

AC 2007-460: ASSESSMENT STUDIES OF GLOBALLY DELIVERED ONLINE COURSES IN BUSINESS AND ENGINEERING

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Assessment Studies of Globally Delivered Online Courses in Business and Engineering

Abstract

Authors have offered some fully online courses for their business and engineering students since the spring semester of 2005. Courses assessed in this study are Strategic Marketing (*graduate level*) and CAD (Computer Aided Design) for Technology (*undergraduate level*). The CAD for Technology course was offered by the second author the second time as a fully online course, while the Strategic Marketing course was offered by the first author the fifth time as a fully online course for the last two years. Authors had been physically on-campus and off-campus, including several cities and states in the U.S.A. and Turkey traveling for scholarly conferences and summer break, while they had been teaching the respective online courses. Students who had registered for these classes were geographically located in a number of states during the semester. The development of these courses and authors' selected best practices were presented at the ASEE 2006 conference and published as a refereed paper¹. This current paper will report the IDEA (Individual Development and Educational Assessment) studies^{2, 3} of authors' courses in delivering these courses fully online and provide the student experiences of learning through online courses.

Introduction

WebCT

WebCT is one of the most popularly used online course management and delivery tools around the world. Currently, more than 3,700 world-wide higher education, K-12, corporate, government and commercial academic institutions utilize solutions offered by WebCT and its parent company Blackboard⁴. In Tennessee Tech University, WebCT has been the only tool used to deliver the web-based courses to its distance students. WebCT provides an environment for developing and delivering web-based educational activities and materials. It permits instructors to make tests, discussions, lecture materials, and sample solutions available via the world-wide web. Some coursework such as homework, tests and laboratory reports, can also be submitted and controlled via WebCT.

IDEA Evaluations

The IDEA survey system takes a positive approach to soliciting student input in any course. Rather than emphasizing the instructor's teaching techniques or personality, the IDEA system focuses on student learning. The IDEA evaluations provide reports for the instructor's teaching objectives. Teaching effectiveness is determined by student progress on goals and objectives chosen by the instructor.

The IDEA system is unique in its emphasis on using the results constructively. Faculty reports are produced that include not only ratings of teaching effectiveness, but also analytical findings to help the instructor improve. These reports gain even more usefulness when combined across classes or years by using the summary reports. Other kind of evaluation services does not offer such comprehensive reporting services.

The overall progress on relevant course objectives set by the instructor in the beginning of each semester is “the single most important score for summative evaluation purposes.”⁵ The IDEA teaching evaluation instrument provides adjusted scores that “compensate for class size and student motivation to take the course.” Adjusted score with a national mean of 50 is used to measure teaching effectiveness and “represents student's perceptions of progress on the weighted average of objectives that the instructor has identified as essential (weighted double) and important on the faculty information form for that course.”

There are 12 main instructional learning objectives (Table 1) on the IDEA short form. Most of them are closely related to the courses delivered. In order to define the progress made there is a scale designed by the IDEA team. The following list describes the scale:

- 1: No apparent progress —In this scale factor, there is no progress made by student.
- 2: Slight progress —When students learn little gains on the objective this is the scale factor.
- 3: Moderate Progress —This means that students made some gain on the course objective.
- 4: Substantial Progress —Course students made large gains on the objective when they pick substantial progress.
- 5: Exceptional Progress —This is the top scale factor indicating ‘I made excellent gains on this objective’.

There are also six additional ratings available on the IDEA short form. These self-rating questions are related to the course and the instructor again.

In order to define the progress made on the above given six issues (Table 1), there is a scale designed by the IDEA team. The following list describes the scale:

- 1: Definitely false
- 2: More false than true
- 3: In between
- 4: More true than false
- 5: Definitely true

