

Building Experiences Outside the Computer Classroom Into the Computer Curriculum

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Abstract

This paper discusses requirements that occur *outside* the classroom that students in the Information Science and Technology (IST) department of Doane College (a four-year, liberal arts college in Crete, Neb.) must fulfill as part of their major (computer science or information systems). These requirements include a *systems analysis project* targeted for the first year, a *community service learning project* typically completed the second year, an *internship* often completed during the third year, and a *capstone project* completed during the final year.

The purpose of this paper is to share what one department is doing in requiring experiences outside the classroom, with the intent that it contributes to a dialogue in which others share their experiences in this area.

Specific topics of the paper include a discussion of how the requirements that occur outside the classroom relate to the mission of the IST department; a description of each of the specific requirements (systems analysis project, service learning project, internship, and capstone project) and how they are administered; and an overview of how the experiences are assessed, including the use of rubrics and a developmental portfolio.

Introduction

Gaining experience outside the classroom as part of a student's education is valuable, yet there is no guarantee that students get this experience unless it is a requirement. Recognizing the value of experience outside the classroom, the Information Science and Technology (IST) department of Doane College (a four-year, liberal arts college in Crete, Neb.) has started requiring four such experiences.

This paper discusses those four requirements that occur *outside* the classroom that students must fulfill as part of their major (computer science or information systems). These requirements include a *systems analysis project* targeted for the first year, a *community service learning project* typically completed the second year, an *internship* often completed during the third year, and a *capstone project* completed during the final year.

Specific topics of the paper include a description of each of the specific requirements (systems analysis project, service learning project, internship, and capstone project) and how they are administered; a discussion of how the requirements that occur outside the classroom relate to the mission of the IST department; and an overview of how the experiences are assessed, including the use of rubrics and a developmental portfolio.

The Experiences

The Doane College Department of Information Science and Technology offers two majors: information systems and computer science. As part of the major, students must complete four requirements designed to give them experience outside the classroom. These required experiences include a systems analysis project, a community service learning project, an internship, and a capstone project.

Systems Analysis Project

While the systems analysis project occurs outside the classroom, its fulfillment is tied to the introductory information science and technology course, typically taken by first-year students. During the project, students actually go through the phases of a small systems analysis and design project, including understanding user requirements, evaluating alternatives to meet user requirements, designing a solution to meet user requirements, and developing and presenting a proposal on how best to meet the user requirements with the solution.

For the project, students form teams of two or three. Each team identifies a user for the project. The user is an individual or small organization considering purchasing or upgrading a personal computer. Early in the semester, members of the team must gather information so that

they understand the user's environment and needs. Interviews are the primary technique used to gather information. During one class session, there is a discussion of how to effectively gather information from a user. It is emphasized to the teams that the focus of the interview is not on what specific hardware and software the user needs or wants, but rather on the information processing requirements of the user.

After the information is gathered, the teams perform research to discover alternatives to meet the requirements of the user. The teams are directed to first examine software alternatives and then research the hardware needed to support the software. The result of this research is an outline of several software and hardware solutions, including a simple cost/benefit analysis of each, that will meet the requirements of the user. From the alternatives, the teams determine a solution that will best meet the user requirements.

The teams then prepare a proposal. Contents of the proposal include an executive summary, a summary of the information gathered about the user and user requirements, a description of the alternatives researched, a formal recommendation of specific alternatives with justification as to why those alternatives are recommended, and an initial implementation plan describing to the user the next steps that need to be taken. The proposal is web-based, so that multiple media can be used and links to vendors' websites can be included.

As a final requirement, students prepare a professional presentation of the proposal, complete with visuals (using PowerPoint) and handouts. The presentation is given to the entire class. It is stressed that user involvement throughout the process is crucial.

Community Service Learning Project

All students majoring in information systems or computer science must complete an activity course, called Doane Information Solutions Cadre (DISC). The activity course, typically taken during the sophomore year, is worth one credit hour and is graded on a pass/fail basis. Students do several activities during the course, including discussing career opportunities and reviewing their portfolios, but the most significant requirement is the completion of a community service learning project.

In teams of two, students identify and complete a project in the local community. In order to place students, we have worked closely for the last several years with the director of the community telecommunications center. The telecommunications center is a grant-driven entity formed to provide information technology resources and education to citizens and organizations in the community. Examples of some of the services provided by the center include access to computers, community kiosks, training workshops, website development for local organizations, and special projects with the local schools, such as an e-mail pen-pal intergenerational program between fourth grade students and a retirement home.

The teams are assigned a project related to the students' areas of interests. For example, students interested in networking might assist the local schools in connecting computers to the Internet; students interested in web application development might develop a website for a local business; students interested in technical support might assist the telecommunications center in routine computer maintenance and troubleshooting; and those interested in end user support might lead training workshops.

Internship

All students obtaining a computer science or information systems major must successfully complete a three credit-hour internship. This translates to working nine hours each week of a fifteen-week semester. Students typically complete the internship requirement during their junior year, although this varies.

Students are completely responsible for finding their internship. To assist them in their preparation and search, Doane College requires students to take a special course prior to participating in an internship. The course, taught by the director of career development, requires students to create a resume, develop cover letters, perform mock interviews, and begin a search of companies for which they may want to intern. In addition, the course explains to students the steps needed in order to complete an internship, including completing a proposal form, registering for credit, completing a learning contract, completing weekly activity sheets, and completing midterm and final evaluations.

The Department of Information Science and Technology assists students searching for internships by providing contact information gathered from friends, alumni, and previous student internship experiences. Students are highly encouraged to identify internships that allow them to perform tasks related to their particular interests, such as networking, software engineering, database application development, technical support, and web-application development.

