Panel: Capstone Experiences for Information Technology

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SUMMARY
The integrative capstone experience is central to the advanced level of a four-year IT degree program as defined by the IT 2008 Curriculum Guidelines [1]. The general requirements for this experience include that students work in teams of 4-8 on a real-world project. This project should be sufficiently complex to require a team effort over many weeks. However, the implementation of the integrative capstone experience can vary widely from a design course without external clients, to projects that have real clients to professional internships and co-operative education experiences. Courses may also vary based on length, evaluation approach, process and deliverables, and instructor role.

The goal of this panel is to discuss best practices for capstone experiences for BSIT degree programs. The panel will contrast varied implementations of IT integrative capstone experiences to provide a starting point for discussion. Each panelist will briefly describe their institution’s capstone experience, discuss the benefits and drawbacks to their implementation, share issues and ideas they have for improving the capstone, and discuss student opinions of the capstone. A minimum of 35 minutes will be set aside for audience interactions. Questions for discussion will include:

- How are BSIT projects different from capstone projects for other computing disciplines?
- What process and products are appropriate for a BSIT capstone?
- How important are external clients for capstone projects?
- How should individual vs. team contribution be evaluated?

Categories and Subject Descriptors
K.3.2 [Computers and Education]: Computer and Information Science Education – Computer Science Education.

General Terms
Human Factors.

Keywords
Information technology education, capstone projects, team projects

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1. GREGORY HISLOP
Drexel University is a medium sized research university with 12,000 full-time undergraduates and about 16,000 total students. Drexel is known for technological and professional education and for extensive co-operative education. There is a full range of computing degree programs including IT, IS, CS, CE, and SE. All these degrees are co-op oriented and the typical student follows a five year program that includes three co-ops of six months each.

Drexel has quarter terms and capstone design for the BSIT has been structured two ways in recent years. Initially, the capstone was a single term team project followed by a two term team project. More recently, this approach has been replaced with an integrated three term team project sequence (totaling about 33 weeks).

The capstone has been taught with combined sections that mix IT, IS, and SE students. Teams may contain a mix of majors, although students often choose to work within their major. Given this mix of majors, projects tend to be software centric, and there has been some faculty discussion as to whether IT majors should be encouraged to consider a broader range of projects. External clients are not required, but students often use projects connected to co-op experiences. The College is moving in the direction of requiring more client participation. As in many colleges, the tension between team experiences and individual grading is a concern.

2. JOSEPH EKSTROM
Brigham Young University is a private university of 33,000 students located in Provo Utah. The IT program is one of 6 programs in the School of Technology. The School is part of the Ira A. Fulton College of Engineering and Technology. The IT program offers an undergraduate IT degree and an MS in Technology with an IT emphasis. The undergraduate program was accredited by CAC of ABET in 2005 and 2011.

The integrated capstone experience consists of a sequence of two courses and a required work experience. The first course is a 2 hour project initiation, requirements, and preliminary design experience during the fall semester. The second course is a 3 hour project implementation, test, and documentation course taught during the winter semester. In addition, students are required to document at least 200 hours of work in a professional IT position. Since most of our students have part-time employment in IT after their sophomore year, this requirement is almost never a problem.

The 2-course sequence is done on a single project as part of a team formed early in the first course. The projects are proposed to the students during the first two weeks of the first course. During the 2011-2012 sequence 30 projects were proposed, 20 were presented...
to the students and 5 were chosen by the students to be implemented. The projects were originated by business entities, other entities in the University, students, and this year by one of the faculty. Students select their top 3 choices and a short paragraph explaining their motivation. The faculty then form teams and assign faculty coaches.

Working with their “customer” the teams complete a project life cycle through presentation of the project deliverables to the Industrial Advisory board. The last 2 years’ teams have competed and placed in the top 10 nationally in Microsoft’s Imagine Cup. Projects included an automatic scaling infrastructure for provisioning Infrastructure as a Service environments, a test environment for using streaming video goggles to assist hearing impaired children in watching an ASL translation at the same time as participating in other activities (i.e. a planetarium), and a cloud based management system for dairy farms. Grading is based on individual assignments and group performance, including coach and peer evaluation of all participants.

3. **HEIDI ELLIS**

Western New England University (WNE) is a small university located in Springfield Massachusetts with approximately 2500 full-time undergraduates. The Computer Science and Information Technology department is located in the College of Arts and Sciences. WNE has had a Bachelor’s of Science in Information Technology since 2006.

The integrative capstone experience at WNE is accomplished via a required 3-credit internship which is a natural fit to WNE’s emphasis on learning outside of the classroom. The internship requires students to work a minimum of 150 hours typically over 10-15 weeks. Students usually complete internships during their junior or senior year or the summer between junior and senior year and students may be paid for their effort. There is strong support from local industries and most students are placed into an internship with ease. Many students are hired by the companies in which they intern.

Grading is based on a combination of internship supervisor evaluation, student logs, and a paper. Students are required to identify learning goals and outcomes specific to the internship in which they are participating before starting the internship. These goals and objectives are set in consultation with both the industry supervisor and the faculty overseer. The student must also identify a tentative paper title. Grading is flexible, however the majority of the weight of grading (typically 60-80%) is placed on the internship supervisor evaluation.

4. **REFERENCES**


The Information Technology programs at Penn College are designed in such a way that all IT students take courses within the core information technologies at the beginning of their curriculum. Once this foundation is developed, students take courses that develop depth within their area of specialization such as application development or networking. Prior to taking their capstone course, they take a specialized 3-credit “pre-capstone” course within their area of concentration. This course develops project design, planning and budgeting within their concentration.

During their capstone semester, students are required to propose a project of their own design. The project must go through an approval process where the faculty member verifies that it meets the depth and breadth of IT. The depth requirement ensures that the project is not trivial in nature and includes aspects of project planning, time management, system analysis and design, and adherence to accepted standards. The breadth requirement ensures that the project includes integrated aspects of databases, programming, networking, web technologies, security, documentation and support. Additionally, projects must incorporate some aspect of IT of which the student is unfamiliar. The students are expected to complete independent research in this area and then integrate the knowledge into their project.

**3. SANDRA GORKA**

Pennsylvania College of Technology (Penn College), a special mission affiliate of Penn State, is committed to applied technology education. Located in Williamsport Pennsylvania, Penn College attracts the second-highest enrollment in the Penn State system. Penn College has nearly 6,000 students enrolled in associate- and bachelor-degree programs relating to more than 100 different career areas. Penn College offers students hands-on instruction and access to the latest equipment, leading to excellent graduate placement and “degrees that work”. The IT program is located in the School of Business and Computer Technologies and has students in several concentrations.