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Course Websites and their Contribution to Students Evaluation of Instructors and their Courses

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Abstract

In this study we examined how course-specific websites (CSWs) that accompanied mathematics and statistics courses affected students' evaluation of these courses and their instructors. The central purpose of this study was to identify how specific elements of CSWs contribute to students' ratings of their success in the course and faculty effectiveness. First we designed a student questionnaire to determine to what extent specific elements of the websites were perceived as contributing positively towards student success in mathematics and statistics courses. These questionnaires were administered to over five hundred students who enrolled in 29 courses taught by 13 lecturers. We then collated website evaluation data with student ratings of the instructors who had designed and maintained the CSWs to identify how student ratings of websites affect faculty effectiveness ratings. Our data indicate that although CSW represent a potentially significant means of helping students to cope with the challenges of mathematics and statistics courses, not all instructors were able to utilize this potential. These results suggest that the instructor's subject expertise represents a necessary but not sufficient condition for effective CSW construction. Unless instructors receive detailed guidance regarding "best practices" in website construction, they will continue to build sites that under-utilize the potential of web technology and make a limited contribution to student learning.

Keywords: Course websites, technology, pedagogical advantages.

Introduction

Theoretical Background: Course Websites: This study focuses on course-specific websites (CSWs) that are designed and developed by faculty as a supplement to specific courses which they teach in a conventional classroom environment. According to Nachmias[1], web-based learning environments have emerged as the results of educators' attempts to "wrap together" contents, pedagogy and the technological features of the Web. In contrast to stand-alone web-based environments, the CSW is designed to augment, not to replace, face-to-face instruction, and offers a number of relative advantages for both students and faculty. However, in many cases, faculty members do not receive the pedagogic preparation and support they need in order to utilize these advantages.

Our main goals in this study were to examine to what extent faculty who received no prior training in website construction are able to utilize the full potential of CSW how students enrolled in mathematics and statistics courses perceive specific elements of CSWs and how course websites affect students' evaluations of their lecturers and their courses. This study represents the first phase of a concentrated effort to utilize distance learning as a catalyst for improving the quality of teaching at tertiary level. Subsequent phases will consist of an action research paradigm to identify what faculty need to know in order to utilize the full potential of CSWs, as well as what administrative and technological supports need to be in place to ensure construction of effective course websites. The advantages of CSWs can be classified according to the three general dimensions of CSWs identified by Mioduser, Nachmias, Lahav and Oren (1999)[2]: content, pedagogy and communication. With regard to content, benefits for students range from immediate and easy access to course materials and reduced pressure to "write it all down" during class, to non-linear structuring of content connected by hyperlinks. For faculty, CSWs provide an ideal platform for storing course materials as well as information about the course, thus reducing time spent on handing out materials and on "housekeeping" during the lesson. Lightfoot (2000)[3]for example, recommends that CSWs be used as well as to replace all in-class announcements, for distribution and collection of assignments, practice tests, discussion groups, providing students with feedback and access to their grades, as an audiovisual archive for all lectures delivered in class. Materials stored on the CSW are easier to update, and the website facilitates utilization of a wider variety of media and content sources.

In addition to advantages of convenience, pedagogical advantages for the student include access to simulations and multimedia three-dimensional representations of knowledge that facilitate multiple-channel encoding of target content. Other pedagogical advantages of CSWs include utilization of the website as a platform for posting supplementary material designed to bring all students to the initial level of competency required to participate successfully in the course.

Course websites also represent a key means of helping faculty cope with the challenge of student diversity. The course website enables the instructor to provide supplementary exercises and additional explanations for students with differing levels of ability and prior knowledge who have not yet mastered the course materials. Posting the contents of each lesson on the CSW also enables these students to revise course content at their own pace, if and when necessary. This aspect of the teaching process has traditionally not been emphasized at tertiary level. However, as higher education institutions become less elitist and accept increasing numbers of students from different backgrounds, faculty become increasingly responsible for meeting the different needs of a widely diverse student body. The ways in which faculty cope with student diversity represents a key challenge currently facing higher education institutions, especially in "service" courses, for example mathematics courses that are compulsory for students who are not majoring in mathematics.

