

# Building an International Resource Center Web Site -- A Capstone Senior Project Course Experience

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## Abstract

When departmental need and educational objectives converge in the evolution of significant, real-world experiential coursework, it is pure serendipity. This paper describes a collaboration involving four university departments, two senior Computer Information Systems students, one senior Professional Writing student, and extraneous university personnel toward creating an extensive international resource center multimedia website. The paper delineates the experiences of each type of participant and discusses what was needed to bring the project to conclusion. The collaboration was achieved through the Computer Information Systems capstone Senior Project course and integrated a Professional Writing field experience course, as well. The participating students learned to work and communicate together as well as with an end-user who had limited computer knowledge and high expectations of the site. The students also had the satisfaction of developing a handsome real-world product that would carry their names. The site itself met an immediate need in serving the university and its constituents and was developed to allow planned future refinement. The experience was a win-win situation for all participants.

**Keywords:** Capstone Course, Computer Information Systems, Internships, Project Management, Senior Projects, Systems Analysis and Design

## 1. INTRODUCTION

Students in the Computer Information Systems (CIS) Bachelor degree program at the University of Houston-Downtown are required to complete a Senior Project capstone course under the guidance of a Computer Information Systems faculty. The requirements for this course include design and implementation of complete and functional information systems for an end-user. The students benefit greatly by gaining needed "real

world" hands-on experience, and the end-user benefits by having a new information system at low cost, if any. Students in the Professional Writing (PW) Bachelor degree program at the University of Houston-Downtown may complete up to 240 hours of field experience through the university's Career Center. The requirements for this course include a proposal for the project that requires approval, written progress reports and a final report plus presentation of pro-

ject work that includes student writing and research efforts.

This paper presents a capstone course experience which was organized around an effort to support internationalization in the authors' university. The project involved a collaboration of several departments and resulted in the creation of an Internet-based International Resource Center (IRC). All participating students experienced the convergence of several years of university coursework into real-world skills and experience. One clear advantage of any type of capstone course is that students have the opportunity to "integrate the knowledge, abilities, and values that faculty have been teaching or demonstrating." (Rodrigues, ed. 2006) The CIS students benefited by learning more about project integration, scope, time, quality, and communications management techniques and methodologies. The PW student learned to work with open-ended research and evaluate Internet sites and information via stringent criteria. This student also benefited from exposure to a wide range of international and cultural topics that were new and intriguing. The university benefited by acquiring a site that will contribute to a need recognized throughout academia: that of internationalizing the campus. ("ACE strongly advocates comprehensive internationalization - a broad, deep, and integrative approach that enables campuses to become fully internationalized." American Council on Education, 2006). The site addresses a wide range of international issues, including political and sociological descriptions of other countries, cultures, foods, religions, art and cultural events, local and federal organizations that deal with international issues, legal international resources, local media resources for international populations, local international medical practitioners, travel information, and a host of other interests. Further, the university gained an interactive international element, as the IRC not only brings data on international issues to the fore but also stimulates thought on the redesign of curricular items, activity planning, and university services, engaging the three major populations of the university (faculty, staff, and student) in international issues and activities that change regularly, thus keeping interest high and gain useful.

Because the IRC is a permanent addition to the university's public website, careful planning was required on several levels. The authors had to gain university interest, agreement and approval. The services of the Information Technology (IT) department were required. Basic structure of the site had to be conceived and all the elements which could meet the needs of the site were gathered. Content had to be determined. Plans had to be made for the actual construction and beta testing of the site, including finding appropriate personnel for those stages. When the decision was made to include CIS Senior Project students and a PW field experience student, additional plans had to be made to dovetail the needs of the project with curriculum requirements. Finally, plans had to be made for the ongoing administration, maintenance and updating of the IRC website.

## 2. THE CAPSTONE COURSES

The capstone senior project course provides CIS students an opportunity to utilize previously learned CIS materials, especially in the areas of Systems Development Life Cycle (SDLC), web design and development, and ecommerce methodologies and techniques. Furthermore, students learn new project management concepts and technologies to meet project requirements by fully developing functional real-world computer-based systems that can be deployed by the end-user.