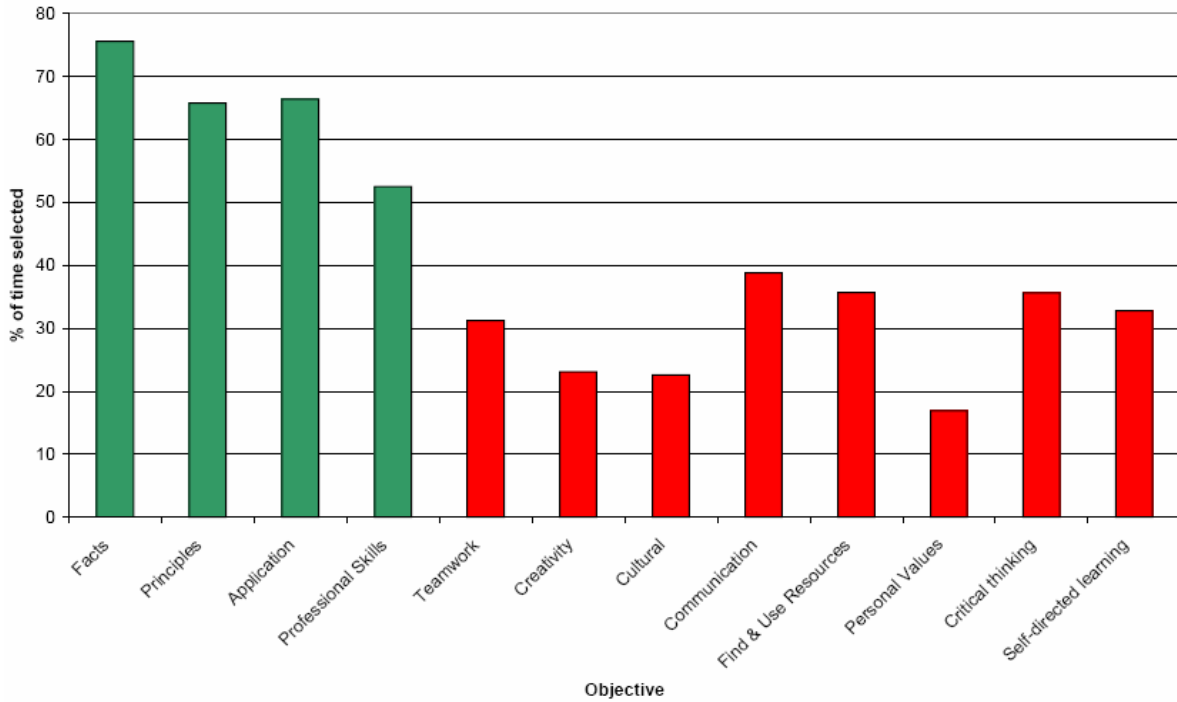
Frequencies of IDEA objectives selected by instructors at Tennessee Tech University between 2001 and 2004 were provided in Figure 1. Facts, principles, application and professional skills were the most selected objectives among the twelve potential objectives (Table 1). The progress made on all those most selected objectives (Figure 2) was within the 49-51 range in terms of adjusted T scores. Find and use resources and self-directed learning were not so frequently

selected objectives, but had similar progress scores as the first four frequently selected objectives had.

Table 1
IDEA Item List

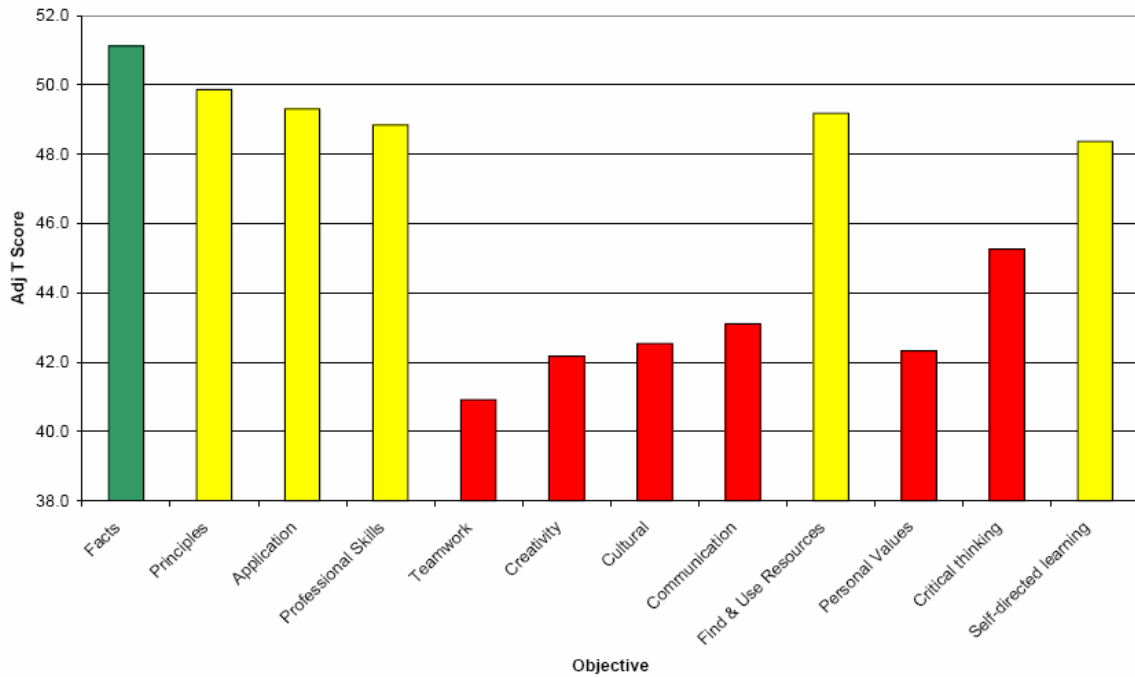
Progress on Item Number	IDEA Short Form
	Progress on Objectives
1	Facts: Gaining factual knowledge (terminology, classifications, methods, trends)
2	Principles: Learning fundamental principles, generalizations, or theories
3	Application: Learning to apply course material (to improve thinking, problem solving, and decisions)
4	Professional Skills: Developing specific skills, competencies, and points of view needed by professionals in the field most closely related to this course
5	Teamwork: Acquiring skills working with others as a member of a team
6	Creativity: Developing creative capabilities (writing, inventing, designing, performing in art, music, drama, etc.)
7	Cultural Activity: Gaining a broader understanding and appreciation of intellectual/cultural activity (music, science, literature, etc.)
8	Communication: Developing skill in expressing yourself orally or in writing
9	Find and Use Resources: Learning how to find and use resources for answering questions or solving problems
10	Personal Values: Developing a clearer understanding of personal values
11	Critical Thinking: Learning to analyze and critically evaluate ideas, arguments, and points of view
12	Self-Directed Learning: Acquiring an interest in learning more by asking my own questions and seeking answers
	Student Self-Ratings
13	As a rule, I put forth more effort than other students on academic work.
14	My background prepared me well for this course's requirements.
15	I really wanted to take this course regardless of who taught it.
16	As a result of taking this course, I have more positive feelings toward this field of study.
17	Overall, I rate this instructor an excellent teacher.
18	Overall, I rate this course as excellent.