A member of the IST faculty serves as a sponsor for the internship. However, all administrative tasks are handled through the Career Development Office.

Capstone Project

Computer science majors, information systems majors, and computer studies minors must successfully complete a seminar course. The course is structured along two lines: career preparation and assessment. In the area of career preparation, tasks completed as part of the seminar include reviewing student portfolios, updating resumes, identifying twenty positions to which to apply (whether in the industry or graduate school), and completing cover letters.

Tasks in the area of assessment are developed with the intent of letting the IST faculty know whether or not a student is prepared to graduate based on the mission of the department. These tasks include the completion of IST assessment examinations, the creation of IST assessment examination questions, participation in two panels covering material from industry literature, and successful completion of a major project.

The project demands that students demonstrate the knowledge, confidence, and skills expected of a Doane IST graduate. Projects must be significant enough that they can be listed on a student's resume as experience.

With faculty guidance and input, students choose projects. Most projects fall under one of four types: a formal research project (not unlike those completed for master's theses but on a smaller scale); application development projects for organizations (including database applications, high-level language applications, and web-based applications); systems analysis, design and implementation projects for organizations (including client and server systems and stand-alone computers); and industry certification projects (most popularly MCSE, Java, and A+).

Students provide project status reports during weekly meetings of the seminar class. Students must write a formal paper and present their work. MICS has been one forum at which students present work. In addition, this spring Doane initiated an annual event which allows students to showcase exceptional academic work. This event, called MindExpo, will be a popular forum for their presentations.

The Experiences and the Mission

As stated in the mission of the Department of Information Science and Technology at Doane College, *the program will offer students of information science and technology innovative, thorough majors in the areas of computer science and information systems with experience both inside and outside the classroom. The acquisition, application, and communication of knowledge and skills, from theoretical to applied, will be provided. An independent, abstract, and critical thought process will be stimulated demonstrating self-confidence and leadership.* While developed to be in-line with the mission of the college, this mission statement, like many, is quite abstract.

From the mission statement, four goals for all students obtaining a major in the IST program have been established. These goals include:

- an understanding of information science and technology concepts and processes, their relationships to each other, and their relationships to existing and emerging computing technologies,
- the confidence and skills to independently learn and apply existing and emerging computing technologies and processes,
- the confidence and skills to solve an unknown problem and to efficiently research, learn, and apply an unknown topic or skill to novel problem-solving situations,
- the confidence and skills to effectively communicate (read, listen, write, and speak).

These goals are much less abstract than the mission statement and were used as the formal framework when developing the systems analysis experience, and are used as guidelines when evaluating possible internships and projects for the community service and seminar. In order for any project to be approved, it must demonstrate that the student will:

1. Utilize and apply the knowledge learned in IST courses and build upon that knowledge (this directly relates to the first goal above),
2. Work directly with information system technology (this directly relates to the second goal above),
3. Independently learn something new and apply it in solving a problem (this directly relates to the third goal above), and
4. Utilize and practice a variety of communication skills, including speaking (one-to-one, small group and formal presentations, both technical and non-technical), reading (technical and non-technical), writing (technical and non-technical) and listening (this directly relates to the fourth goal above).

In addition to helping us meet our goals related to our mission, these experiences also allow students to develop a sense of professionalism and to have experiences that cannot be duplicated in the classroom.

Assessing the Experiences

All IST students maintain a developmental portfolio of their work, beginning in the introductory course and continuing through seminar. Each entry in the portfolio requires students to reflect on the knowledge and skills they possess, their growth, and their needed development related to the four goals described in the previous section.

Students complete a portfolio entry for each of the four experiences described in this paper. This entry is reviewed by the faculty and other students as part of a larger portfolio review process. In creating the entry, the student reflects on how the experience aided with growth and development in the four areas outlined by the goals above. In reviewing this entry, members of the faculty can assess the value of the experience from the student's perspective.

In addition, there are other tools used that allow the experiences to be assessed. Some of these tools are for the student to use, while some of the tools allow an external assessment.

For the systems analysis project, the other primary assessment tool is a feedback and evaluation form completed by the course instructor. The form is completed twice - once after an initial draft of the proposal and once after the final draft and presentation.

For the community service learning project, there are two other assessment tools. The first is through weekly project update reports and a final presentation given by each student to the course instructor. The second is feedback provided by the director of the telecommunications center. She provides regular feedback to the students on a weekly basis and provides a more formal report of the students' performances to the faculty member coordinating the activity course.

For the internship, the other primary assessment tools are the forms required as part of all internships. Students participating in an internship must complete weekly task reports in addition to a mid-term and final internship performance evaluation. All students participating in an internship must not only have a faculty sponsor, but must also have a supervisor at the internship site. The supervisor is asked to complete two performance reports, one in the middle of the internship and one following the completion of the internship.

For the seminar project, students provide regular project reports to the instructor responsible for coordinating the seminar. In addition, students must complete a paper and presentation, both of which can be used for assessment purposes. Finally, students do a final assessment of their project using a rubric structured along the four goals.

Summary

It is important to note again that these experiences were designed according to department goals developed in order to help the department achieve its mission - which is directly related to the mission of the college.

It is also important to note that these experiences are only part of an overall academic experience. In addition to these experiences outside the classroom, the courses themselves and the projects and assignments developed for the courses are designed with these four goals in mind.

Finally, it is important to note that there are several other experiences outside the classroom that we highly recommend and advise to our students, but do not require. These include working for Doane's IT office, obtaining part-time and summer employment, owning their own computer,

offering their services to fellow students and faculty, getting involved in the college's computer club, and joining a professional organization as a student member.