USING TECHNOLOGY TO ENHANCE LEARNING IN LARGE UNDERGRADUATE BUSINESS CLASSES

Because of funding pressures and increased participation rates, particularly in Ontario, large classes are becoming more the rule than the exception in universities. This study reports on a pilot project to teach Marketing Research in a large class format to business students and shows how technology can be used to overcome many of the challenges of this format including the lack of individual face-to-face contact with the professor.

Introduction

September 2003 marked the beginning of an important academic year in Ontario because the “double cohort” entered university. Two years of high school graduates became eligible for university at the same time, effectively increasing the applicant pool by 50 percent. Other factors that increased the size of the incoming student body included a higher post-secondary participation rate, and a larger age cohort as a result of the “echo” baby boom. With no increase in the size of the faculty complement in the School of Business Management at Ryerson University, we began, for the first time, to discuss teaching selected courses in a large class format as a way of dealing with classes that would be 50% larger. Although conventional wisdom indicates that small class sizes are the preferred format for university teaching, and many post-secondary institutions choose to differentiate themselves based on class size, there are no definitive data that indicate that there are negative repercussions on student learning or student performance as a result of class size (Wulf, Nyquist, & Abbott, 1987; Schech & Kinicki, 1994; Gilbert, 1995; Hill, 1998).

If large class teaching were to be implemented on a broad basis in the School of Business Management, we needed data on how such a class operates in order to ensure an appropriate learning atmosphere. As a result, in January 2003 and September 2003, I taught Marketing Research in a large class format. Marketing Research is a required course for Marketing Majors and Minors, and is normally taken in the second year for marketing majors and in third year for marketing minors. Three hundred students had a two hour lecture once a week and then the class was broken into smaller groups of 70 to 80 for a one hour session once a week. The course was managed using Web-CT in the Winter semester and Blackboard in the Fall semester. In the first week of the semester, students answered a 15 item online questionnaire about their attitudes toward large classes. The sample sizes were 217 in Winter 2003 and 235 in Fall 2003. In the middle of the semester, the students answered a much longer survey (60 items) that contained both quantitative and qualitative questions about their experience to date. The sample sizes were 289 in Winter 2003 and 213 in Fall 2003. This paper will use the results of these surveys to explore the challenges encountered when teaching in a large class format and how technology was used to not only to overcome these difficulties, but also to enhance learning.
Challenges of Large Class Teaching

Much has been written about the challenges of large class teaching and many universities have Websites devoted to listing the problems of this format and ideas for overcoming them. (See for example the Websites at Illinois State University, University of Oregon, Johns Hopkins University, University of Western Ontario, University of Waterloo and the University of Ottawa.) My experiences in large class teaching revealed problems similar to those identified on these Websites. As Figure 1 illustrates, I have grouped them under five challenges.

Communication

The communication challenges of large class teaching are illustrated in the results from the survey conducted in the first week of the marketing research class. Prior to taking this course, students answered a number of attitudinal questions about whether a particular characteristic was likely to be seen more, less or the same in large classes versus small classes. It was clear that students had strong opinions about the disadvantages of large classes, despite lacking experience with this type of format. About 40% of student respondents had been in a class with more than 200 students. In both samples (Winter 2003 and Fall 2003), over half of students indicated that they believe fewer students attend large classes than small classes. In addition 29% believe that fewer students will keep up with assigned reading in large classes. Over 70% in both samples agree that fewer students participate in large classes. Importantly, over three-quarters of students believe fewer of them will have an opportunity to speak individually with the professor in a large class. Thus, the communication challenge is to ensure that students have access to the course content even if they choose not to come to class, that strategies are employed to facilitate participation and that the professor finds a way to interact with individual students.

Connection

One of the major disadvantages of large classes is that students can be anonymous and there is a lack of connection among students and between students and the professor (Wulf et al., 1987). One of the ways this disconnection is manifested is the assumption that students will not be able to communicate with the professor in the same way as they can in small classes. In fact, over 40% felt the quality of teaching would be lower in the large class than in a small class and half felt the overall effectiveness of the professor would be lower.
Context

Although knowledge of the principles and practices of marketing research is essential for most business careers, the reality is that few commerce graduates actually become marketing researchers. Thus, this required course is approached with less enthusiasm than some other business courses. The challenge is to cover the principles and concepts of the scientific method in a way that students find relevant. Since case discussions are difficult to implement in a large class format, other strategies had to be found to show the relevancy of research methods to business students. Students too felt that marketing research in a large class format would not be as useful as other courses in that over 40% felt they would learn less and more than half of respondents believed students would pay attention less.