Among the prerequisites to this course are successful completion of Systems Analysis and Design (CIS 3301), Computer Hardware Systems Software Architecture (CIS 3303), and Database Management System (CIS 3306) courses. (Rebhun et. al., 2005) In addition, students must have senior standing and have successfully completed the Junior Writing Proficiency Exam. These prerequisites serve as the needed foundation for the multitude of skills and applications needed to bring a senior project to a satisfying conclusion.

The evolution of senior projects in our university's CIS department allows for a comfortable variety of project types. While often individual students are assigned to simple projects that require less than 150 man-hours, teams of multiple students are assigned to large, complex and more time-

consuming projects, following the most widely-used format for capstone courses – that of the Major Project course. (Fanter, 2006) As long as there is a meaningful end-product through which a student or group of students can demonstrate the integration and expression of their knowledge and skills, the project can focus upon the enhancement of existing systems or upon the creation of a new system. Regardless of the type of project, certain outcomes are shared. Students collaborate with peers, hone presentation skills, organize material, and gain an in-depth understanding of how the theories they have learned work in real-life situations. They exit the project with a far better understanding of what expectations the work world will place upon them and how to meet those expectations.

### 3. THE END-PRODUCT

The International Resource Center site (IRC) is based upon an unusual organizational pattern – that of concentric development, beginning with data in the personal forum and moving to ever-widening areas of contact (university, community, and world).” (Kellersberger et. al., 2006) The site uses multimedia to attract users, then offers data that satisfies personal needs to hook users and encourage further exploration. While browsing, the user finds ways to connect to ongoing university issues and events, discovers local resources, and eventually finds opportunities to gain a deeper and broader knowledge of the world’s cultures. Because site data are focused and useful, the site also facilitates research and directed browsing.

The IRC site’s home page offers six main categories of data:

- **Around the Globe**, which is a large repository of resources: links, organizations, calendar events, businesses – in short, all matters international that might be of interest or use to the stakeholders in the university community and to the larger community that may come to these pages for research and browsing;
- **UHD Resources for International Education**, which collects all university international programs, offices, information and endeavors in one area for easy browsing and which includes experts lists for faculty, staff and students;
- **Houston Community Resources**, which is a repository of contact information on

people and organizations dealing with international issues, as well as URLs and physical addresses and telephone numbers for information, businesses and places in the city that offer international experiences, support and interaction;

- **Featured Topic**, which hosts an archive of the various video lectures with accompanying summarized commentary that comes from a monthly WebCT VISTA page offering interactive discussion at the university level;
- **Broaden Your Horizons**, which suggests a new book, art work, movie and piece of music each month, all on international themes, and which maintains an archive of commentary from a WebCT VISTA bulletin board on past months’ selections;
- **Cross-Cultural Collisions**, which offers a cross-cultural friction point each month with explanation and suggestions for the handling of similar situations.

The site is a large site that should be revisited often; it is designed to appeal to users. Site navigation is simple, useful, and low-key. It is important to the authors that the users experience a separate, definable mental space when entering the site. That requirement is supported through the use of music and art to capture attention and isolate the user from everyday surroundings. Each page on the site opens with a bit of international music, just enough for the user to recognize the culture it is from and start making associations. The artwork uses saturated colors and interesting photos to appeal to mood and crystallize the sense that this segment of the Internet is removed from the usual data site. More emphasis is put on the senses to help the user relax and enjoy the experience, which in turn facilitates easing new ideas and perspectives into the user’s daily framework. (Appendix A)

### 4. CONSTRUCTION

Construction of the IRC was a semester-long 15-week process that began after the authors had completed basic planning and data collection. Senior Projects were developed which isolated various areas of the site for actual coding, for site design within the broader plan for the site, for data collection and for writing in terms of annotations, directions and explanations. Although this involved frequent student contact and redi-

rection, it also provided helpful feedback and ideas from this group.

