

DESIGNING A CAPSTONE COURSE FOR INFORMATION SYSTEMS: CHALLENGES FACED AND LESSONS LEARNED

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ABSTRACT

Increased outsourcing of Information Systems (IS) jobs to foreign countries has led to a national debate on the future of Information Systems professionals in the United States. As the trend towards outsourcing continues there is a fear that it may have an impact on Information Systems education in this country. Anecdotal evidence indicates that these fears have led to a reduction in students applying for IS programs nationwide. It is our belief that IS programs nationwide need to adapt to changing conditions in the information systems industry. While curriculum changes in a University can often be a time consuming process, changes can be incorporated in the capstone IS course. The capstone IS course provides an excellent opportunity for students to learn skills that will make them more competitive in the IS marketplace. In this paper we highlight the challenges of designing a capstone Information Systems course and recommend specific strategies to enhance student learning and success in a capstone IS course based on our experience of designing one.

Keywords: Capstone IS course, integrated course design, student learning, IS curriculum, outsourcing.

INTRODUCTION

A challenge that organizations face every day is how to increase returns from their investments in information systems (IS). While the investments have continued to increase steadily in recent decades the returns from these investments are suspect. As companies struggle with ascertaining returns from IS deployed in an organization they are turning to cost cutting measures by outsourcing parts of their IS operations. In a recent article in the Financial Times, Roberts (7) reports on the outsourcing phenomena, “3.3 million U.S. jobs would go offshore through outsourcing by 2015 (Forrester Research)” and “up to 25% of traditional IT jobs would be relocated from developed to developing countries by 2010 (Gartner Research).” This situation is complicated further due to an ongoing debate worldwide that started with Carr’s (1) article titled “IT Doesn’t Matter.” In his article Carr (1) mentions that IT has become a commodity and is no longer a source of competitive advantage for organizations. While one can argue Carr’s statement there is no doubt that some components of IS appear to have been commoditized and as a result we have seen a growth in the outsourcing phenomena. Even if these jobs are not outsourced we may see more automation of routine tasks. So one may ask, what is the significance of this for the IS discipline in academia in the US? If the trend continues there is a fear that IS education in the US would face challenges with respect to recruiting students. As educators it becomes pertinent that we in the IS discipline address these issues.

One logical place to begin from is an examination of our IS programs and students. Does the IS program offer the skills that are relevant in today's world? Do students graduating from the program possess the knowledge required to be a successful IS professional? Do they understand fundamental business and IS concepts? Are students able to creatively analyze and synthesize business and IS concepts learned over a four year period? Are students able to apply this knowledge in developing real-world computer-based information systems?

The opportunity to synthesize, analyze, and apply knowledge acquired over several years is provided to students in a capstone course in most schools. This course enhances the education experience of students by helping them understand the big picture, i.e. how knowledge acquired from all the courses in their curriculum converges together and how can students apply this knowledge to develop an information system. Students that learn to successfully synthesize, analyze, and apply knowledge in a capstone course gain an advantage in the highly competitive IS marketplace, leading to successful careers in the IS field. Information Systems programs can highlight these success stories creating a tremendous effect on student recruitment for the IS major. The challenge for us as educators is to design a capstone course that provides students the opportunity to learn and succeed in their chosen field. In this paper we address two critical questions for designing an IS capstone course.

(1) What unique challenges does one face when designing an Information Systems capstone course that integrates knowledge from all courses that students take in a four year program?

and

(2) How can we enhance student learning and success in an IS capstone course?

In the following section we look at the existing research on capstone courses. This is followed by a discussion of unique challenges that we faced when designing (the focus of the paper is on the design aspect and not the actual implementation) the capstone IS course at Central Michigan University. Finally in the concluding section we list and discuss strategies that we used to overcome challenges faced by us in designing the capstone course.

RESEARCH FOUNDATION

Knowledge integration and application in a capstone course is a challenging task in any program. An instructor designing a capstone course needs to ensure that critical components from all the courses are integrated. The scenario is complicated when one is involved with designing a capstone IS course due to factors such as the need to integrate business concepts and technology skills, the diversity of IT skills and the rapid rate of change in the IT industry. IS design and development projects used for application of concepts in a capstone IS course need to address the complexity of the process yet be simple enough so that students can complete them in a semesters time.

Neville and Adam (5) highlight the need to provide a "hybrid IT-Business expertise" to IT students. They state that this enables students to develop skills that they can use immediately to "contribute to the organizations that hire them." To achieve this they use a business simulation case that enables students to understand the complexities of software development. Lopes and

Morais (2) reinforce the need to integrate business and IT skills and point out that both are important for IS curriculum. They also highlight the fact that IS courses need to be “frequently updated to remain effective” due to the nature of the evolution and advancement in the IT industry. Frequent updates to individual courses impacts the design of capstone course as it will need to be continually revised to incorporate changes. Noll and Wilkins (6) point out that IS programs need to take a serious look at what their curriculums are and recommend the need “to create programs that more accurately reflect the demands of the marketplace.” They highlight the diversity of skills needed by the IS industry and the fact that a generic IS program cannot provide these skills to students. They recommend “distinct concentrations” such as “programming, analyst and user support” that provide diverse skills to students.

