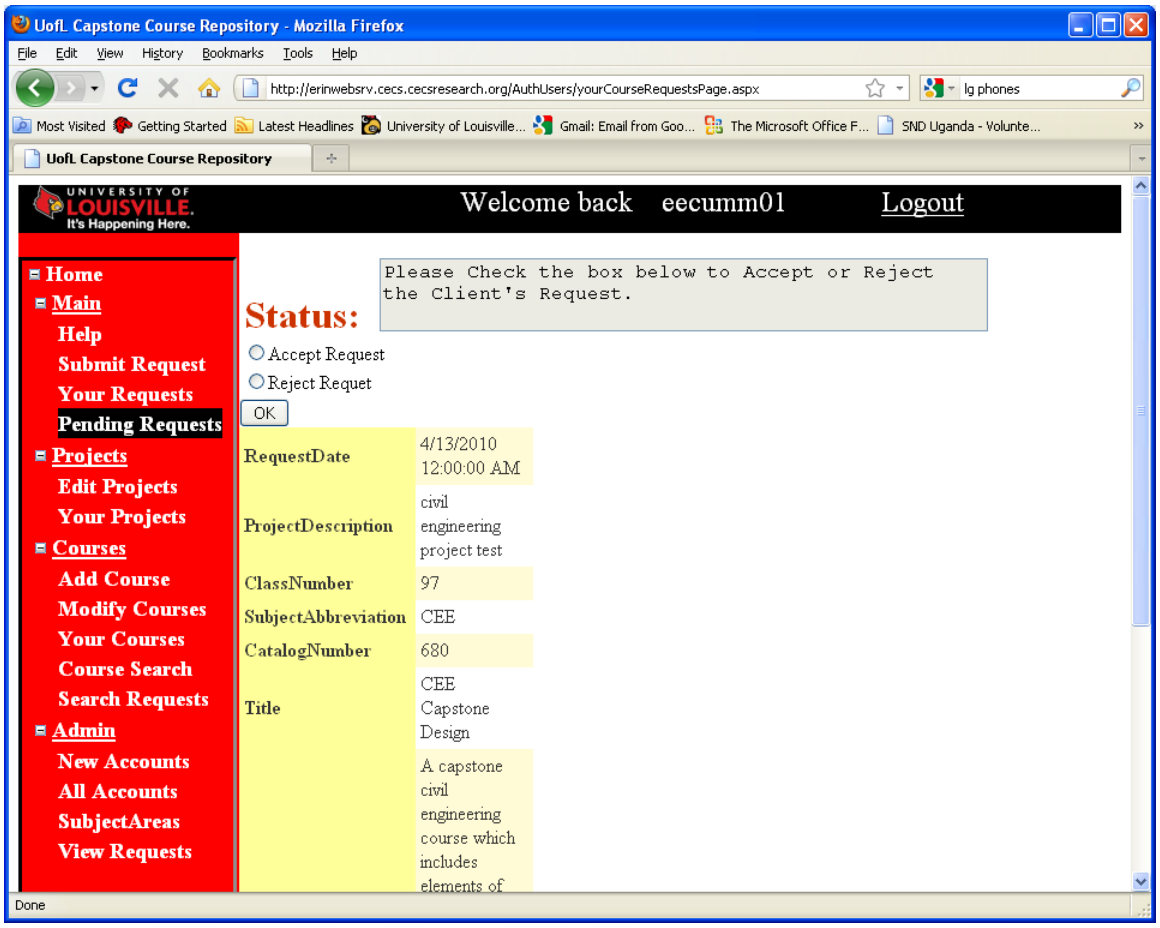

FIGURE 8 – Professor Accepts Project Request

Next, a message is sent back to the Jim in the Office of Community Engagement asking if he would like to accept the course offer. He logs on to the database website and chooses “Accept” from the “Your Requests” option on the left.