Figure 1
Frequencies of IDEA Objectives Selected by Instructors at Tennessee Tech University (2001-2004)



Source: <http://www.tntech.edu/planning/Assessment/FrequencyIDEAGoalsSelected.pdf>

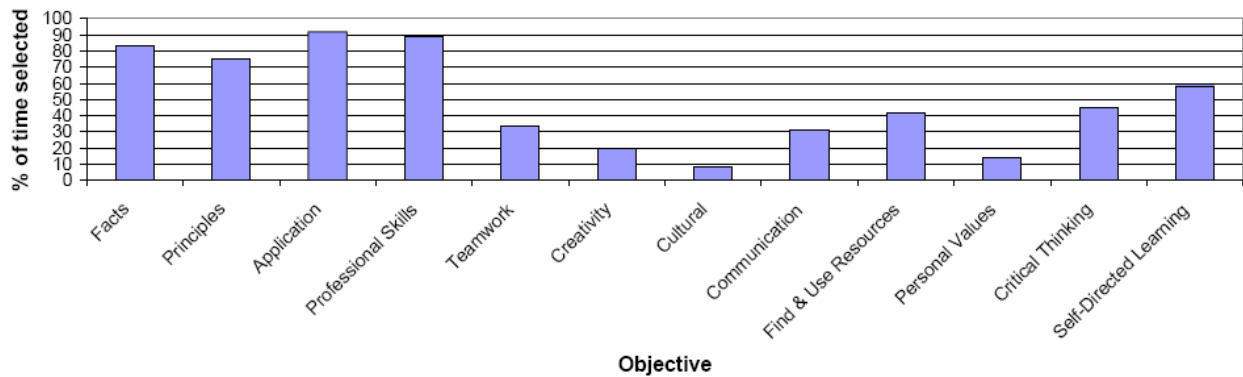
Figure 2
Progress on IDEA Objectives at Tennessee Tech University (2001-2004)



Source : <http://www.tntech.edu/planning/Assessment/ProgressonIDEAGoals.pdf>

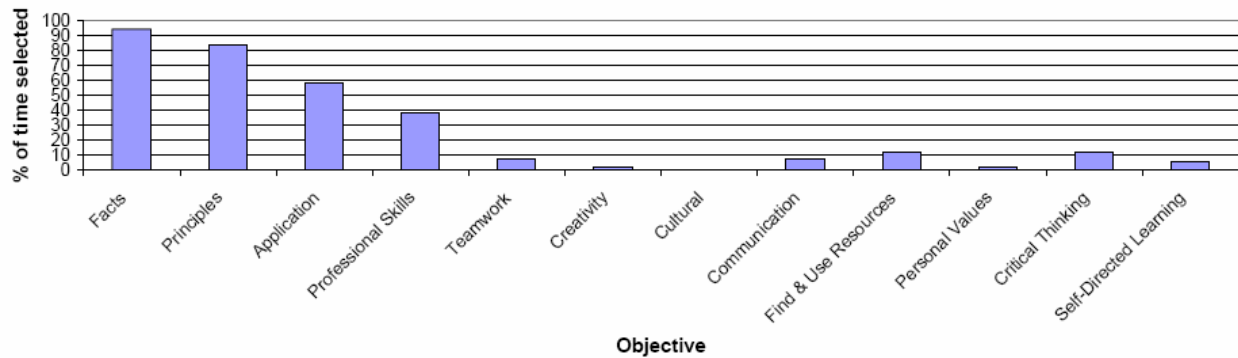
Frequencies of IDEA objectives selected by instructors of Manufacturing and Industrial Technology as well as instructors of Marketing at Tennessee Tech University between 2001 and 2004 were provided in Figure 3 and Figure 4, respectively. Instructors of Manufacturing and Industrial Technology put a greater emphasis on the first four objectives in line with university level aggregate frequencies. Instructors of Marketing preferred more of an even distribution among all twelve objectives.

