

Successfully Blending Distance Students into the On-Campus Classroom

Susan L. Murray, Ph.D. David Enke, Ph.D., and Sreeram Ramakrishnan, Ph.D.
Engineering Management
University of Missouri – Rolla

Abstract

As universities are increasingly embracing distance education technology, it is useful to examine the challenges and opportunities of technology in the classroom. This is especially true when the course contains on-campus local students in addition to students learning at a distance. A significant challenge commonly faced is how to remain flexible in presenting course materials while still having notes and other handouts in electronic format available before the lecture. Other challenges include creating and using lecture material that can be viewed at low resolution and low bandwidth, and getting distance students to interact with the instructor, on-campus students, and fellow distance students. Technical challenges include having the proper recording facilities, resolution of the video, clarity of the audio, and syncing of the video and audio for those distance students participating in the live lectures.

Fortunately, benefits and opportunities do exist for developing distance education programs, beyond increasing student enrollment. Distance students often bring valuable insight and practical “real world” experience to the classroom discussions. The challenge, of course, both from an organizational and technical perspective, is how to incorporate this experience into the classroom environment. In this paper the authors draw upon their years of experience teaching distance education, educational research, and survey results to highlight the main issues that need to be considered in instructing hybrid class rooms, while suggesting some strategies to be incorporated into the engineering classroom. The development of techniques that can be used to facilitate the education of distance students, without taking away from the quality of the on-campus educational experience, is also a critical concern.

Introduction

The importance of distance education cannot be overstated, and its use as a medium for course delivery is becoming more prevalent in engineering education (Evans and Murray, 1998). In addition to enhancing the overall classroom experience, Intranets are allowing for Distance Teaching and Learning Academies, along with streaming video capabilities, to reach rural communities, both at the K-12 and college levels (Gosmire and Vondruska, 2001). The survival of rural communities may depend on technology to link members of the broader community, facilitating their education, and thereby increasing the community’s ability to attract and keep business (Musial and Kampmueller, 1996). It is likely that urban communities will also benefit.

There are many definitions and forms of distance education. Students can receive material as text, graphics, audio, video, or combinations of these. Faculty may receive feedback ranging from none to real time streaming video connections. Traditional on-campus students may or may not be present. It is imperative to understand the various factors that will influence the learning experience of the students in this hybrid environment so that faculty can customize their teaching and lesson plans. This paper is first in a series of papers that will discuss on-going research activities in the Engineering Management department at University of Missouri – Rolla aimed at understanding and developing novel methods for hybrid classrooms. In particular, this paper will outline some of the challenges and opportunities for various teaching situations, and discuss some of the common myths of teaching two-way distance education (Musial and Kampmueller, 1996). The on-going research attempts to model the challenges and opportunities associated with distance education into three broad categories – technology, logistics, and student behavior. In this paper, an overview of these three categories has been provided. The remainder of this paper is organized as follows: First, a brief discussion on the research framework is presented. This is followed by a discussion on challenges and opportunities in each of the three aforementioned categories. The paper then concludes with a summary and an outline on planned future research activities in this field.

Challenges and Opportunities in Hybrid Class Rooms

As mentioned at the outset, this paper discusses a framework to analyze the various factors that impact the student learning experience and faculty teaching styles and lesson plans in the field of distance education, with an emphasis on hybrid education (both on-campus and distance students). Table 1 presents some of the issues associated with each of the three categories – technology, logistics, and student behavior.

Category	Some Challenges	Some Opportunities	Example Key Questions
Technology	<p>Additional responsibility for instructor</p> <p>Fine tuning lecture plans to suit available technology</p> <p>Modifying teaching styles</p> <p>Availability of technology to students (bandwidth, cost, etc.)</p> <p>Infrastructure and resource scheduling issues</p>	<p>Opportunities for self-review of lectures to monitor teaching plans/style</p> <p>Additional motivation to encourage collaborative learning</p> <p>Additional channels to foster teacher-student interactions</p> <p>Can facilitate asynchronous learning</p>	<p>Level of technology required?</p> <p>Types of technology to be adopted for a class?</p>
Logistics	Information exchange among	Uses of multiple modes of	How to streamline