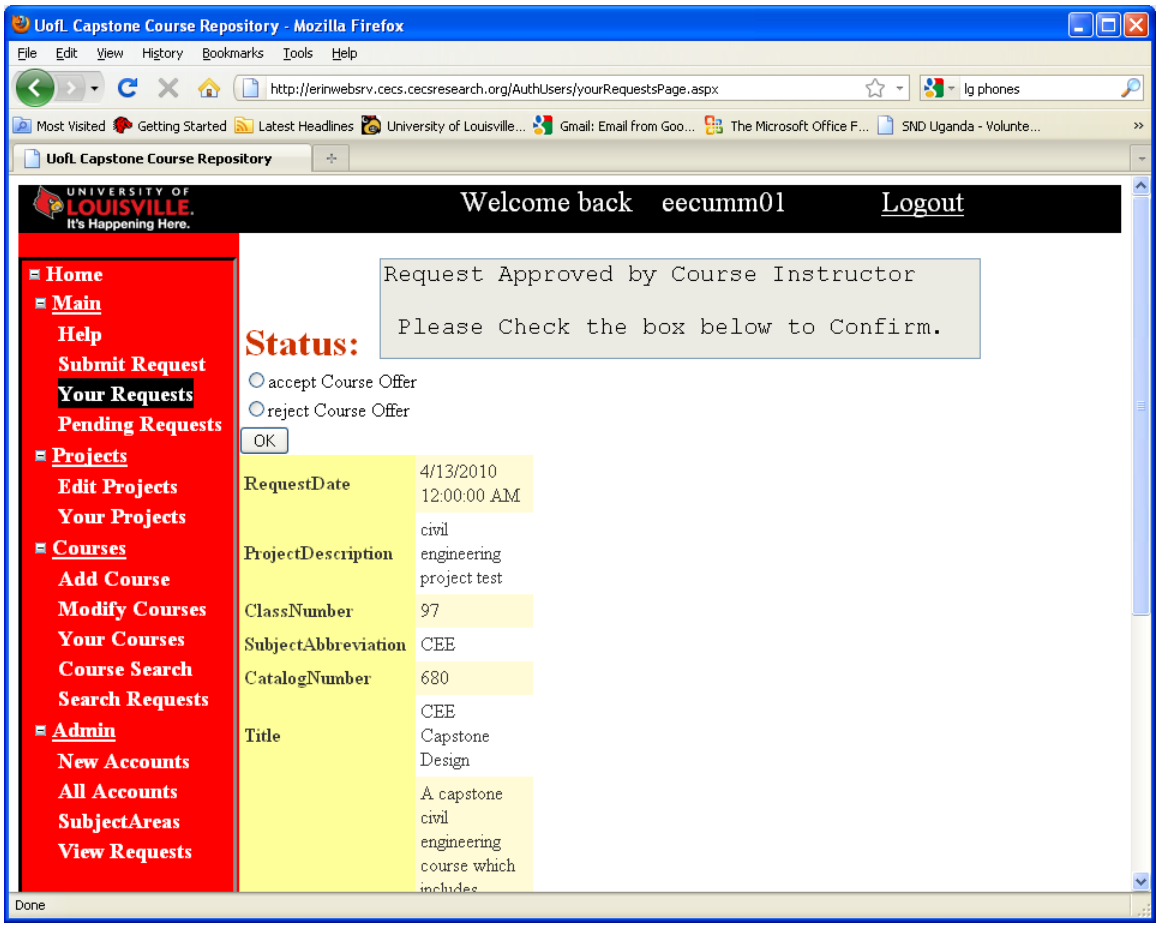

FIGURE 9 – Client Accepts Course Offer

The database emails both Jim in the Office of Community Engagement and the civil engineering capstone course professor to notify them that a match has been made and exchange contact information. The professor will then enter a dialog with Susie Smith from School X to discuss the possibilities of the project.

VI. CONCLUSION AND RECOMMENDATIONS

A. Conclusions

This research entailed developing a connection between the University of Louisville and the community by satisfying community needs with student efforts; more specifically, it involved satisfying practical and technical needs with the capabilities of engineering students. In order to achieve this connection, information was collected, assembled, and compiled to populate a database through interviews with engineering capstone professors. A system to use that database was modeled after existing systems used in the Office of Community Engagement. A user's manual was generated for the utilization of the system updated from the user's manual created by the Computer Engineering and Computer Science students. This work required a great deal of organization and management skills.