Figure 3
Frequencies of IDEA Objectives Selected by
Instructors of Manufacturing and Industrial Technology at Tennessee Tech University
(2001-2004)



Source: http://www.tntech.edu/planning/Assessment/Idea_results_by_discipline.pdf

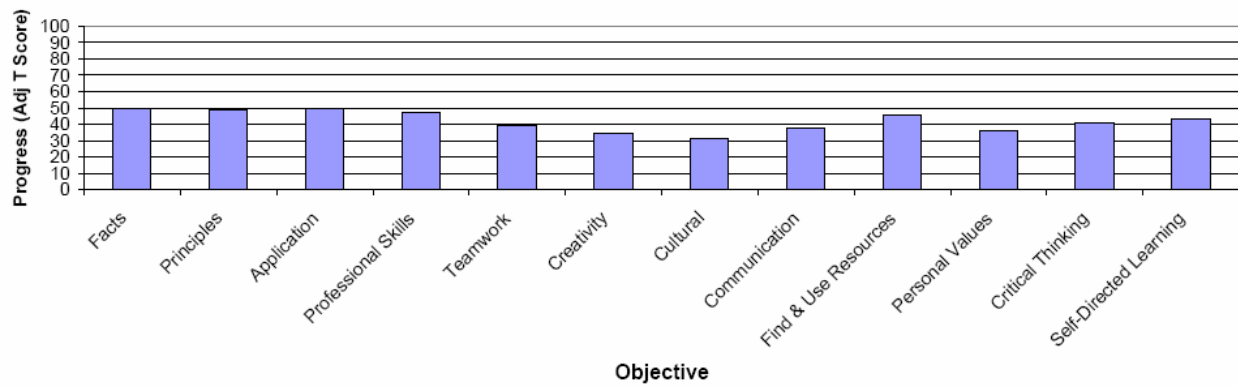
Figure 4
Frequencies of IDEA Objectives Selected by
Instructors of Marketing at Tennessee Tech University (2001-2004)



Source: http://www.tntech.edu/planning/Assessment/Idea_results_by_discipline.pdf

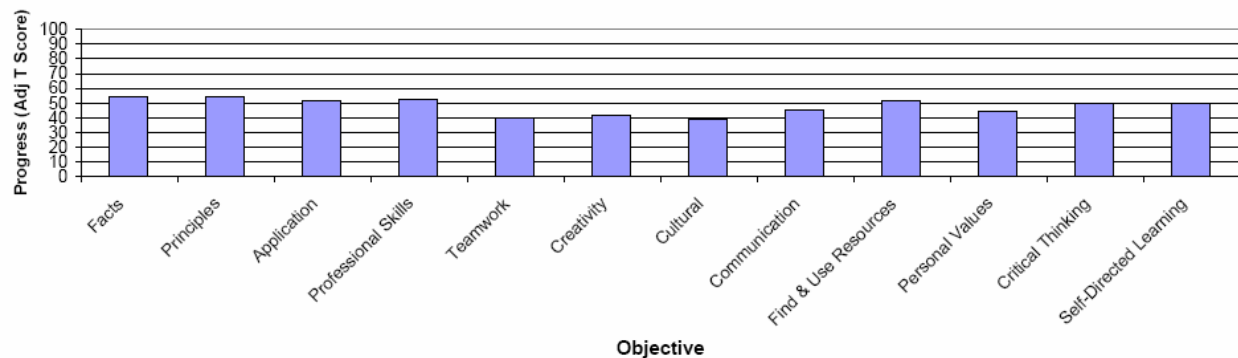
The progress made on those most selected objectives in Manufacturing and Industrial Technology (Figure 5) was in the range of 50 in terms of adjusted T scores, while the progress made on the most selected objectives in Marketing was within the 52-55 range. Comparable to the university level results, find and use resources and self-directed learning were not so frequently selected objectives in Marketing, but had similar progress scores as the first four frequently selected objectives as well as the critical thinking objective had.