Additional pedagogical advantages of CSWs lie in the utilization of the website for knowledge transmission, in contrast to knowledge construction. By relegating a large proportion of information transmission to the website, faculty are able to "free up" valuable class time which can then be invested in supporting students' processing of the information and developing higher-order thinking skills such as problem-solving and critical thinking. Finally, as Mioduser et al. observe, CSWs extend the time available for student-teacher communication by allowing students to interact with faculty between lessons. The facilitation of communication between lessons also supports an increased degree of collaborative learning and the creation of learning communities amongst students enrolled in the same class.

This brief overview of the relative advantages of CSWs provides a general indication of the extent to which construction and maintenance of websites represent an increased workload for both faculty and students. However, administrators of higher education institutions tend to under-estimate the extent of faculty time and effort required for effective website construction. In most cases, faculty members receive minimal guidelines regarding what represents "best practices" of website construction. Although some technical assistance is usually available, lecturers rarely receive adequate assistance regarding the pedagogic principles of effective website design. Consequently, facultytend to transfer traditional teaching models from the classroom to the website instead of adapting the instructional process to the unique features of the web-based learning environment.

As a number of studies have shown, for example Offir, Lev, Barth and Shteinbok[4] and Barth[5], the lack of face-to-face contact between students and teachers in a distance learning environment is not merely a technical issue: the absence of the non-verbal channel of communication between teachers and students has significant effects on both the teaching and learning processes. Conventional and web-based learning environments thus represent significantly different contexts: what "works" in conventional learning environments do not automatically work equally well in an online context.

Consequently, instead of merely transferring instructional designs of conventional environments to online contexts, course instructors need to carefully re-examine course goals and objectives and determine how websites can be utilized to help them achieve course goals. To design an effective CSW, course instructors need to understand which goals and objectives can be achieved most effectively via face-to-face communication in the classroom, in contrast to goals that can be effectively achieved via self-access material on the CSW. However, optimal integration between face-to-face meetings and virtual communication via the CSW requires course designers to be experts in at least three areas: course content, instructional design and evaluation, and the relative strengths and limitations of web-based environments. Unfortunately, faculty workshops often fail to provide course instructors with the specialized knowledge and set of skills they require to construct effective websites. When such programs are available, faculty are often reluctant to participate in "one-size-fits-all" workshops, as Kember and Kwan[6] have shown. The lack of faculty development programs that help teachers acquire the expertise needed to design and develop effective websites may partially explain the wide variations in the quality of CSWs. These variations have been documented by a number of researchers, for example Leung and Ivy. Their research shows that wide variations in relation to websites occur in the amount and depth of information provided, the quantity of student-to-student interaction that occurs online, the level and quality of student-instructor interaction and the degree to which assignments and tests are incorporated in the website. This high level of diversity among CSWs has also documented by Miaduser, Nachmias, Lahav and Oren[7], who developed an extensive taxonomy for characterizing educational websites. Following six empiric studies that examined approximately 1000 educational websites, Mioduser et al. conclude that "against this rich background, and looking at pedagogical qualities and resources, the vast majority of educational websites prove to be the unripe fruits of the promising but still immature web technology." These "unripe fruits" and high level of diversity between CSWs may be partially explained by three common fallacies:

The "everybody can do it" attitude (Mioduser, Nachmias, Lahav and Oren.

The "omnipotence of faculty expertise" approach – administrators believe that all faculty who are experts in a specific subject area will automatically also be able to construct exemplary websites in their subject area.

The "omnipotence of websites" belief - all websites, by virtue of being of the WorldWide Web, will automatically provide maximum effective support to students. The above three

fallacies may partly explain the lack of recognition and incentives offered by administrators to faculty for website construction. Instead of awarding faculty release time and/or other forms of incentives, administrators tend to take these efforts for granted and fail to recognize or compensate faculty for the seemingly endless number of man-hours required to construct and maintain an effective website.

In this study we attempted to assess how students perceive the contribution of CSWs constructed by faculty who received no previous training in website design. Since one of the central goals of this study was to establish the size of the gap between the ideal and the real, we examined students' evaluations of 24 course websites that supported courses in mathematics and statistics at an academic college. The main objectives of this study were to identify which specific elements of CSWs are seen as contributing significantly towards learning among students who are enrolled in service courses in mathematics and statistics courses and to examine how students' evaluations of CSWs contribute to positive student evaluations of the lecturer and the course.