The database for community service is a very worthwhile endeavor. Not only should it benefit the community, but it also should benefit the students by giving them opportunities for experience in addressing real problems in a setting that forces them to engage with real clients.

B. Recommendations

Implementing the database was much more difficult than what was originally estimated. While the database was already developed as a basic tool, no guidance for systematic use of the database had been generated. Furthermore, preparing the documentation required to make the database functional on the University of Louisville's website as a permanent installation will require considerable work by information technology experts. This long-term installation could perhaps be completed in a future capstone CECS course. Otherwise, it is recommended that funding is found in order to sponsor an expert in completing the required documentation.

Obviously, the database documentation and implementation must meet the University of Louisville IT department requirements in order to reside on the university server. While the implementation of the database would require considerable investment of time and effort initially, competent installation should make the database system self-sustaining. Maintenance of the system, however, should not be forgotten.

It is recommended that the Office of Community Engagement oversee the database system in the future as a part of the Signature Partnership Initiative. In order to market the program, it is necessary that the Office of Community Engagement advertise it in the existing newsletters that are distributed to the Signature Partnerships seasonally. It is also recommended that the Office of Community Engagement list completed projects on their website with a link explaining the program and how to submit a project request.

After the database is made functional for Speed School courses, faculty members in the other colleges at the University of Louisville should add their culminating experience courses and any other courses that apply to the database. Sustained use of the database will allow reliable and continual engagement of the university in the community.

VII. REFERENCES

Bays, Cathy. Supporting Undergraduate Innovation: Ideas to Action (i2a) Implementation Grants. 16 March 2010. https://louisville.edu/ideastoaction/grants/09-10-2/Co-Curricular-and-Student-Support. 6 Jan. 2010.

Mendes, Roger, Woodard, C., Zaw, T., and Bedan, J. April 2009. Capstone Course Repository. J. B. Speed School of Engineering, University of Louisville.

Tsang, Edmund. 2000. *Projects That Matter: Concepts and Models for Service-Learning in Engineering*. USA: American Association for Higher Education.

UofL Communications and Marketing . "Signature Partnership Works to Revitalize West Louisville." UofL Today. 18 June 2007. http://php.louisville.edu/news/news.php?news=915; 15 March 2010.

UofL Communications and Marketing. "UofL named one of America's Top 25 'Best Neighbors'." *UofL Engagement*. December 2009. http://louisville.edu/communityengagement/signature-partnership/Fall%2009%20newsletter.pdf. 17 March 2010.

APPENDIX A—USER'S MANUAL

The menu on the left is structured as follows.
(Note that you may not have all options listed available to you.)

Main

- Help - This page.
- Submit Requests - Submit a project to the database. You will be presented with a form where you will enter a description of your project and optionally, a list of keywords that may assist in finding a match for your project. Once submitted you will be presented with a list of courses that may be able assist with the project based on the types of projects that are typically done in that course. Once you submit the project, it will remain in the database and will be able to be browsed by faculty looking for projects for his or her classes to work on.
- Your Requests - Review project requests that you made and delete them if you desire.

Projects

- Edit Projects - This is to be used by faculty members to add projects that have already been completed into the database. Administrators may edit or delete any project. These projects will be used to assist in matching a course to a project.
- Your Projects - Used to display and edit previous projects that you have entered into database.

Courses

- Add Course - This will be used by faculty or administrators to enter capstone courses or courses in which students are required to complete projects into the database.
- Modify Course - Used to modify the course information for a course that is already in the database.
- Your Courses - Display and modify courses that you personally have entered into the database.
- Course Search - This is used to search the list of capstone courses in order to find a course that may be appropriate to work on a particular project.
- Search Requests - Perform a search on pending project requests.

Administrator

- New Accounts - When someone creates a new account requesting access to use the database, a database administrator will use this menu option to approve or disapprove the new user as well as assign various roles to the user.
- All Accounts - Used to manage the users that have access to the database.

