Critical Success Factors in Developing, Implementing, and Teaching a Web Development Course

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ABSTRACT

As universities respond to the recent demand for E-commerce, faculty members are now being assigned the task of developing, implementing, and teaching E-commerce courses. Since E-commerce is intertwined in almost all areas of business, most business courses now include some discussion on pertinent E-commerce topics. However, many information systems departments are discovering the need for a course that exclusively deals with the technical issues of E-commerce or web development. This study presents several critical success factors in developing and offering a course focused exclusively on web development. Critical success factors presented include book and software adoption, where the course fits in the curriculum, the skill sets of students entering the web development course, and faculty development.

Keywords: Web Development, Teaching Web-Development, Course Development, and Student Skill Sets

1. INTRODUCTION

As universities respond to market pressure of adding E-commerce to their curriculum, faculty members must be prepared to develop, implement, and teach E-commerce. E-commerce tends to encompass many areas in the information systems (IS) curriculum. Therefore some schools simply include E-commerce topics in existing courses. However, others may choose to implement a new course focusing exclusively on a specific area of E-commerce. Web development is one area of E-commerce that seems to be popular in the information systems field. When developing a new web development course there are several factors that need to be considered. The factors include where the course fits in the curriculum, book and software adoption, the skill sets of students, and faculty development. The purpose of this study is to present critical success factors and some recent experiences in developing and implementing a new web development course into the curriculum.

2. THE IS CURRICULUM AND E-COMMERCE

The first critical success factor for a web development course is the development and design of the content to be covered. One method of implementing a web development course would be to examine other schools that have successfully implemented web development into their curriculum. Another possibility is to look at guidelines or accreditation standards for guidance. In looking to a standard such as the IS 97 there is no mention of E-commerce (Davis et. al. 1997). The dynamic nature of this field leaves little question that the guidelines and standards for an undergraduate degree in IS will incorporate E-commerce in the future. The model curriculum and guidelines for graduate programs in IS has incorporated E-commerce (Gorgone et. al. 2000). This provides some guidance in designing a graduate level E-commerce course. For an undergraduate web development course communication with a comparable institution(s) that has successfully implemented a web development course into their curriculum is always a viable and recommended option.

Another important issue pertinent to the design of a web development course is the other courses in the curriculum. In determining the content for the web development course, an understanding of what is currently being presented in other courses in your curriculum is essential. Daigle, Doran, & Ryder (1999) illustrated the importance of coordinating courses within the curriculum. If Visual Basic is taught as the required programming language in the curriculum, active server

pages (ASP) could be covered in greater detail, since ASP is in the Visual Basic family. Active Server Pages is a popular method to add dynamic functions to a web site. The notion of teaching CGI and Perl to students that have little background in a Unix environment would be quite an undertaking. However, if the students program covered UNIX, then CGI and Perl would greatly enhance a course focused on web development (Denton 2000).

3. CHOOSING A BOOK/SOFTWARE

The second critical success factor is the adoption of a book and software. The number of books pertaining to E-commerce published in the last couple of years is overwhelming. While many of these books take a managerial approach, there are books that focus on web development. The Deitel series as well as the Shelly-Cashman series is an example; their books take "a hands on approach" dealing with everything from HTML to XML. Many publishers such as Wrox, Que, Sams, Course Technology and Prentice Hall have books that focus on web development. A note of caution, the textbook decision is very important to the success of the course. The content of the book needs to correspond to the topics covered in the course while helping achieve the goals set forth in the course proposal. Many publishers will shrink-wrap books together, which provides savings to the student and allows the instructor to cover more topics. The decision on shrink-wrapping books depends on the publisher and books in question.