Consistency

Given the size of the class and that all of the evaluations were in essay format, teaching assistants did all the marking. The consistency challenge was to provide some way to standardize marking over several TAs and to make students feel they had been marked fairly. In addition, course material had to be provided in a consistent and accessible format.

Course Management

The administrative managing of the course was a particular challenge not only because of the number of students, but also because a marketing minor is an option for students not registered in the Faculty of Business. Thus, about 40% of students were from three other Faculties in the university and represented 6 different programs, each with its own behaviour and performance norms. The evaluation framework for this course involved two individual assignments, two group assignments and 5 hand-in tutorials in a 13 week semester. In addition, data were collected each week from students for use in the analysis tutorial conducted in Week 9 of the semester. All these activities required a significant time investment in overall course logistics including managing grades and the 50+ project groups.

The Use of Technology to Overcome Challenges

A variety of technological devices and techniques was used to create a positive learning environment for the marketing research class and to address some of the unique challenges of large class teaching.

CD - Player

The first challenge of a large class is logistical; that is moving three hundred students into a lecture hall as 300 students are moving out. Playing music over the sound system for the first 10 minutes after the hour over the hall’s sound system ameliorated some of the logistical issues. Because different genres of music were played each week ranging from rock n’ roll to hip-hop to reggae to classical, students were motivated to take their seats in a timely fashion in order to listen to the current week’s offering. Part of the course involved the students evaluating the week’s music selection through an online survey that was available through Blackboard. Each week students answered a quantitative and qualitative question about the music and these data were later used as the basis for an analysis tutorial. Thus, technology helped address a context issue in that asking for an evaluation of the music allowed students to be marketing research respondents and see how data collection has relevance for decision making. It also enhanced their
understanding of the process of conducting research as they were later asked to analyze the data they provided. On the quantitative evaluation, 76% of students thought the formal evaluation of the music selection over Blackboard should be continued.

In addition, students took a real interest in my choice of music and as I had left a couple of weeks with no music arranged, a few students particularly enamoured with a particular genre supplied selections to be played. At the end of the semester, I also gave the students an opportunity to suggest music selections for the next year’s class and these were subsequently used. According to qualitative comments by students, playing music set a positive tone for the class as it helped me to forge a connection with students on a topic other than their performance in class. On the quantitative survey, 78% agree that having music at the beginning of class creates a positive learning atmosphere; 73% look forward to listening to it; and 97% think it should be continued in the future. From a course management perspective, the end of the music was the signal that the class was to begin and it meant I did not have to shout above the chatter and ask people to be quiet, a request that does not set the tone I was seeking for this class. Thus, being able to play music using the available technology helped me to communicate my expectations and set the tone and atmosphere for the course.

Wireless microphone and mouse

One of the biggest disadvantages of a large class for both the student and professor is the distance between the two, particularly for students seated at the back of the class (Wulf et al., 1987). One of the ways I tried to minimize this lack of connection was to walk up and down the centre aisle of the lecture hall to get closer to the students and to be able to make eye contact with more individuals. Using a wireless microphone and mouse provided me with the necessary mobility and flexibility. The students seemed to appreciate my roaming throughout the class as on the evaluation survey 78% said they like it that I walk up and down the aisle during the lecture rather than speaking exclusively from the podium. Technology helped me to connect with the students in terms of minimizing physical space and increasing social interaction. In fact, 63% reported that there was more participation in the lectures than they had expected in such a large class.

Posting course material on Blackboard

There was no textbook for the course, so the lecture notes became the defacto text book. The course was divided into 6 modules, usually lasting two weeks and the course content for each module was posted on Blackboard. All the modules were available during the first week of the course, so students could choose to download the current module or all the modules. To facilitate downloading a comprehensive handout was created for each module in PDF format. The handout included the lecture notes, PowerPoint slides in handout format, instructions for one hand-in and one in-class tutorial, instructions for the assignment for the module, the marking sheet that would be used to evaluate the assignment and a peer evaluation form if the assignment was a group effort. Students favour posting the course materials in advance with 96% indicating that PowerPoint and lecture notes should continue to be available on Blackboard. In addition, 75% of students feel that Blackboard has made it easier for them to access course materials. Finally, using technology to assist with formatting the course made the material seem organized to the overwhelming majority of the students (91%). Posting course material with a consistent format gave the course an aura of standardization that helped students feel knowledgeable about the expectations for performance. Interestingly, there were almost no questions about the TAs grading as marking sheets were distributed in advance and they clearly identified what was required for each assignment and how marks were distributed among sections.
Turnitin.com