Several scholars (4, 8) have written on the IS curriculum capstone course. Myers (4) describes a project that can be used for a capstone IS course. Tuttle (8) describes the organization of the capstone IS course at Humboldt State University. Both these studies provide useful insights primarily from a capstone project experience perspective that focuses on IS curriculum. Tuttle (8) does go beyond the project experience and describes the course structure, methodology and the student feedback. In our view these studies fail to take a comprehensive view of the IS capstone experience and this is the gap we are trying to fill. Students need to learn about the integration and convergence of not just the IS curriculum but the complete academic experience. This becomes more important now due to the increase in outsourcing as most of the jobs being outsourced are specific IS skill based, e.g., coding, maintenance etc.

UNIQUE CHALLENGES FACED

Designing a capstone course is a challenging task that involves many variables. In our view every institution needs to address the following questions when they design a capstone IS course.

What do our students know?

One of the first challenges that an IS capstone course instructor faces is what do the students know when they come to this course. While the course design is usually completed by an instructor before they teach a specific course, it is important that a capstone course instructor adapts their course design based on the skills that their students possess. The first class can be used to elicit answers to several questions that will strengthen the course design. So what are the questions one should ask?

1. What is the level of comfort with respect to key concepts in the IS discipline, for example data modeling, process modeling etc.?
2. Do the students understand business concepts such as organizational structures and information flows, business processes, data as an organizational resource etc.?
3. Do they have the ability to identify the practical application of key concepts acquired in courses that span the entire curriculum?
4. Can they make a business case for an IS project?

What do we want students to learn?

The contents of the capstone IS course are determined to a large extent on the IS program content of a school. The IS program curriculum in different institutions is often based on several factors. While most schools try to incorporate recommendations of professional associations like AACSB, AIS, and IRMA etc. to determine foundational discipline knowledge there are other factors that may influence the curriculum. For example, in some cases specific products (SAP) may play a major role in the curriculum if there is a University alliance with the vendor, while in other cases recommendations of departmental advisory boards may also influence curriculum as these organizations are the primary job outlets for graduating seniors. In today's world it is not just the IS program content that is relevant for an IS capstone course, rather the focus should be on an integrated business-IS course content.

How do we enhance student learning and satisfaction?

The well designed capstone IS course requires a higher level of learning for students as multiple concepts need to be synthesized, integrated and applied. These concepts are derived from a diverse set of courses which in turn are part of multiple disciplines such as Finance, Management, Accounting, Marketing and IS etc. The complexity of the course can easily overwhelm students. The question that arises is what can an instructor do to enhance student learning and success in a capstone IS course?

STRATEGIES FOR ENHANCING STUDENT LEARNING AND SUCCESS

The fundamental question when designing the capstone course is that institutions should use a strategic approach rather than a tactical one. This implies a comprehensive and long-term view of learning rather than short term skill enhancement exercises. In the following paragraphs we discuss these strategies based on our experience of designing a capstone course.

Know your Students

In order to ensure that students enjoy the course and learn the material we believe that three activities can be critical as part of the capstone course design. The three activities that an instructor needs to incorporate in their course design include identifying student skills, knowledge of student learning styles and developing a rapport with students.

Identify Student Skills in the Beginning: Another critical course design element is identifying the skill set of students in your class early on. Use a questionnaire to elicit responses on business, technical and soft skills they have acquired. While business and technical skills are critical ingredients for designing and developing information systems, soft skills often determine success or failure of IS projects. Noll and Wilkins (6) point out that among other skills “soft skills” such as “writing, working in a team environment, delivering presentations, managing projects, and developing interpersonal relationships,” are important components that should be a part of the IS curriculum. Determine their level of comfort with respect to these skills. One option is to post the questionnaire on a website, such as a course management system like BlackBoard (BB), and request students to bring it to class on the first day. Student perceptions of their comfort level on

different skills help tremendously in designing course content. For example, if an instructor plans to spend two class periods on data modeling and student responses indicate that they are not very comfortable with data modeling the instructor needs to adapt his/her course to address this. Adding a class period for discussing data modeling, or posting examples on BB are probable ways in which the instructor can address this issue.

Identify Student Learning Styles: Another factor that can be critical in designing a course is identifying student learning styles. For example, the Grasha-Riechmann Student Learning Style Scale identifies six types of student learners, Independent, Collaborative, Dependent, Participative, Competitive, and Avoidant. Knowledge of individual student learning styles helps to design the course to accommodate the diversity in student learning styles. Further classroom activities can be structured to help students strengthen less dominating learning styles. For example, while some students may feel confident and comfortable working in a group others may be reluctant and may prefer individual learning styles. Classroom activities and assignments can be designed to enable both types of students feel at ease. Further the data can be useful to design activities that promote group work and prepare students for the corporate world where these skills are critical.