- Subject Areas - This is used to add new departments that will be available in the dropdown lists when courses are added to the database.
- View Requests - View the current pending projects requests.

APPENDIX B—CAPSTONE COURSE DESCRIPTIONS AND KEYWORDS

Department	Capstone Professor	Capstone Course	Course Description	Keywords
Chemical Engineering	Dr. Watters	CHE 572-01: Plant Process and Project Design	The chemical engineering department is interested in any project related to chemical engineering and renewable energy. Most projects focus on designing a plant to produce X, where X can be a chemical product, an energy product, or could contribute to pollution abatement or environmental improvement.	renewable energy, energy, plant, chemical, product, pollution, food, chemical engineering, biodiesel, oil, waste, methanol, coal, acetone, butanol, mixture, biomass, fuel, protein
Civil and Environmental Engineering	Dr. Cohn	CEE 680-01: CEE Capstone Design	A capstone civil engineering course which includes elements of geotechnical, structural, transportation, and water resources engineering in a comprehensive design project.	civil engineering, environment, structure, building, construction, soil, rock, foundation, geotechnical, geology, highway, street, traffic, water, groundwater, stream, river, water quality, channel, culvert, bridge, water supply, sewer systems
Computer Engineering and Computer Science	Dr. Elmagrahby	CECS 596-75: CECS Capstone Design	The computer engineering department is interested in working on any projects related to computer engineering including programming, writing algorithms, and maintaining networks.	computer, computers, technology, hardware, software, internet, programming, network, algorithm, system, website, database, web
Electrical and Computer Engineering	Dr. Dozier	ECE 599-01: Capstone Design in ECE	Students work in teams on design projects related to electrical and computer engineering. Community projects might involve such things as designing a traffic light control system or designing a set of sensors and horns to drive pigeons off the courthouse roof.	electrical, electrical engineering, electronic, electronics, computer, control system, network, database, sensor, technology

Department	Capstone Professor	Capstone Course	Course Description	Keywords
Industrial Engineering	Dr. Alexander	IE 499-01: Capstone Design	The students work in teams on open ended real world problems provided by industry, health care, and government organizations. The projects range from developing facilities plans to increase capacity and improve operating efficiencies to designing systems to reduce queue time and improve utilization.	industry, health care, government organizations, plant, efficient, queue, time, operation, facility
Mechanical Engineering	Dr. Sharp	ME 497 497-01, 02: Capstone Design Project	Because mechanical engineering covers such a wide range of projects, the ME department is interested in essentially any project related to mechanical engineering.	mechanical, engineering, dentistry, solar energy, wind energy, and super mileage vehicles, energy, home weatherization, machine, car, thermodynamics

APPENDIX C—PROJECT REQUEST FORM

Database for Community Development
Project Request

Date:	Name of Organization:
Address:	
Contact Person:	Phone:
Fax:	Email:
Brief description of the contact:	
Brief description of the project:	

Which of the following engineering field focus areas will this project address? *(Mark all that apply)*

- ❑ Civil engineering
- ❑ Electrical engineering
- ❑ Industrial engineering
- ❑ Mechanical engineering
- ❑ Chemical Engineering
- ❑ Computer engineering