Students' Evaluations of Course Websites: A survey of the literature revealed that very few studies have been conducted on students' evaluations of CSWs. Most of these studies were conducted on a small scale, for example Barnes, Sims, and Jamison[8], Huff [9], Washenberger[10], Morss[11] and Leung and Ivy [12].

In one of the few relatively large studies, Taley-Ongan and Gosper[13] investigated student feedback in relation to two undergraduate courses which were delivered in face-to-face mode with web-supported delivery. The feedback involved 320 students from two courses over a two year period: 115 students and 107 students in 1998 and 1999 from one course, and 98 students in 1999 from another course. In both courses, they found a general increase in student web-skills and positive shifts in students' attitudes towards the online learning experience. Despite what Nachmias, Mioduser, Oren and Lahav refer to as the wide gap between expectations and reality, research on students' evaluations suggest that they tend to have a positive view of CSWs in general and do not view the CSW as an increased workload. These results seem somewhat surprising in view of the size of the gap between the potential value of CSWs and the extent to which faculty appear to be utilizing the potential capabilities of CSWs. Consequently, one of the main purposes of the current study is to clarify how students view CSWs designed by faculty with no prior training in website construction.

Material and Methods

Research population: A total of 506 students participated in this study. Students were enrolled in 24 courses in the Department of Mathematics and Statistics at the Academic College of Judea and Samaria during the 2005/2006 academic year. These courses were compulsory "service" courses for students who were not majoring in mathematics. These 24 courses were taught by 13 instructors who had been teaching these courses since the 1990's.

Course websites were on the Michlol system - the College's academic administration government software package - and contained syllabi, course abstracts, assignments, lesson summaries, forums, images, power point presentations and exercises. The academic year 2005/6 was the first year that these courses were supported by CSWs.

Research Instruments: two closed-questions, likert-scale questionnaires were completed by students in this study. The first questionnaire was designed to measure students' perceptions of the course website. Students were asked to rate eight different parameters of the course website along two different dimensions: The first dimension measured to what extent the CSW displayed each of the eight parameters. The second dimension measured to what extent the student thought that each of the eight parameters contributed to his or her successful learning during the course.

The second questionnaire (SEFE – Students' Evaluations of Faculty Effectiveness) was part of a wider survey that evaluated students' ratings of their lecturers and their courses at the end of the semester. Students were asked to rate faculty effectiveness across parameters conventionally used in faculty evaluation questionnaires.

Procedure: In the first stage of this study, students completed a questionnaire developed within the framework of this study. This questionnaire measures students' ratings of specific elements of the CSWs and students' perceptions of how each of these elements contributed to students' learning. The purpose of the questionnaire is to identify "best practices" of websites that support mathematics and statistics courses for students who are not mathematics majors. In the second stage of this study, students completed SEFE questionnaires that evaluated effectiveness of faculty who taught the courses supported by CSWs evaluated in the first stage of the study. In the third and final stage, we compared student ratings obtained by the lecturers in the academic year 2004/5, before they constructed CSWs with the student ratings they obtained for the same course in the following year, after the introduction of CSWs.

Statistical Analysis: Analyses were performed by course, including t-tests for independent samples, MANOVA with repeat measures, and Pearson correlations.

CSW Evaluations: First Dimension: Students were asked to rate to what extent the following elements characterize the CSW that accompanied a specific course:

Access to the website: Students rated the extent to which the CSW was convenient and easy to use (single item).

Structure and organization of the website: This index was comprised of an average of ratings of two items (Links and clear connections between the various course materials on the website and the connections between the CSW materials and the course objectives were clear).

Use of multi-media: This index was comprised of an average of ratings of four items ("Utilization of visual media," "Most documents on the CSW were clear and scanning was of a high quality," "The CSW was focused mainly on transmitting information about the course and The CSW focused mainly on explaining the lessons and course contents").

Extent of interactivity: This index was comprised of an average of ratings of two items ("The CSW contains surveys and online quizzes designed to help me stay focused throughout the course," and "The CSW contains interactive quizzes that provide automatic feedback and/or explanations of answers.").