Turnitin.com has been a topic for discussion in the popular press and on academic listservs and a range of opinions exists about the ethics of using this instrument. From my perspective, it was an invaluable tool in my course and it would have been very difficult to manage the course without it, given that my TAs were used exclusively for marking and not for administration. There was a required hand-in tutorial for five of the six modules. Students were given 2 marks for each tutorial submitted regardless of content. Completed tutorials were submitted to the appropriate assignment box in turnitin.com in advance of the one hour class. For my course, the primary use of turnitin.com was to simplify the process for tutorial grade calculation. Turnitin.com provides the instructor with a list of students who submitted tutorials by the deadline and this list was used to calculate the tutorial grade.

Although the tutorials were not marked individually for content, a selection was scanned by the professor to gain insight into how well students were able to apply the concepts presented during the lectures. Weak areas were then highlighted in the one hour session. Completing the tutorials in advance seemed to enhance both the quantity and quality of the tutorial discussions. In fact, 77% of students agreed that the one hour session had been a better learning experience because they did the assignments in advance. In addition, 67% felt there was more participation in the one hour classes than they had expected, and 88% felt that the format of these one hour sessions was effective in clarifying the lecture material. Being able to submit these assignments electronically gave students maximum flexibility to complete their assignment. That coupled with the 2% penalty for not submitting resulted in a very high compliance rate.

Another and much less important use of turnitin.com was to identify students who plagiarized. Over the course of two years 6 students were identified as having copied a classmate’s tutorial assignment. Both students involved were contacted by e-mail and in each case the student who did the copying came forward to claim responsibility for the infraction and to apologize. There were no repeat offenders. Given that the tutorial assignments were only worth 2 marks each, getting zero was not an onerous penalty, but gave an important signal about expectations for academic conduct.

The final use for turnitin.com was to keep track of submitted papers. All assignments were submitted to turnitin.com and to my office in a hard copy. The last assignment was a secondary research paper and as the papers came in, they were randomly distributed to the two TAs who did the marking. When consolidating the final grades, there were four papers missing. After checking turnitin.com and finding that these papers were not submitted, it was determined that they had not been completed, and were not lost as initially assumed. It is a challenge to manage 300 papers given they are submitted at different times, leave the office to be marked by TAs and then are returned. There is always the possibility of losing a paper and having an electronic copy on turnitin.com provides the added security of knowing a student will not be penalized because of human error. Despite the ongoing ethical debate, for my purposes, turnitin.com was a most helpful tool for course management.

Electronic communication

One of the disadvantages of a large class versus a small class format is that students believe they have fewer opportunities for interaction with the professor. I tried to use several of the electronic communication tools within Blackboard to their full extent to minimize the distance
between me and the students and to ensure that the opportunities for two way communication were maximized. First, I encouraged students to use Blackboard e-mail and discussion boards and I modelled that behaviour in my communications with them. I used the Announcement function on Blackboard extensively. Over the course of the semester, I put up 64 announcements that dealt with issues ranging from changes in course format to general feedback on assignments. In addition, if an issue was being raised repeatedly in private e-mails and on the discussion board, I would put up an announcement that addressed these concerns in order that the whole class would be operating from the same base of information.

Seven separate discussion boards were set up; one to deal with general course issues and six others that related to specific assignments that were part of the course requirements. No marks were assigned for making a posting to any of the discussion boards; participation was strictly voluntary. Over the course of the semester there were 893 postings from students on the various discussion boards. I read all of these postings and responded to most of them. Overall 96% felt that the use of Blackboard to post messages about course management should be continued. In addition, 98% felt having a designated discussion forum for each assignment should be continued.

In order to simplify the communication process for me, I made it a rule that I would only reply to course enquiries through Blackboard, not through my Ryerson e-mail. This was done not only to minimize the number of accounts I had to check, but also because the nature of student hotmail addresses made it difficult for me to differentiate legitimate e-mails from the porno-SPAM that was filling up my mailbox. I wanted to avoid deleting student e-mails inadvertently. Another “rule” was that if students were asking a specific question about an assignment that may have application to other students then it had to be posted on the relevant discussion board and not sent in a private e-mail. Thus, the number of private e-mails I received over the course of the semester was only 272, many fewer than the postings on the discussion boards. Another interesting trend is that over the course of the semester, more and more students responded to requests from their peers for clarification or assistance and did not wait for me. This seemed to indicate that an online community of learners was developing (Driver, 2002).