Figure 5
Progress on IDEA Objectives in Manufacturing and Industrial Technology
at Tennessee Tech University (2001-2004)



Source: http://www.tntech.edu/planning/Assessment/Idea_results_by_discipline.pdf

Figure 6
Progress on IDEA Objectives in Marketing
at Tennessee Tech University (2001-2004)



Source: http://www.tntech.edu/planning/Assessment/Idea_results_by_discipline.pdf

CAD for Technology Course

The Engineering Course

CAD for Technology course (MIT3301) covers the CAD techniques for industrial applications with laboratory experiences. This junior level course has three fundamental parts. Each part in this course has the following outlines:

Part 1: Basic two-dimensional entities

- Beginning a new drawing, exploring the drawing window, interacting with the drawing window
- Drawing Aids detailing changing the settings, accessing AutoCAD help features; layers, colors, circles and line types
- Template drawings
- Rectangular and polar arrays
- Object snap

Part 2: Dimensions, text and complex entities

- Entering and modifying the text
- Dimensioning and modifying the AutoCAD features
- Drawing polylines and complex features
- Creating blocks, attributes, and external references

Part 3: Isometric drawing and three-dimensional modeling

- Isometric drawing
- Wireframe models
- Surface models
- Solid models

MIT3301 course has the following course management modules in the WebCT system.

- Course syllabus and information
- Calendar, tips and grade book
- Lecture materials and extra study materials
- Tests, labs, practice quizzes, and homework
- Discussions, chat and e-mail
- Supplements

This course has been successfully delivered as a hybrid engineering course before its online offer. Based on the students' interest, MIT3301 has been scheduled fully online since the summer semester of 2005. There were twelve undergraduate students registered in summer 2006.

While the course was offered at Tennessee Tech University, the course instructor was managing the course from Turkey and he was not in the United States when the course was offered.

Teaching Methods

The MIT3301 course is a combination of instructional modules and industrial design practices. Each chapter has very well prepared support materials. These materials help students learn the specific design issues by themselves. There are also numerous tutorials linked to instructional tutorials. As soon as students finish their learning, they start practicing the laboratory exercises given as a separate handout.

WebCT materials prepared for the MIT3301 course also have its pre-requisite materials so that students refresh their past learning. Although the majority of the course is based on the individual practices, it is a requirement for the students to prepare and submit their final industrial design projects with a team. Teams are formed with two-to-four students.

Course students practice various communication mechanisms during the semester. There are many discussions made on the final projects although there is a very minimal discussion on the class assignments. E-mail and chat tools are also popularly practiced communication tools during the semester.

In order to announce the course schedule, the course calendar is fully filled for the entire semester. Student tips are commonly used so that students learn the upcoming assignments and due dates quickly.

Findings of the IDEA Evaluations

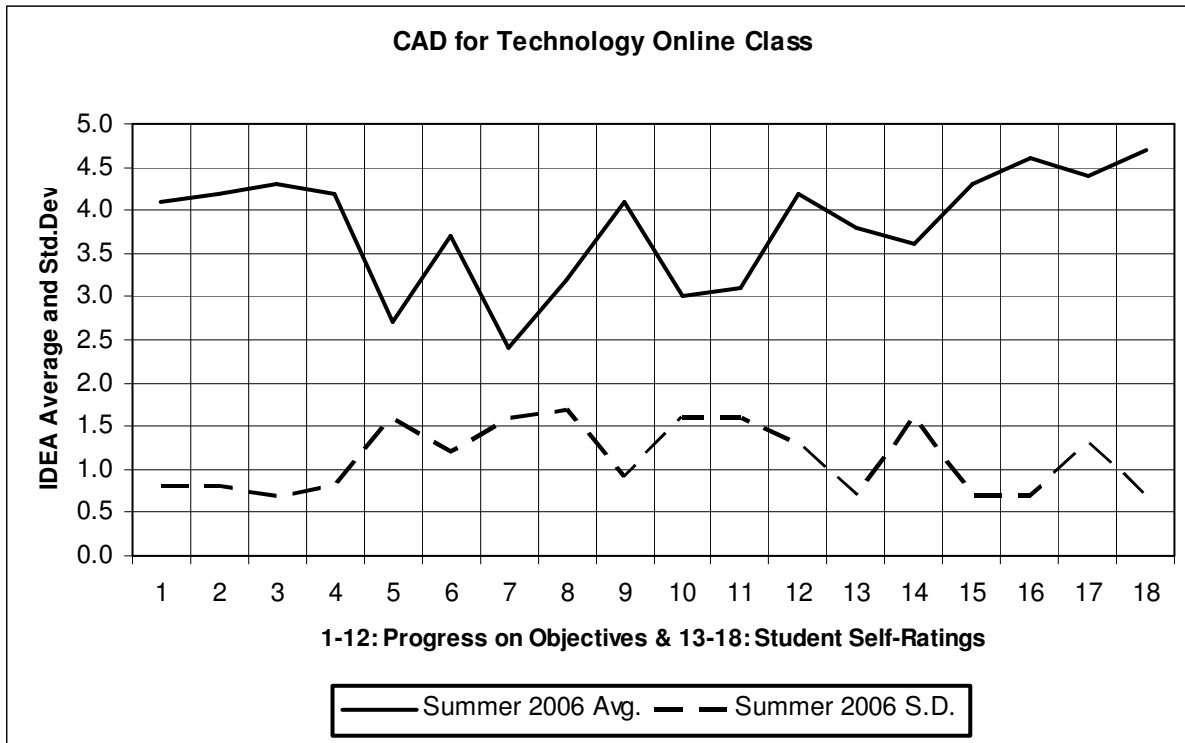
As reflected in Figure 3, Manufacturing and Industrial Technology students always enjoy practicing their learning in a laboratory environment. This means that professional skills and applications are very essential. Topics in IDEA key factors related to social, cultural and personal values are not as important as other ones. For the MIT3301 course; applying course materials is the essential objective for the student progress. Gaining factual knowledge and learning fundamental principles are selected as important course objectives.