Another point to stress in the adoption of a textbook is software. Many book publishers now include a CD at the end of the book that contains the examples used in the book. The publisher may also shrink wrap a student version of software with the book. This is normally different than the CD included with most technical books because there is no time or usage limit. Many of the technical books from the publishers listed above will include a trial version of the software with some type of limit. This normally does not provide adequate coverage for a semester long web development course. When the publisher shrink-wraps either books or a book and software, the shrink-wrapped package is given a new ISBN. The best way to find out what is available is to contact your book representative. Internet & the World Wide Web: How to Program by Deitel, Deitel, and Nieto is an example of where the book includes a student version of the web development software covered in the book. A separate ISBN exists which allows this book to be shrink-wrapped with a student version of Microsoft's Visual InterDev 6.0 (Prentice Hall). Visual InterDev 6.0 is a powerful web application development tool. Visual InterDev is part of the Visual Studio 6.0 and includes the integrated development environment. Visual InterDev includes a WYSIWYG editor and a source editor, which creates an easy to use development environment. The inclusion of Visual InterDev with the textbook is a tremendous advantage to students that commute, work full time, or just don't have easy access to the school's computer lab. Another option is to search out software companies that offer significant discounts to universities. For example your school may currently have a contract in place with Microsoft that allows you to purchase Microsoft FrontPage or Microsoft Visual Interdev for under $30. Also, Microsoft and Oracle have implemented programs designed to assist departments in obtaining software at a tremendous savings. These vendor programs require a yearly fee to join and allow the department to load their software on any departmental computer. They also allow the distribution of the software to students. The details for the Microsoft Academic Alliance can be found at: http://www.msdnaa.net/. The details of the Oracle Academic Initiative can be found at: http://oai.oracle.com/pls/oai_site/oai_site.home. These programs significantly increase the student's accessibility to cutting edge high-powered web development software.

4. WEB DEVELOPMENT SKILL SETS OF THE STUDENTS

The third critical success factor involves understanding the student's skill sets pertaining to web development. Student skill sets in an application-oriented course can exhibit a fairly high variance. The instructor needs to be aware of the potential variance in the skills the students bring to the course. Understanding the student's skill sets would help the instructor in preparing for the course, in terms of content detail, time to spend on each topic and overall expectations. Students in a web development course were questioned on several topics concerning their skill sets upon entering the course. The course consisted of mostly seniors, however the course was cross-listed so graduate students could also enroll. A few juniors and sophomores were also permitted in the course. This was the first opportunity for students to take a full semester course on web development. While not a formal requirement in other courses, several courses in the curriculum do require students to build a web page. Twenty five percent of the students indicated that they had a personal web page. The possibility exists for a student to enroll in this course with no formal instruction in web development. However, a presumption of this study is that the "better" IT students would also be fairly competent with web development. The study assumed these students would be ambitious enough to seek out tutorials and other information on the Internet concerning web development. This study does not develop a formal hypothesis but focuses on the self perceived knowledge and skills of each student. A questionnaire was administered and completed by 61 students. The characteristics of the questionnaire can be further broken down to consist of the following: 5 graduate students, 46 seniors, 8 juniors, 1 sophomore, and 1 student not seeking a degree as shown by table 1.

Table 1: Class Standing

Class Standing	Number in the Course
Graduate	5
Senior	46
Juniors	8
Sophomore	1
Other	1
Total	61

When asked to rate their overall computer skills only 5 students rated their skills below average. This could be attributed to the amount of time IS majors spend on the computer. Johnson and Hignite (2000) found that IS majors spend more time on the computer but their percent of Internet use was less than other groups. Fifty-nine students felt they possessed at least average skills concerning the Internet, surfing, emailing, and using an FTP package. Table 2 indicates that over 90% of the students rated their overall computer skills as average or above. Fewer than 20 percent of the students felt that they possessed at least average html coding skills, compared to 36% of the students that felt they possessed at least average skills using a WYSIWYG editor.