Although I had regular office hours and always replied to voice mail messages, by far the preferred method of contacting me was electronically. In fact, 76% of students indicated that Blackboard made it easier to stay in contact with me. In terms of approachability and responsiveness being enhanced by technology, 71% of students felt comfortable approaching me with a problem and 87% felt I was responsive to student needs.

In order to enhance communication among students, particularly those working on group projects, individual group bulletin boards and e-mail lists were set up. Interestingly, while 95% want the practice of having designated group project bulletin boards set up in Blackboard to continue, this was not the preferred mechanism for electronic group interaction. While 25% used the Blackboard group discussion forum, and 19% used the group e-mail, 44% used MSN Messenger and 91% used personal e-mail accounts to confer with their group. This underlines the importance of providing a number of mechanisms for electronic communication among students because enhancing peer to peer interaction is just as important for learning as is student and professor communication (Wegegrif, 1998). This is especially significant when group projects are part of course requirements.
Summary

My experience suggests that technology can be an effective tool for overcoming the challenges of large classes. Electronic tools such as e-mail, bulletin boards and announcements in the Blackboard course management system can enhance communication between professor and student and among students. In fact, there is some anecdotal evidence that students who are less comfortable speaking up in a classroom setting availed themselves of electronic communication tools to ask questions. I used music to connect with the students in ways that did not involve a discussion of marks on assignments. In addition, the wireless microphone and mouse allowed me to reduce the physical distance between me and the students in the lecture hall. Making this connection facilitated interaction and participation. The online survey function of Blackboard allowed students to be respondents in a marketing research project and to develop a more complete understanding of the context and relevance of the scientific method for decision-making and strategy development. Being able to upload all the course documents onto the Web in a standard format, enhanced the perception of consistency and organization across the course. Because the documents were able to be transformed into PDF format, students could download one comprehensive handout for each module instead of different documents requiring different software capability. Course management is a particular challenge in large classes, but Blackboard with its online grading system and survey function, and turnitin.com made it much less complicated to keep track of student submissions and for students to keep apprised of their progress in the course.

The Use of Technology to Enhance Learning

According to deWinstanley and Bjork (2002), there are three fundamental features that describe the process of learning. First, information is stored in terms of its association and relationship to existing knowledge; that is, for learning to occur, it must be linked to what is already known. Second, the recall of information is dependent on cues; and finally, retrieving the information once means that it will be easier to recall it in the future. In designing an effective course, the professor is trying to include processes that will facilitate effective processing. My experience with large class teaching has revealed the important role technology can play in triggering these processes.

Researchers have explored the impact of attention on memory and recall because focusing a student’s attention during a lecture is a necessary condition for learning (deWinstanley & Bjork, 2002). They found that when students divide their attention between verbal and visual information, poorer recall is the outcome (Rabinowitz, Craik, & Akerman, 1982). Other researchers have noted the existence of two distinct channels for manipulating and representing knowledge: a visual pictorial channel and an auditory-verbal channel. Because each channel has a limited capacity, there is a possibility of overload, which in turn has a negative impact on learning (Baddeley, 1999).

While the use of PowerPoint slides during a lecture would seem to exacerbate the instances of divided attention (deWinstanley & Bjork, 2002), if PowerPoint is used correctly, it can enhance learning. For example, Mayer (2001) found that learning is more likely to occur when verbal and pictorial processes work together. Further research has found that when students mentally connect the pictorial and the verbal, it enhances the possibility of deeper learning (Mayer, 2002). The ideal would seem to be presenting visual and pictorial representations of concepts rather than words and text on PowerPoint slides. Deeper learning also occurs if the lecture narrative on the concepts and the pictures on the PowerPoint slides are presented simultaneously rather than successively (Mayer, Moreno, Boire, & Vagge, 1999). The outcome
is also better when the words are spoken, rather than having the words reinforced with on-line text (Mayer, Heiser, & Lonn, 2001). The message for those who teach large classes and want to use technology to enhance learning is not to overload either the visual or the auditory channel, but to use both to reinforce learning. This can be accomplished for example by using a pictorial representation of a concept on a PowerPoint slide in conjunction with a narrative from the professor that simultaneously explains the concept in words.