Referral to additional sources of knowledge: This index was comprised of an average of ratings of four items ("The site contained links to additional sites, sources and bibliographies", "The site facilitated easy access to additional background materials", "The site enabled me to communicate with my instructor between lessons".

CSW contributes to improved use of classroom time: This index was comprised of an average of ratings of three items ("Knowledge transmission via the website enabled the instructor to devote more time to teaching strategies and demonstrating processes such as case analysis, illustrating how to implement course concepts in order to solve problems and demonstrating what factors should be considered in "thinking like" and making decisions like an expert mathematician.

Instructor's utilization of CSW: This index was comprised of an average of ratings of five items "The lecturer used the course website to fill in gaps in background knowledge that I should have had before starting the course, helping me to get an idea of the lesson content before each class, to give additional explanations of issues that were not adequately discussed in class, to give supplementary exercises for students who had difficulty in mastering the content and to present more challenging material for advanced students and create more interest in the course." Perception of the CSW as adding to the course workload (one item).

Results and Discussion

Table 1 presents the average ratings and standard deviations of students' (N=309) ratings of the extent to which the above eight parameters characterized a specific CSW.

Analysis of variance indicates that there are significant differences in the extent to which the above parameters characterize CSWs ($F(7, 2156)=100.60$, $p<.001$). Ease of access was given the highest rating, which indicates that this was the element that students perceived as most characteristic of their CSWs. This parameter was followed by a sense of organization and structure, and use of visual channels and multi-media.

Table -1
Students 'Ratings of Course-Specific Websites

Parameter	Average Rating	SD
Ease of access	3.61	1.31
Website structure and organization	3.33	1.23
Use of multi-media	3.03	1.13
Website adds to students workload	2.68	1.45
Instructor's use of the website	2.53	1.28
More effective use of classroom time	2.49	1.32
Interactivity	2.37	1.32
Referrals to additional materials	2.28	1.29

Parameters that rated the lowest included more effective use of class time, degree of interactivity of the website and referrals to additional sources of knowledge. In addition to rating the extent to which their course sites could be characterized by the above eight parameters, students (N = 309) were asked to evaluate their CSWs along a second dimension. This dimension measured the extent to which students perceive that each of the above eight parameters contribute to their success in the course. Results of this dimension represent the "added value" that students attribute to specific elements of website construction and utilization. Average ratings and standard deviations of these ratings are reflected in table 2.

Table- 2
Students' Perceptions of CSW Elements as Contributors to Success

Parameter	Average Rating	SD
Ease of access	1.82	0.76
Website structure and organization	1.76	0.64
Use of multi-media	1.68	0.60
Website adds to students' workload	1.60	0.74
Instructor's use of the website	1.57	0.57
More effective use of classroom time	1.49	0.59
Interactivity	1.47	0.58
Referrals to additional materials	1.45	0.61

Analysis of variance showed that there are signficant differences with regard to the perceived contribution of different elements of CSWs ($F(7, 1344)=21.06$, $p<.001$). The three elements perceived as contributing the most to student success during the course were ease of access, followed by a sense of organization and structure, and use of multi-sensory channels to present course content. The two elements that were perceived as contributing the least to students' success in the course were referrals to additional sources of knowledge and the degree of interactivity of the website. These rankings closely resemble

rankings shown in table 1.The central purposes of this study were to examine the gap between the ideal and the real with regard to faculty's ability to maximize the potential of CSWs as well as the extent to which students perceive CSWs as contributing to their success. Consequently, it was important to determine the degree of inter-instructor variability regarding websites constructed by faculty who had not received any significant training in website design and development. The two dimensions of students' ratings of CSWs, namely "mapping" the extent to which specific elements characterized the CSW and evaluating to what extent each specific element contributed to his or success in the course are shown in Tables 3 and 4 respectively. From table 3 we see that no significant differences were found among the lecturers with regard to their utilization of specific elements of CSWs. In general, instructors made similar use of the elements investigated in this study and under-utilized the unique features of web technology such as degree of interactivity. This finding suggests that unless faculty receive both pedagogical as well as technological training and support, their websites do not make full use of the technological capacities of the web.