Which of the following key words apply to this project? *(Mark all that apply)*

- ❑ Environment
- ❑ Building/Structure
- ❑ Construction
- ❑ Geology
- ❑ Soil/rock
- ❑ Street/highway
- ❑ Traffic
- ❑ Parking
- ❑ Water/groundwater
- ❑ Water quality
- ❑ Supply
- ❑ Sewer/pipe
- ❑ River/Stream/channel
- ❑ Culvert/Bridge
- ❑ Foundation
- ❑ Electronics
- ❑ Computer
- ❑ Control system
- ❑ Network
- ❑ Database
- ❑ Sensor
- ❑ Technology
- ❑ Hardware
- ❑ Software
- ❑ Internet
- ❑ Programming
- ❑ Algorithm
- ❑ System
- ❑ Website
- ❑ Web
- ❑ Industry
- ❑ Health care
- ❑ Plant
- ❑ Efficient
- ❑ Queue
- ❑ Time
- ❑ Operation
- ❑ Facility
- ❑ Energy
- ❑ Super mileage
- ❑ Vehicle
- ❑ Car
- ❑ Machine
- ❑ Thermodynamics
- ❑ Weatherization
- ❑ Dentistry
- ❑ Renewable energy
- ❑ Product
- ❑ Pollution,
- ❑ Food
- ❑ Biodiesel
- ❑ Oil
- ❑ Waste
- ❑ Methanol Coal
- ❑ Acetone
- ❑ Butanol
- ❑ Mixture
- ❑ Biomass
- ❑ Fuel
- ❑ Protein

Other keywords:

Is there a timeline on this project?

OCE Staff Member: _____
(Signature)

APPENDIX D—COMPLETED PROJECT REQUEST FORM EXAMPLE

Database for Community Development
Project Request

Date: 3/14/10	Name of Organization: School X
Address: Example Drive, Louisville, KY 42377	
Contact Person: Susie Smith	Phone: (502) 999-9999
Fax: (502) 888-8888	Email: suse.smith@schoolx.edu
Brief description of the contact: principal of elementary school	

Brief description of the project:

School X is in need of expanding to support increasing student enrollment. The expansion needs to house classrooms, teacher offices, and meeting rooms. There is an existing stream in the preferred location of the expansion. The parking lot will need to be expanded as well. School X is looking for design options and costs.

Which of the following engineering field focus areas will this project address? *(Mark all that apply)*

- ☑ Civil engineering
- ❑ Electrical engineering
- ❑ Computer engineering
- ❑ Industrial engineering
- ❑ Mechanical engineering
- ❑ Chemical Engineering

Which of the following key words apply to this project? *(Mark all that apply)*

- ❑ Environment
- ☑ Building/Structure
- ☑ Construction
- ❑ Geology
- ❑ Soil/rock
- ❑ Street/highway
- ❑ Traffic
- ☑ Parking
- ☑ Water/groundwater
- ❑ Water quality
- ❑ Supply
- ❑ Sewer/pipe
- ☑ River/stream/channel
- ❑ Culvert/Bridge
- ❑ Foundation
- ❑ Electronics
- ❑ Computer
- ❑ Control system
- ❑ Network
- ❑ Database
- ❑ Sensor
- ❑ Technology
- ❑ Hardware
- ❑ Software
- ❑ Internet
- ❑ Programming
- ❑ Algorithm
- ❑ System
- ❑ Website
- ❑ Web
- ❑ Industry
- ❑ Health care
- ❑ Plant
- ❑ Efficient
- ❑ Queue
- ❑ Time
- ❑ Operation
- ❑ Facility
- ❑ Energy
- ❑ Super mileage
- ❑ Vehicle
- ❑ Car
- ❑ Machine
- ❑ Thermodynamics
- ❑ Weatherization
- ❑ Dentistry
- ❑ Renewable energy
- ❑ Product
- ❑ Pollution,
- ❑ Food
- ❑ Biodiesel
- ❑ Oil
- ❑ Waste
- ❑ Methanol Coal
- ❑ Acetone
- ❑ Butanol
- ❑ Mixture
- ❑ Biomass
- ❑ Fuel
- ❑ Protein

Other keywords: N/A

Is there a timeline on this project? No

OCE Staff Member: Jim Johnson
(Signature)

VITA

The author was born in Edgewood, Kentucky on March 14, 1987 to Timothy J. Cummings and Christine A. Gunkel. She graduated from Notre Dame Academy in Park Hills, Kentucky in May of 2005. In August of 2005, she enrolled in the University of Louisville and entered the Civil and Environmental Program. Erin earned a Bachelor of Science Degree in May 2010 with a Minor Degree in Mathematics in addition to a Master of Engineering Degree with a Certificate in Environmental Engineering. Upon graduation, she plans on completing a four-month internship with an Environmental Engineering firm in Detmold, Germany.