Care was taken at the onset of the project to assure that students felt there was a useful end-product, the creation of which would involve discovery and unpredictable outcomes. Given the value of integrating and presenting student skills and knowledge, students were expected to learn more about their own abilities and be able to display them on a broad spectrum. Thus, senior project students were given an objective and guidance but were provided with flexibility. These planned aspects of the project echo Jaques' seven descriptors of a worthwhile project. (Jaques, 2002) Methods of reaching the objective were left up to them, but their progress was monitored closely and their ideas were encouraged and evaluated, some later being used in the project while others were discarded.

Departments involved were the Finance, Accounting and Computer Information Systems department, the English department, the English Language Institute, and the Information Technology department. A Computer Information Systems (CIS) faculty member provided two CIS Senior Project students to work on the design and development of the site. One specific area of the site required a calendar that would include major holidays in various countries of the world. It was desired that the calendar update dynamically, taking into account changes of days and dates of particular celebrations or commemoratives. This was a particularly complex module of the project which was assigned to a single student. Another issue concerned the construction of the different elements of the site, the linkages, and the setup for art, sound, and content. The English department provided a Professional Writing field-experience intern who was to gather as much information on specified areas as possible, annotate the entries, and organize the body of data into a sane and usable format. Changes and new directions occurred throughout the development, data collection, and site construction phases, some due to necessity and some due to brilliant ideas. The further the project was expanded, the more new ideas appeared to facilitate a greater breadth of the project. It was clear that the site would see future development long after it was deployed and in use.

Naturally, the deployment and continuation of the site is a process that continues even though the senior projects are complete. It was, of course, alpha tested (except for the WebCT VISTA portions which are still under development) and uploaded to a staging server where a small group of selected participants from each of the three user groups (faculty, staff, and students) will explore it. To help hone the site, a survey will be circulated among members of these groups for a site critique. Once appropriate suggestions are incorporated, the site will be released for public consumption, accompanied by a university-wide advertising campaign to draw attention to the new addition on the university's webpage. The IRC site will quickly become known to the university community, and experience increasing usage with time.

## 5. CONSTRAINTS

Planning the schedule for the completion of the IRC required taking into account the various constraints of the project. First and foremost was the time constraint of 15 weeks (~150 hours). While the CIS students were working on the coding and development of the site, the authors and the Professional Writing field-experience intern were involved in gathering and organizing additional information and developing a format for its delivery. Not all of the information-gathering could be completed in the 15-week period, which meant that some material would have to be added by the authors or by a new crew of CIS students later.

A second constraint was the number of people working together on the project: three students, two faculty members, and a host of university officials and faculty who were involved in such aspects as providing official acceptance of scope of project to providing server space, placement on the university's webpage, developing lectures for the topics page, and providing information. Such involvement created the typical delays, confusions, red tape issues and schedule juggling that generally accompany the acquiring of support from a disparate group of individuals.

A third constraint arose from our need to secure space for the site on the university's server. The site had to be accessed by multiple people (faculty member, user, and CIS students) and this created a conflict with

university policy, which prohibits multiple users sharing the same account. There was also a firm ring-pass-not on the issue of providing the students with access to any server technology that would allow them to make changes to the university's site and server. These issues were overcome by the creation of a shared directory within one author's existing Linux account and the granting of access (read, write, execute, and delete) for this directory only to the project's CIS students.

Finally, a fourth constraint was the nature of and resources on the UHD servers. One of the elements planned for the IRC was a World Calendar which would provide major countries' daily calendars that updated automatically on an annual basis using SQL and PHP scripts. However, since UHD standard policy is not to allow external codes (written by users outside the UHD IT department) to reside on its staging or production servers, as the IT staff can only review and verify or test every line in the scripts written internally by IT staff, the project team had to take on the very difficult task of creating a self-updating calendar that could accommodate lunar and solar calendar data on an external server with the understanding that once the university IT staff had tested the script, the calendar module could be moved to a UHD server.

## 6. THE PROJECT TEAM

### The User

The Director of the English Language Institute, a department within Continuing Education which provides English language training to international students, is a university staff member who has a history of supporting the efforts of the CIS faculty. She has conceived of several systems which were made available as projects to CIS Senior Project students. On the IRC project, she and the co-author conceived and expanded the idea for the site, developed a detailed layout and outline for data gathering, and provided staffing, time and other resources to the senior project students.

