Case-Based Learning in Computer Information Systems

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INTRODUCTION

How can we retain computer information systems (CIS) students? A decline in enrollment similar to that which occurred in the 80's (Mawhinney, Callaghan, & Cale, 1989) is the motivating factor for this question. A google™ search on declining enrollments in information systems brings up reports supporting this trend. DePaul University, for example, had increased undergraduate enrollments "in all colleges but the School for New Learning and the School of Computer Science, Telecommunications and Information Systems" (DePaul University, 2003). A report from the California Community College system listed the top 15 curricular areas of declining FTE's (Perry, 2003); Computer and Information Science and Computer programming made the list. Our own Computer Information Systems (CIS) and Computer Science programs have fewer students enrolled.

BACKGROUND

A recent comparison study (Jennings, Mahwinney, & Fustos, 2003) confirmed past research (Mawhinney et al., 1989) indicating that students perceive that an IS career provides less work-place interaction than they desire. Lack of understanding regarding an IS career is not uncommon. As Mawhinney et al. (1989) and von Hellens and Nielson (2001) found, students believe that CIS entails working alone and requires a high level of math. Because of the scarce or inaccurate knowledge regarding a CIS degree or career, students may avoid CIS programs.

In addition to a lack of understanding related to what an IS worker does in his/her job, retaining students within entry-level college IS courses is a problem (Myers & Beise, 2001). Many students feel they are computer literate until they enter an IS program. The skills that they possess and the skills needed within an IS degree are likely to be disparate (Easton & Easton, 2002; Karsten & Roth, 1998). Rather than a sink or swim attitude on the part of colleges and universities, time spent coaching and encouraging students on relevant computer skills for the IS degree may help them feel confident and able to complete the program (Compeau, Higgins, & Huff, 1999). This means more than showing students the benefits of technology or how to use a computer. It may require providing meaningful and relevant learning situations in which to use the technology (Venkatesh, 1999) that are similar to actual work-related scenarios (Gallivan, 2000).

Without an accurate picture, it is difficult for students to understand the work-style of information system professionals. The content of CIS courses is technically-oriented and many students struggle with the content, usually in isolation. This, however, belies the business environment where employees usually work together on projects. Learning should take place in a similar environment. In addition, research suggests that there is a synergistic learning effect within group environments (Ryan, Bordoloi & Harrison, 2000; Savery & Duffy, 1995). For example, better understanding of a system and development of more accurate mental models was found in a group environment (Gallivan, 2000). An unconstructive aspect of such a learning situation is that negative comments may affect the attitude of group members (Gallivan, 2000), or "group think" may stifle creativity.

MAKING THE CASE

Given that the team or group-based projects approach is a ubiquitous part of a career in this field, authentic learning environments could provide students with a more realistic model of the IS field. With authentic learning environments, the necessary information technology skills are embedded in the learning process. Also embedded in the learning process are the soft skills that managers say

are lacking in employees, such as problem solving, communicating effectively and working in group environments. (Lee & Trauth, 1995; Todd, McKeen, & Gallupe, 1995).

There is a body of research and theory on the importance of providing authentic and relevant learning environments. This is often within the context of constructivism, an umbrella term that identifies a learning philosophy. Constructivism gained wide-spread acceptance in the educational technology discipline in the early nineties (Duffy & Jonassen, 1991; Lebow, 1993; Savery & Duffy, 1995; Vanderbilt Cognition and Technology Group, 1990), although it has been in existence in different forms for decades. It is gaining acceptance within information systems and computer science education as well (Ben-Ari, 2001; Boyle, 2000). The Web, in particular, has provided a platform where collaborative learning environments can be supported (e.g., Shang, Shi & Chen, 2001; Vat, 2001).

Cases (Harvard Business School, 2003; Potvin, 2000) or problem-based learning (PBL) (Barrows, 1993, 1985), situated cognition (Duffy & Jonassen, 1991), learner centered (Henson, 2003) and cooperative learning and anchored instruction (Vanderbilt Cognition and Technology Group, 1990) are some of the terms or models that fit within a constructivist paradigm. While some aspects may vary, the overriding principles include active engagement, collaboration and personal relevance. The reasons for learning are embedded within rich, authentic contextually relevant environments (Harvard Business School, n.d.; Lebow, 1993). The outcome is the ability to reason and problem-solve ill-structured situations. These types of environments are more likely to develop ownership on the part of the students involved (Savery & Duffy, 1995) and may promote what Agarwal & Karahanna (2000) call cognitive absorption and Jennings (2002) calls cognitive aesthetics.

The Harvard Case Method (Harvard Business School, 2003) and PBL are probably the most well known examples. Neither Harvard cases nor PBL are new concepts. The Harvard Case Method originated in 1913 (Harvard Business School, 2003). The objective of the case method was to enhance judgment and decision-making capability and it is widely used because of its success (Harvard Business School, 2003; Potvin, 2000). Problem-based learning was developed in the mid 50's for medical education (Savery & Duffy, 1995) and like the Harvard Case Method, provides a student with a problem that they must solve. Most often, when a student resolution has been reached, it is compared to the solution of the company or physician from which the case originated, although this is not always the situation. Whether or not a comparison is made, the goal is for students to acquire the knowledge and skills to solve problems in their respective fields.

Constructivist models are designed for ill-structured material and provide relevant, engaging, authentic contexts from which to draw conclusions. Teachers (or facilitators) are mentors and guides who challenge students to problem-solve; they model higher order thinking skills (Barrows, 2003; Savery & Duffy, 1995). These models all include interaction between peers which is a successful means to engage students (Vanderbilt Cognition and Technology Group, 1990).

They are however, not particularly easy to implement because of the time commitment and the difficulty in distilling a problem into an appropriate case or authentic environment in which to anchor instruction. The problems for Harvard cases come from the business world, such as a company implementing an e-business model. It can take between 1-4 months to develop a case and Harvard Business School (HBS) considers four factors when devising a case (Harvard Business School, 2003):

1. The issues on which the case will focus;
2. The analysis required on the part of students to address those issues;
3. The data required in the case to perform that analysis satisfactorily; and
4. Where the data can be obtained.

Two sites that provide many free cases are the Idea Group Inc. Web site (http://www.idea-group.com/cases_pp/login.asp) and the HBS Web site (http://harvardbusinessonline.hbsp.harvard.edu/b02/en/cases/cases_home.jhtml). Idea Group has information systems cases while HBS provides general business cases. In addition, the following links (retrieved February 12, 2004) have either example cases/problems or information regarding this type of learning environment.

- Multidisciplinary case-based learning for undergraduate students: http://www.blackwell-synergy.com/links/doi/10.1034/j.1600-0579.2000.040404.x/abs/
- The Center for Problem-Based Learning (PBL) at Samford University:http://www.samford.edu/pbl/
- University of Delaware (a list of links): http://www.udel.edu/pbl/others.html
- Problem-Based Learning: An Introduction: http://www.ntlf.com/html/pi/9812/pbl_1.htm

Another potential source for cases is a college's local business community. Working with a local company to develop a case provides a unique opportunity for students to interact with the company. Student feedback strongly indicates that this opportunity increases the relevance, engagement and desire to implement a worthwhile solution to a problem.