Online MIT3301 IDEA evaluation findings present parallel results when they are compared to Figure 3. Course students show very similar results in applying course topics.

Since the online delivery was an option for the students who have coop and internship positions, MIT3301 students found the course one of the excellent courses they have taken in their major field of study as can be seen in IDEA course evaluations of item 17 and 18 of Figure 7.

Although self-directed learning and find-and-use of resources are not selected as essential or important objectives by the course instructor; the IDEA survey results indicate that many students prefer to select these two key factors quite a bit in the online CAD for Technology course.

Figure 7
CAD for Technology Online Class



Discussion and Student Experiences

MIT3301 CAD for Technology course is an application based industrial design course. It basically teaches the industrial drawing practices through the implementation of AutoCAD 2006 software.

The assessment data collected by IDEA short survey indicates that MIT3301 students gain more positive feeling toward the industrial and manufacturing design practices. However, their improvements in communication skills have very little progress in this course. When students face any difficulty it is hard for them to trouble-shoot or resolve the design trouble in a short period of time.

The essential objective in this course is to apply course materials. Other than the instructional delivery of the course, students practice their learning with industrial part design and prototyping cases. The important objectives are to let students learn factual knowledge in industrial technology and grasp the principles and theories in advancing computer aided design. In both essential and important objectives, online MIT3301 course does a good job for its students located in various places of the USA.

Comments made by the online MIT3301 students were very constructive. Students found the course components very well prepared and user friendly. Adding instructional materials related to the MIT3301 pre-requisites helped students quite a bit when they wanted to refresh their former learning.

Students also enjoyed using a fully prepared course calendar. Calendar entries were also supported with the Student Tips feature. Course students enjoyed seeing the frequent course announcements made through Student Tips.

As a summary, students made the following comments for the course:

- “Great class-learned a lot. There was almost no significance in student learning when compared to on-ground learning settings for MIT3301.”
- “Overall this is a great class online. I would suggest anyone to take it. Offering MIT3301 was a great benefit of the co-op and intern students who are away from their residence during the summer semester.”
- “This course is an excellent Web course, I enjoyed taking it. The only thing I would like to see changed would be the scheduled homework assignments and tests. I think it would be beneficial for the all of the assignments and the tests to be available when the course starts. This way, students could work ahead and complete the course sooner if they desire. Overall, this was one of the best classes I have taken!”
- “Great class! Really enjoyed it. There should be more courses like this one offered for the benefits of students who are in internship and co-op program.”

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Strategic Marketing Course

The Marketing Course

Strategic Marketing is a required core course at the graduate level in the MBA program. The course mainly discusses “strategic marketing issues and opportunities that impact both the marketing process and marketing program. Decisions also consider environmental variables as well as the internal elements of an organization.”⁶

Strategic Marketing course initially refreshes the marketing foundation so the students can build upon by eventually utilizing a marketing simulation to learn what it is like to compete in the fast-paced, competitive market where customers demand value and the competition tries hard to take away their business. Therefore, the course, at first, briefly highlights selected marketing principles, concepts, tools, processes, theories, issues, debates, real-life practices and ethics based on the following definition of marketing: “Marketing is an organizational function and a set of processes for creating, communicating, and delivering value to customers and for managing customer relationships in ways that benefit the organization and its stakeholders.”⁷

Main course objectives include comprehending the strategic marketing process, mastering the design and use of each element of the marketing mix, applying marketing principles, and developing an understanding of customer value as it applies to marketing decision variables within the marketing process. Specifically, students were expected to gain factual knowledge (terminology, classification, methods and trends); learn to analyze and critically evaluate ideas, arguments, and points of view represented by teammates; improve their skills in thinking, problem solving, and decision-making under stress; and acquiring skills in working with a team.