As the development of the site got underway, the user was contacted by a Professional Writing faculty member and asked to sponsor a professional writing student's field-experience course of 120 hours by giv-

ing the student an assignment in one of the user's on-going projects. Since the user had already developed a general outline for the type of data to be included in the site, the PW student was assigned to research, find, and compile topic-specific sites and annotate these links.

The user, while basically pleased with the progress of the project, encountered several obstacles along the way. Some were simply the irritating issues that arise when working with a disparate group of people and students, such as scheduling difficulties and student procrastination. Because the CIS students were online students, they were not often on campus to display the stages of product development; thus the user ran into disappointments and precious little time in which to correct them. Other scheduling difficulties occurred because officials from distant parts of the university had to be involved at certain steps and their parts had to be concluded before project workers could move forward. University officials did not always have the project on their priority list. Although preliminary discussions with university officials had assured that the website would be welcomed, once the semester started there were slowdowns, equivocation, and lack of decision-making when such things as a location on the university's homepage were needed.

As has been noted by other faculty working with student collaborations, "one of the greatest challenges for students is time management." (Rosenthal, 2003) The IRC project was no different. Over 50% of the interactive project work took place in the last few weeks of the semester, which also happened to coincide with the busy end of the user's regular session with English language students. Time became a prized commodity and tempers frayed as students attempted to monopolize the user's attention during this period. Toward the end of the project, an additional time issue evolved with data delivery from the PW student. Thus, some material could not be included on the site immediately.

Other unexpected project obstacles were more profound. Because the user had a background in English and art but no knowledge of computer systems, she was able to develop clear visual and behavioral expectations of the website but lacked necessary

awareness of available technology to understand what could be done to bring those concepts to fruition. When student perception was not aligned with the user's perception, the user had no technical expertise to help redirect the confusion through examples. Similarly, lack of vocabulary familiar to the students left the user stumbling about in the darkness of technical jargon. The students, of course, felt the user was unaccountably imprecise! Communicative exchanges could be prolonged and frustrating, with misfires along the way. Thus, differing perceptions led to time wasted on efforts that did not meet the user's requirements or expectation.

### **The Faculty and Students**

During the first week of the semester, the CIS faculty who has been teaching the Senior Project course for many years contacted enrolled students to consider developing the IRC web site. Since most CIS 4312 students acquire projects well before the semester begins, only a handful of students were willing to study the IRC system requirements. Finally, two motivated students with high GPAs who had the needed expertise were selected as the project team. Both students were recipients of several honors and scholarships, and both were finishing their last semester's study at UHD while working full-time. Their selection was to ensure that students whose abilities dovetailed with the user's needs were assigned to the project, therefore increasing likelihood of project success. (Janicki, 2004)

Because the students were working fulltime, they were distance education enrollees. This meant that much of the communication student-to-student, student-to-user and student-to-faculty needed to occur through email and telephoning. However, as research indicates that groups using primarily technological communication are less satisfied than those using face-to-face means, meetings and monitoring was set up to encourage some face-to-face exchanges. (Walther, 1996) Thus, once the project team was formed, the CIS faculty scheduled an introductory meeting with the user and students to provide for an opportunity to exchange information, discuss the site, and agree on the project scope. Thereafter, they were given time to formally study the proposed IRC website project and its require-

ments and document their findings in the study phase report.

Meanwhile, a Professional Writing field-experience intern was added to the project team with the sole responsibility of gathering data on assigned topics relating to the website, verifying link accuracies, and writing link descriptions. This student was enrolled in a 120-hour internship course that required a proposal, an interim report, and a final report of the internship experience along with a sample of the project completed. The great majority of this student's time was spent in gathering data. She was directed in her search through on-going discussions with the user about the type of data needed.