Table 2: Self Perceived Computer/Internet Based Skills

	Overall Skills	WYSIWYG FrontPage	Html code	Produce a Web Site
Excellent	7	4	1	1
Good	34	8	5	6
Average	15	10	6	5
Fair	5	6	13	18
Novice	0	33	36	31
Total	61	61	61	61

There was a significant difference in the student's assessment of their own overall computer skills and their ability to produce a web site. Table 3 shows the results of a paired samples *t* test, which compared the mean responses for each question. The test produced a *t* statistic of 14.234, which was found to be significant at the .05 level of significance. The students were asked to assess their skills as either novice, fair, average, good or excellent. There is also a significant difference at the .05 level of significance in their self-perceived overall computer knowledge and their ability to code html and use a WYSIWYG editor. A significant difference was also found, at the .10 level of significance using an F-test, in the variance of their self-perceived overall computer skills and the ability to generate a web site, code html, and use a WYSIWYG editor. Table 4 shows the results of the F-test. The instructor needs to be aware of the potential variance in skill sets among their students. While some students entering a web development course may lack exposure to html coding and other web development related technologies, they are very enthusiastic and driven to learn the material. Knowledge of the potential variance in the students skill sets will allow the instructor to plan and take measures to ensure the experience is rewarding for all involved.

5. FACULTY DEVELOPMENT AND THE DYNAMICS OF E-COMMERCE

The final critical success factor is appropriate planning for faculty development. Due to the dynamic nature of web development technologies, it is a formidable challenge for universities to offer a web development course(s). The technologies associated with web development change frequently. Therefore, increased levels of training and development need to be available to the faculty members teaching a web development course. While many of us that teach web development are continually reading and updating our skills, departments need to make funds accessible in order to allow faculty adequate training and development. The faculty member responsible for teaching the web development course needs to make the administration aware of the special faculty development needs of this course.

6. CONCLUSIONS

As universities respond to the market's demand for E-commerce, many issues need to be addressed. Faculty members will need to consider issues, such as the current curriculum, book and software adoption, student skill sets, and faculty development. This study presented several critical success factors to help a faculty member develop, implement, and teach a web development course. Issues such as the adoption of a textbook, software, and the skill sets of students entering a web development course were all discussed. The adoption of the textbook and the software depend upon the individual school's curriculum and course content of the other courses. This study presented survey results that showed a significant difference in the students self-perceived overall computer knowledge with the ability to code html, use a WYSIWYG editor, and generate a web site. Also presented were results that showed a significant difference in the variance between overall computer skills and html coding, using a WYSIWYG editor and web site development. Web development is an area that requires continual training. Faculty members need the opportunity to attend training sessions and accessibility to other forms of training to meet the demands of teaching a web development course.

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Table 3: Results from paired Sample T tests.

	Overall Computer Skills		**Ability to produce a web site**			
	Mean	**Variance**	**Mean**	**Variance**	**T**	**df**
Perceived level of individual Skill Sets	3.7049	.6115	1.8197	1.1169	14.2348	60
	Overall Computer Skills		**WYSIWYG Skills (Frontpage)**			
	Mean	**Variance**	**Mean**	**Variance**	**T**	**df**
Perceived level of individual Skill Sets	3.7049	.6115	2.05	1.8110	9.612	60
	Overall Computer Skills		**HTML Coding Skills**			
	Mean	**Variance**	**Mean**	**Variance**	**T**	**df**
Perceived level of individual Skill Sets	3.7049	.6115	1.7213	1.1043	14.2345	60

Table 4: F-Test Two Sample for Variances

	F	F Critical (lower tail)	Reject H_o if $F > F_u$ or if $F < F_L$
Overall Computer Skills and the Ability to code HTML	0.5536	0.6517	$H_O: \sigma_1^2 \neq \sigma_2^2$ $F_L = 1/F_U$ $\propto = .10$, df_{num} & $df_{den} = 60$ F_L critical = 1/1.5343 $F_L = .6517$
Overall Computer Skills and the Ability to use a WYSIWYG editor	0.3317	0.6517	
Overall Computer Skills and the Ability to use a WYSIWYG editor	0.5474	0.6517	

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