Table - 3
Average Ratings of Elements of CSWs, per Individual Course

Course	N	Ease of access	Structure and organization	Use of multi-media	Interactivity	Referrals	More effective use of classroom time	Instructor's use of the website	Website adds to students' workload	Total
Int to Statistics for Economists	27	3.54	3.63	3.40	2.77	2.78	2.89	2.72	2.86	3.04
Partial Differential Equations	44	3.58	3.61	3.29	2.29	2.37	2.60	2.89	2.92	3.03
Mathematics for Social Studies	3	3.67	3.00	3.67	2.50	3.08	2.78	2.60	4.00	3.03
Calculus A	16	4.38	3.88	3.32	3.00	2.52	2.76	2.81	2.67	3.01
Mathematics for Economists	56	3.51	3.59	3.47	2.74	2.59	2.72	2.65	2.57	2.99
Int to Statistics for Economists I	10	3.90	3.30	3.14	2.50	2.43	2.40	2.55	2.14	2.98
Mathematics for Economists II	67	3.63	3.43	3.30	2.42	2.55	2.60	2.78	2.87	2.92
Calculus II	143	3.85	3.73	3.20	2.36	2.14	2.44	2.55	2.69	2.83
Calculus I	28	4.21	3.45	2.89	2.15	2.27	2.52	2.66	2.88	2.76
Calculus A	18	3.76	3.06	3.12	1.97	1.84	2.33	2.86	3.07	2.59
Calculus B	77	3.51	2.96	2.64	1.82	1.74	1.83	1.73	1.95	2.19
Total	489	3.72	3.48	3.16	2.33	2.25	2.44	2.53	2.63	2.79

Table- 4
Average Ratings of Student Perceptions of CSW Contribution to Success, per Instructor

Instructor (designated by letter to protect privacy)	N	Ease of access	Structure and organization	Use of multi-media	Interactivity	Referrals	More effective use of classroom time	Instructor's use of the website	Website adds to students' workload	Total
A	4	4.25	3.83	4.13	3.63	3.73	4.22	3.85	2.75	3.86
B	24	3.88	4.13	3.72	2.43	2.50	2.91	3.50	3.67	3.40
C	34	3.75	3.44	3.43	3.17	2.95	3.25	2.90	2.82	3.19
D	51	4.10	3.46	3.28	2.56	2.45	2.71	2.91	3.12	3.01
E	83	3.69	3.51	3.28	2.42	2.56	2.65	2.85	3.02	2.98
F	106	3.80	3.87	3.43	2.41	2.15	2.45	2.55	2.60	2.91
G	5	3.25	3.30	2.93	3.00	2.90	2.67	2.48	2.75	2.82
H	28	4.21	3.45	2.89	2.15	2.27	2.52	2.66	2.88	2.76
I	16	3.44	3.43	3.12	1.68	1.96	1.75	1.89	1.91	2.51
J	39	3.61	3.33	2.76	2.06	1.96	2.10	2.23	2.17	2.47
K	41	3.45	3.21	2.72	1.92	1.79	1.88	1.96	1.94	2.27
L	38	3.29	2.62	2.49	2.10	2.05	2.08	1.82	2.06	2.22
M	20	3.42	3.33	3.06	1.58	1.25	1.67	1.48	2.14	2.16
Total	489	3.72	3.48	3.16	2.33	2.25	2.44	2.53	2.63	2.79

Table -5
Results during Academic Years 2004/5 - 2005/6

2005/6 Semester B	2005/6 Semester A	2004/5 Semester B	2004/5 Semester A	Instructor
4.69	4.39	4.47	4.17	A
4	3	3.45	2.55	B
4.4	4.25	4.54	4.42	C
4.14	4.16	4.19	4.43	D
4.57	4.15	4.35	4.51	E
4.44	4.47	3.97	4.29	F
3.94	2.84			G
3.08		2.64	2.54	H
3.11	3.18			I
4.57	4.63	4.5	4.29	J
3.92	3.94	4.01	4.14	K
3.51	3.25	2.84	2.67	L
3.58	3.39	4.39	3.85	M

The above table shows that in addition to the tendency to under-utilize the web's technological capacities, most of the lecturers are also characterized by low utilization of the relative pedagogical advantages of CSWs. These advantages include more effective use of lesson time and referrals to additional sources of knowledge.