Teaching Methods

Each student team up with three or four other students to form an entrepreneurial firm that will compete in a "business war game" over the Internet. They run their own company, struggling with marketing fundamentals. They manage its operations through eight quarters of decision cycles, and meanwhile, they face great uncertainty in decision making. Continuously, they analyze the marketing environment, plan a marketing strategy to improve it and then execute that strategy for future outcomes.

Students have to refresh the fundamentals of marketing and keep on applying interactive parts into their decision making process in the simulation. As a part of preparation toward that end, they go through certain steps based on different teaching methods and performance measures all in WebCT. Those include reading a comprehensive syllabus (24 pages), understanding the course introduction and lecture summaries for each chapter (22 chapters in total), practicing exercise(s) such as QFD exercise in understanding how to create customer value, reading the simulation documents (e.g., only student manual itself had 122 pages), reading quarterly information (reviews, updates, comments, warnings, and fatal errors), preparing eight executive briefing reports (one for each quarter), taking 22 online quizzes, and preparing two term projects (business/ marketing plan and a report to the board of directors) and one individual paper.

Besides all the preparation and testing, the time management is an essential component of this marketing course. For example, in the last semester (Fall 2006) when this course was taught, the communication board of WebCT had 979 e-mails, while there were 1,529 individual postings in the discussion board in WebCT. Still besides those, each student had to spend a considerable amount of time in studying the simulation parameters online. Specifically, in the entire semester, each student had spent up to 5,312.58 minutes (88.5 hours) online individually, not counting the virtual team meetings (via chat rooms and teleconferencing) they held several times a week as well as personal communications over the phone, through personal e-mails, or instant-messaging.

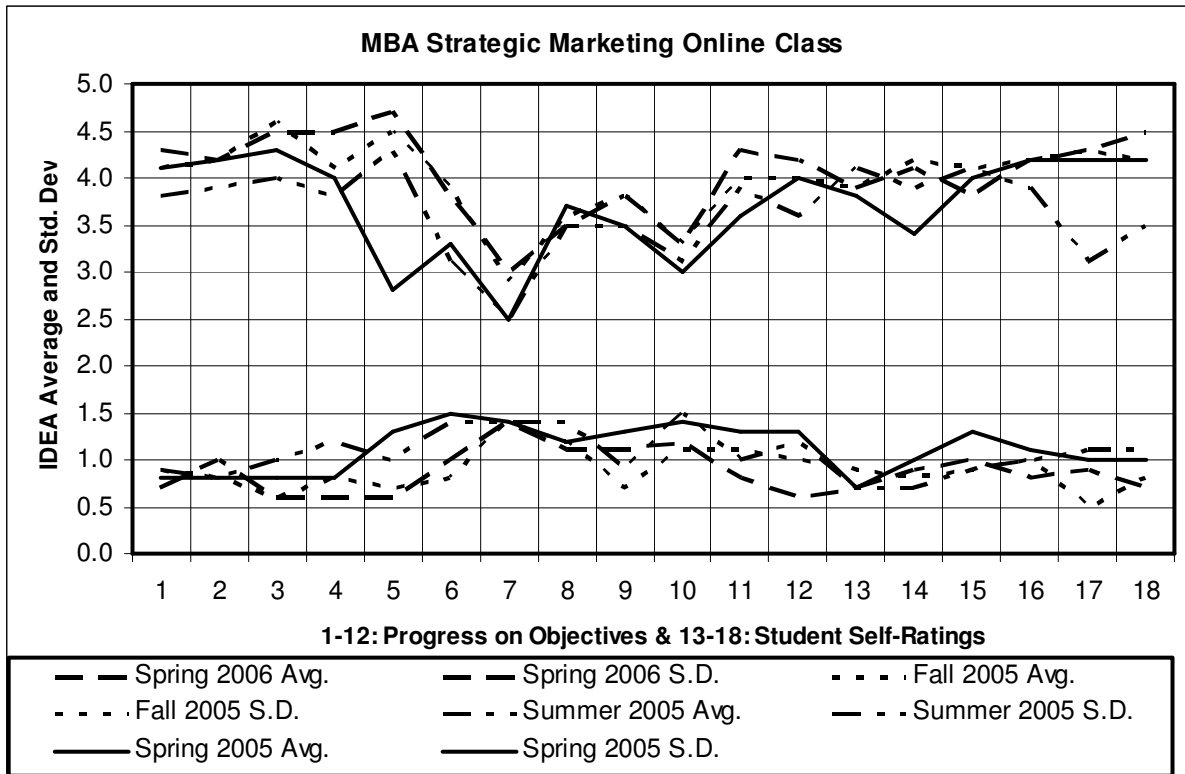
Findings of the IDEA Evaluations

Business graduate students in the Strategic Marketing class have been very eager to provide their course evaluations and comments by the end of each semester. Average class size for this fully online marketing course was 25 while the average response rate to IDEA evaluations was 81 percent.