Develop Rapport with Students: We believe that it is important to know individuals before the process of learning can occur in a classroom environment. This can be achieved by showing greater interest in the students by familiarizing yourself with their names, hobbies etc. Plan on sharing experiences with them and encourage them to do the same. This process is critical and often leads to motivating students. Motivated students tend to be more receptive to learning. When designing the course make sure that the first class meeting is planned for developing the rapport with students. This prepares students to interact actively with the instructor and other students leading to an environment that promotes active learning in the classroom.

Determining Course Content: Business-IS Integration Using a Systems Approach

When determining what do we want our students to learn, the first step is to ensure that the capstone IS course is designed using an integrated business-IS approach. To reinforce what has been done earlier we believe it is imperative that a systems approach is used in designing a capstone IS course. This requires the alignment of course content with student learning objectives (SLOs) of the program. The SLOs in most schools are normally aligned with the University and College of Business mission statements. This alignment ensures that course objectives reflect the integration of business and IT as most IS programs are housed in the College of Business. The course should be designed so that students understand and learn the concept of a system and be able to relate to an organization as a system with different subsystems such as human resources, finance, accounting, information systems etc. The role that the IS subsystem performs in the organization should be clearly explained and discussed. Once the students understand this concept it will be easy for them to design and develop an IS that meets business needs.

The second step in this process is to involve students actively in the learning process. The course should be structured to emphasize cooperative learning rather than a pure lecture based approach. Weekly classes should be designed to encourage learning and on-going assessment should be a

part of this process. Students should be required to come prepared with assigned readings so that classroom time can be spent on discussions. Individual students should be asked to read assigned materials and then discuss challenging issues within their groups using BB or some other electronic media. Issues that continue to challenge students can be discussed in the classroom where all groups are present. Each week students should be assessed on their knowledge on different topics and their ability to communicate this knowledge to their peers in the classroom. The key to this process is providing feedback to students on an ongoing basis where they learn their shortcomings and have the opportunity to improve.

The third step in the process is the capstone project and project management. While classroom discussion will promote understanding of key concepts it is important that a capstone project is used as a tool to help students learn application of the business-IT integration. Selecting and assigning projects in a capstone IS course can be a challenging task. Business simulations or text book cases provide good capstone project experiences for students though they are limited by the lack of users that students can interact with. This deprives students of the valuable opportunity to learn how to interact with people and students may miss out on the socio-political aspects of information systems development. Magboo & Magboo (3) provide excellent examples of projects in a University setting where different departments in the University collaborated to develop information systems. This provided students an opportunity to learn real-world application of conceptual skills while user departments benefited as they were able to use systems developed at minimum cost to them. Individual instructors should take the initiative and effort in identifying projects which can provide a “real-world” experience for students. Project management can be an ongoing process where every student in a group plays the role of project manager for a specific project milestone. This individual should be assigned the responsibility of planning the process of project milestone completion, assigning tasks to individual members in the group, and finally integrating and submitting the milestone on the due date. The project leader should be required to report on individual members work. This will ensure that all members in the group participate equally and at the same time learn project management.

Enhancing Student Learning and Success

An effective instructional course design is critical for enhancing student learning and success in a capstone course that focuses on business-IT integration. An instructor’s vision that focuses on the big picture, implemented using activities that promote sharing of this vision with students, is what can ensure enhanced student learning and success. The question is what kind of activities. In addition to the strategies described in the earlier two subsections an instructor needs to understand that this is a critical time for the students. The students are engrossed in the final leg of their journey towards completion of their degree programs which is a demanding process. This situation is further compounded by their concerns for finding a job especially in a tough market that we see in the IS world. In our view an instructor can play an important role here to calm their fears about planning their futures by incorporating various activities in the course. These activities, though not limited to, include helping students by evaluating their resumes, organizing campus visits by IS professionals who can help in advising students on interviewing, inviting advisory board members to talk to students, informing students about industry trends, and writing references for students etc.

CONCLUSION

Rapid changes that are taking place in the IS marketplace require students to be well versed in skills that go beyond traditional IT skills. To achieve this, instructors in IS programs across the country need to design courses that reflect these changes. Failure to incorporate these changes in the IS program will lead to graduating IS students who are not competitive in the marketplace. While curriculum changes are often times a time consuming process, the capstone course in an IS program can be used effectively to reflect these changes. In this paper we attempt to highlight the challenges that an instructor faces when designing a capstone IS course. While the process is indeed demanding there are strategies that can be used to enhance student learning and success in a capstone course. These strategies include, among others, identifying student skills and learning styles in the beginning, developing a rapport with students, using an integrated business-IT approach to design the course, involving students in the learning rather than simply using a lecture-based approach, identifying projects that challenge students and help them experience the complexity of the design and development process, and supporting students in their transition to their new careers. It is our belief that if these strategies are followed by instructors a capstone experience can be a truly productive one for both students and instructors leading to enhanced learning and success in the classroom and future careers.

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