### **7. PROJECT LIFE CYCLE**

Once the project study phase report was reviewed and analyzed, the CIS faculty and students met to identify the work breakdown structure (WBS). While the CIS faculty assumed the role of project manager, the CIS student with the higher GPA was designated, in an effort to synchronize student efforts, to act as a project leader, holding regular meetings to discuss project progress and to report problems as well as compiling various project reports. Furthermore, according to their expertise, each student was assigned a series of tasks to complete. Because of the number of interrelated and embedded tasks, it was agreed that they would generate one set of project documentation and would earn the same grade for the project.

Throughout the design phase and even into the implementation phase of the IRC website, students utilized Joint Application Development (JAD) and Rapid Application Development (RAD) methodology and techniques (Wood, 1995). The students designed the site with full input from the user via face-to-face meetings, email exchanges and phone conversations. In fact, on a number of occasions, the user (an artist) would create Word files containing a particular webpage's contents, colors, graphs, and pictures, and email it for students to code. When communication was unclear, the user would browse through the web for examples of things she was trying to describe to the students. These were emailed with descriptions. Finally, the technical writing for the site was sent to the students for inclusion on

the second and third layers of the site. The student who took responsibility for the coding of text consulted with the user about how the text should look graphically as well as in format and division. During each of the phases of the project, the user reviewed the reportage created by the students and signed off on it to signify her satisfaction with that stage of development.

At the end of each phase of system development, the students were required to turn in a comprehensive report that would include description of tasks for the specific phase along with related charts and diagrams. Furthermore, the students were required to orally present the system twice – once at the end of the design phase and once at the end of implementation phase.

The CIS faculty would review the reports and system documentation, note corrections, make suggestions, and schedule meetings with the students to discuss the state of the project and their progress. Moreover, as needed, the CIS faculty met with students to provide them guidance and help them resolve technical glitches. As the semester progressed, the CIS faculty also became the liaison between the UHD IT department and the end-user, especially when trying to resolve the site location and shared directory issues.

Although, for this capstone experience, the supervising CIS faculty member relied on student GPAs and résumés to select the project team, as it turned out, one of the students was not as motivated as the other, which caused frustration, disappointment and a few delays along the project milestone. Although the weaker student eventually delivered his work, when that student fell behind and could not deliver high quality work, the group leader hesitated to report the misconduct, and instead chose to complete some of the work assigned to the weaker student. In this case, it was obvious that one student deserved a higher grade than the other. However, since the weaker student finally delivered his work, the grade agreement was honored and both students

earned the same grade. This issue once again raises the question of fairness of a group grade for project teams. (Rebhun et al. 2005)

## 8. CONCLUSION

A collaboration of the breadth and complexity of the IRC site can be an interesting challenge both to participating students and faculty. In the case of the IRC, the story is only beginning. Other faculty members have become interested in using the site as a means of disseminating international issues and projects of their own. The interactive nature of the site, with its WebCT VISTA component, offers an unusual facet for the university community to explore. The authors expect to see multidiscipline collaborations appear as the WebCT VISTA component is launched, presenting timely international topics through the posting of videotaped lectures and offering on-going commentary through chat rooms and bulletin boards. Because faculty, staff and students are stakeholders in the site, it is likely that class assignments will soon appear, both direct ones and those fascinating meta-observations of what is going on during human interaction and exchange. Finally, certain faculty members are already talking about involving students from other countries in assignments through connections with colleagues abroad. As it develops, then, the site will be a fine locus for international collaboration and exchange of ideas between students and faculty.

Is the senior capstone project, then, a positive experience? Resoundingly so, the authors say, for all involved. In the case of the IRC, the process and results challenged and satisfied the students. The CIS faculty not only provided masterful management of the many disparate elements of the project but also contributed to a lasting legacy for the university. The end-user saw a good idea come to fruition and, again, contributed to a lasting legacy for the university. All in all, the collaboration was well worth the planning and effort.

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APPENDIX A



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graph TD
    IRC[International Resource Center] --> ATG[Around the Globe]
    IRC --> UHDE[UHD Resources for International Education]
    IRC --> FT[Featured Topic]
    UHDE --> HCR[Houston Community Resources]
    UHDE --> BHZ[Broaden Your Horizons]
    UHDE --> CCC[Cross-Cultural Collisions]
        
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**Partial code:**

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