Another key finding about how learning occurs is that if students can defer note taking until later and can just listen to some parts of the lecture, their learning is enhanced (Hadden, Kirby, Woodhouse, 1999). Electronic course management systems such as Blackboard allow professors to send course documents to students easily. In my course students had the lecture notes and PowerPoint slides in advance, so this reduced the need to focus exclusively on writing during class. Ample opportunities were provided during the lecture for reflection on the content being presented.

Researchers note that much classroom time seems to be spent on the transmission of definitions, facts and concepts rather than the deep end of the comprehension continuum (Graesser, Person, & Hu, 2002). Although asking and answering deep comprehension questions is important for the enhancement of learning, a typical student asks very few questions (an average of .17 questions per class) and even fewer that involve deep thinking (10%) (Graesser & Person, 1994). The challenge then is to provide a mechanism for encouraging deeper thinking and comprehensive understanding. If used effectively, electronic discussion forums may provide a way to achieve this goal. My experience is that many of the questions posed on the forum were of a higher quality than those posed in class. They were usually triggered by an obstacle to understanding encountered when trying to complete an assignment. The very act of trying to put the question and the obstacle into words meant the students had to approach the problem from a more strategic and comprehensive perspective. In fact, while 84% agreed that their knowledge about the techniques for conducting research had increased dramatically as a result of this course, 76% also felt their ability to think strategically had increased. While the discussion forums were certainly not the sole avenue for the development of this skill, they did contribute to the learning in this area.

Electronic communication can also be an important mechanism for professors to maintain contact with students. In a study of the learning dimensions that were important for both students and professors, O’Toole, Spinelli and Wetzel (2000) found that quality of the learning experience was more dependent on the characteristics of the professor than other factors such as size of the class, time of the class, textbooks and supplements. The professor’s availability and helpfulness were particularly significant to students. E-mail and computer conferencing have been found to facilitate communication between students and professors (McHenry & Bizik, 1995). In fact, there is a positive relationship between the use of a Web-centric learning environment and social interaction among students (Driver, 2002). Research has also shown that students in online classes receive more attention from their professors (Jana, 1999). Because the TAs did the marking of course assignments, I had more time to devote to answering e-mails and monitoring the postings on the discussion forums. Over time, an expectation developed that I would respond within 12 hours and since I was able to meet and many times exceed that expectation, I was able to establish trust and develop rapport with a significant portion of the class. One rule I made for myself was that I would always answer immediately even if it was just to thank someone for sending me something. The volume of e-mails and postings made it too easy to forget a communiqué that I had every intention of dealing with at a later time.
Other ways to enhance the connection between students and professors include using self-disclosure (Beck, 1983). The thoughtful use of e-mail and discussion forums provides an opportunity for professors to inject some personality into their communication, which may in turn make them seem more approachable. In my electronic responses, I tried to use humour and personal examples to reinforce the points I was making. This was an effective strategy and my positive results were consistent with research conducted by Schmidt (1994) who found that sentences written in a humorous style were more likely to be remembered. In addition, Fredericks (1987) found that students prefer personal experiences to be mixed with objective information.

Conclusion

Over the past several years, universities have been faced with needing to serve more students with fewer financial resources. One response has been to offer more courses in a large class format. It is unlikely that in the foreseeable future this trend will change. For example, at Ryerson University in the School of Business Management, we admitted 826 students in the Fall of 2003, a 91% increase from the Fall of 2001. Enrolment in introductory marketing has soared by 37% and this academic year 1655 students are taking Marketing 100. As a result, for the first time it is being delivered in a large lecture theatre.

While we tend to think of large classes as only having disadvantages for both students and professors, there is research that indicates there are benefits to having more students in one location, including the ability to have complex interactions that are not possible in smaller classes (Wulf et al., 1987). Another indirect benefit of the growing trend for more large class teaching formats has been its role as a catalyst for focusing professors’ attention on developing innovative strategies for presenting course materials and forging connections with students. My experience indicates that technology can be a positive tool in helping professors do a good job in the classroom, regardless of class size. In fact, technology is not just an add-on, but rather an integral part of course delivery and organization. The effective use of presentation software such as PowerPoint allows professors to design lectures in a format that leverages the role of visual and auditory channels in enhancing learning. The variety of communication channels offered by Web-based course management systems such as Blackboard provides unprecedented access to professors, albeit not face-to-face.

Research points to class size not being the key variable in determining learning outcomes, but rather a professor’s knowledge, enthusiasm and empathy are the defining features of a positive learning experience. Thus future research may want to focus on the ways technology can be used to enhance professor student interaction, improve the clarity of course material, increase the attention of students during lectures, and provide more opportunities for deep thinking and complex reasoning.

References