Application and teamwork were the “essential” objectives while critical thinking was an “important” objective for this marketing course. Specifically, each student was “essentially” expected to learn to apply course material (to improve thinking, problem solving, and decisions) and to acquire skills working with others as a member of a team. At the same time, they were “importantly” expected to learn to analyze and critically evaluate ideas, arguments, and points of view. All other nine objectives were of minor importance. The only exception was in the spring semester of 2005 when students performed simulation activities individually as an independent agent competing against the computer rather than other teams (companies in the marketplace). Therefore, in this unique semester, teamwork was not an essential or important objective, but “facts” (gaining factual knowledge) was one important objective besides critical thinking.

IDEA results on different types of course objectives were distinctive (Figure 8). Progress on essential objectives had an average score of 4.4 over a four-semester period (data was not available for the fifth semester) while important objectives had an average score of 4.0. The remaining nine objectives not selected by the instructor as essential or important had an average IDEA score of 3.6. In terms of the last two measures on teacher excellence and the course excellence, with the exception of the summer semester, the scores were consistently in the range of 4.2-4.5. Still, it seems that many students are not quite ready to live up to the expectations and to digest the rigor of a demanding course where time-management is essential in such a short summer semester of 10 weeks rather than 15 week-regular fall and spring semesters.

Figure 8
MBA Strategic Marketing Online Class



Discussion and Student Experiences

Comments and feedback provided by the students in this fully online Strategic Marketing course were quite detailed and very constructive. They found the course very challenging and demanding. They also appreciated the value of the challenge once they started digesting and applied the marketing content in a highly integrated managerial decision making process. They said they found the marketing simulation extremely realistic because of the feeling they had as if they lived in the real life like uncertain and stressful environment of business. Teamwork added another challenge in the beginning and provided a great synergy at the end. Therefore, they enjoy the teamwork. Even if they, for example, hate to lose sales and market share or to have a failing product and an advertisement not working well in the simulated marketplace, they benefited from intensive interactive intra- and inter-team interaction to make things work for competitive advantage. At the end, they found the overall experience in this class very rewarding. Here are some of the student comments and feedback that support this discussion.

- “The course was challenging and demanding. The amount of effort put forth by a student results in a directly proportional understanding and appreciate of the subject material. simulation was an excellent teaching methodology, permitting application of the subject material.” (– Course Evaluation, Spring 2005)

- “Great Teacher. Would recommend this class to anyone.” (– Course Evaluation, Spring 2006)
- “Dr. Anitsal has done a wonderful job with this Distance MBA class. He always explained the course requirements very thoroughly. He also has been very willing to answer questions and seems to have a genuine concern for his students to learn the material. This course was challenging, but has been a wonderful experience. (– Course Evaluation, Spring 2005)
- “Wow! What a tremendous experience. It was fun, but so much more stressful than I would have ever imagined. This simulation is so realistic. It truly makes you think about all of the factors involved in building and maintaining a successful organization. And of course, working through this simulation as a team effort makes it even more challenging. Combined with the excellent text and quizzes, I rate this as my favorite MBA class to date. Very informative! Thank You Dr. Anitsal!” (– an E-mail, Summer 2005)
- “I have honestly enjoyed this class more than the other distance ones and I think it is because of the "group" work. It has been the closest thing to personal contact that I have had since starting the MBA. This "game" hasn't always been fun (I hate losing money!), but I have enjoyed playing with all of you.” (– a posting, WebCT Discussion Board, Summer 2005)
- “Of the three courses I have taken at Tennessee Tech University, this was the most stressful and time-consuming! It was also very rewarding. The marketplace sim is detailed and thought-provoking. Excellent choice for the sim game. Dr. Anitsal is a good facilitator, offered upbeat, positive direction through the course.” (– Course Evaluation, Spring 2005)

Furthermore, students had similar experiences and made comparable comments in both on-line and off-line versions of the same course. Online simulation was a common point in both versions while other aspects of the on-ground course were held face-to-face.

- “I would like to personally say that I enjoyed the learning experience of your class. I think that the business simulation online is a creative way to get students to think critically and like most of my classmates have already said, adapt to an ever changing competitive environment. This method of learning brought a lot of clarity the true concept of marketing and how marketing effects all functional departments within an organization. Continue to use this online simulation. Thanks for the experience!” (– an E-mail, Spring 2005)

Conclusions

The number of online distance learning degrees available is growing daily. The number of schools and institutions that offer online learning opportunities is also equally expanding rapidly. It is very important for faculty members to be in line with these current trends so that they can

deliver their course concepts online for the students via electronic course management tools. This emerging style is extremely important when especially students are non-traditional, disabled, or coping/interning. In this paper, authors present two best practices with some key essential and important course objectives they developed and implemented in Strategic Marketing and CAD for Technology courses.

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