A similar picture is revealed in Table 4, which shows how students who studied with different instructors perceived specific elements of CSWs as contributing to their success in the course. As we saw in table 4, no significant differences were found among lecturers who constructed websites without receiving prior pedagogical or technological training. These results underline the importance of adequate training and support designed to help faculty maximize the full technological and pedagogical potential of course websites.

In the second stage of this study, students completed SEFE forms to assess faculty effectiveness. These data were then compared to student evaluations received by the same lecturers in the previous academic year, before the introduction of CSWs. This comparison enabled us clarify how students' perceptions of the course websites affect students' evaluations of faculty effectiveness. Table 5 shows a comparison between student evaluations received by the 13 instructors in this study over two successive academic years: in 2004/5, before they developed CSWs, and in 2005/6, after they introduced websites to accompany their courses.

SEFE (Students' Evaluations of Faculty Effectiveness): To assess the differences between students' evaluations received by instructors before and after the introduction of CSWs, we performed t-tests on independent samples. No statistically significant differences were found between evaluations obtained by the same instructors in 2004/5 and 2005/6 ($t(10)=0.96$, $p>.05$). This lack of significant differences between pre-website and post-website student ratings of faculty indicate that CSWs did not have a significant effect on the way students perceived their instructor or the course. The lack of a significant relationship between student ratings of faculty before and after the introduction of CSWs indicates that positive student evaluations of CSWs do not have a ripple effect on student evaluations of faculty effectiveness. The lack of a connection between student ratings of the CSW and faculty effectiveness shown in table 5 may be partially explained by students' perceptions of the instructor and the website as fulfilling separate and substantially different roles. Clearly, student ratings of instructors reflect what students expect from effective mathematics and statistics instructors: These expectations include the ability to diagnose the source of the student's difficulties during the lesson, and use a range of alternative explanations without "skipping steps" in order to solve these difficulties. While specific elements of a CSW are perceived as contributing to student success, it is important to note that these elements will not necessarily serve as a substitute for effective faculty or as compensation for an ineffective instructor.

Results indicating that students see the role of the course instructor in a conventional face-to-face classroom context as separate and significantly different from the role played by the course website have important implications for future research. These results show that additional research is required to determine which aspects of the teaching process are viewed through the students' eyes as an essential part of the instructor's role in a face-to-face context, in contrast to aspects of the teaching process that can be relegated to the course website. Further research is also required to establish to what extent students' perceptions of the roles played by effective faculty and effective websites are context-dependant, and change according to the demands of different disciplines.

Conclusion

Clearly, an effective CSW represents an additional and potentially powerful means of helping instructors and students to achieve the course goals and objectives. For example, CSWs can provide an excellent platform for explaining new concepts in additional ways that are not available to teachers during the conventional classroom lesson. Other advantages of CSWs include the option of offering a variety of alternative explanations from which students can choose, and providing a platform for supplementary practice and immediate feedback.

In mathematics and statistics courses, one of the key factors that determine the pace of instruction is the prior knowledge of all students enrolled in the course[15]. Here too, CSWs can save precious class time by elaborating the pre-requisite level of knowledge for each course, and providing materials and/or links to help students independently acquire this level of understanding. Despite these advantages, our data suggest that while students viewed some elements of CSWs as contributing positively to their success in a specific course, positive perceptions of the CSW did not have a ripple effect on student evaluations of the course instructor or the course. This is clearly reflected in the lack of significant differences between student evaluations of faculty effectiveness before and after the introduction of CSWs. These results indicate that despite the large amounts of time and effort invested in website construction, these websites will not utilize the unique pedagogical and technological advantages of web technology unless faculty receive adequate training and administrative support.

The main conclusion of this study is that constructing an academic CSW is not merely an intuitive process of organizing accumulated course materials and making them available online. A structured training module must be designed to teach instructors to build effective CSW. Instructor training is also necessary[14] to illustrate that such CSWs do not constitute an added workload for instructors, but rather a sophisticated means to engage students, guide their independent learning activities, and provide platforms for additional practice and enrichment. Unless faculty receive this training, many CSWs will continue to be what Miaduser et al. refer to as "the unripe fruits of the promising but still immature web technology."

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