	<p>distance students</p> <p>Networking and team-building among distance students</p> <p>Additional time requirement for collection of tests, assignments, arranging for proctors, etc.</p> <p>Additional time for e-mail and responding to individual student queries</p>	<p>communication</p> <p>Could reduce preparation times for a course offered later</p> <p>Easy archiving</p> <p>Increased channels for student interaction and feedback</p> <p>Could promote independent learning</p>	<p>interactions with students at different sites and with different questions?</p> <p>How to structure tests, assignments, and lectures?</p>
<p>Student behavior (attention and issues of honesty)</p>	<p>Student attention spans and interest levels</p> <p>Student interaction in lectures</p> <p>Monitoring exams</p> <p>Ensuring fairness in grading policies and expectations</p>	<p>Ability to change format /teaching style in same lectures to improve attention</p> <p>Ability to incorporate techniques to increase student engagement in lectures</p> <p>Opportunities to evaluate the need for traditional closed-book exams</p>	<p>Techniques to increase student attention and engagement?</p> <p>What techniques work for what types of courses?</p> <p>Role of traditional exams in grading schemes?</p>

Table 1. Examples of opportunities and challenges in distance education

Technology Challenges

Regardless of the technology used, there will be problems (Evans and Murray, 2000). This is an incredible source of frustration for students. Distance education students need a way to communicate if they are having a technical problem. Even though this is most likely not an instructors' area of responsibility, it is very likely that the students will turn to the instructor for any help. It is therefore necessary for an instructor to have contact information for the person they should talk to. It is necessary to take effort to demonstrate that an instructor is concerned about the students' ability to get information.

Watching your class from a distance student's perspective can be an eye opening experience. A colleague was shocked to realize how distracting a photo background was on the computer. He had picked a colorful photo, thinking students would enjoy it. But when he watched himself on tape he realized how horribly distracting it was and how much distortion it caused.

Faculty often review their recorded lectures to learn more about their teaching approach. Many times this is done in the office with a computer connected to a T-1 line. It is easy for the faculty to assume that they are receiving the same experience as the distance student. Nothing could be further from the truth. Many students do not have T-1 lines and watch at home using a telephone line connection, or a broadband connection much slower than a T-1 line. The experience when watching in this environment is very different. When viewed off-site at slower speeds, the audio delay is typically very distracting. These experiences help one to understand the delayed student responses to questions. It is normal for faculty teaching distance course to ask themselves, “Why aren’t the students paying attention?” Obviously, part of the problem is the time delay. As a result, collaborative learning techniques (Haller, et al, 2000) should be used for directing questions to the distance education students. For example, students can be asked to pair up and take a minute to list all of the possible causes they can think of for a particular problem. This approach gives distance students more time to hear the question and reply more effectively.

Technology Opportunities

Observations have been made about how little progress the typical professor has made beyond the ‘caveman’. The caveman used a small rock to make marks on large rock walls. Some professors still use small rocks (chalk) to make marks (unintelligible words and formulas) on a large rock (slate chalkboard). By definition distance education has brought technology into the classroom and has served as a means for innovation (Viechnicki, et al, 1995), causing instructors to find new methods for teaching difficult concepts. The extra technology in the classrooms often facilitates this innovation. With the decreased cost and portability of computer and information technology, normal on-campus classes can also take advantage of these techniques. Video players, cameras, and the Internet are just a few of the resources available. Instead of drawing a machine, instructors can show digital photos. Instead of passing hands-on examples around for the class to see sequentially, the entire class can watch up-close demonstrations.

When used properly, technology can be used to pique students’ interest before introducing a concept. For example, when ergonomics is introduced to an industrial engineering class, a short video clip of an assembly line task can be shown. Students can then be asked to identify aspects of the job that make it uncomfortable and unsafe. This clip provides a springboard to introduce various ergonomic principles.

The use of new course delivery technologies, such as streaming audio and video, have also helped to improve the quality of the distance education experience. Initially referred to as “compressed video technologies,” special transmission processes utilizing compressed video made it possible to maintain a live, two-way visual and auditory communication link over a smaller bandwidth (Paris, 1999). This is in contrast to satellite transmission, where many locations were limited to one-way video and two-way audio, often keeping the instructor and students from seeing each other (Schrum, 1996).

Distance students can now take a course at their leisure, or have a classroom experience that is real-time, allowing for a more natural educational experience.

Logistical Challenges

Distance education students often require more attention from the instructor than on-campus students. In a traditional class, if a student is uncertain of something they often start by asking their classmates (i.e., when is the homework due?). Since they are widely dispersed, distance students often do not have a working relationship with other students in the class. So, they email their questions directly to the professor. Handling these one-on-one greatly increases the instructor's support time for a class.

Homework from distance students takes longer to grade. With on-campus students, you get a pile of papers to grade, record, and return in mass. The distance students email their homework individually. Returning homework via fax or email is much more time consuming. If on-campus students are also allowed to email homework, the time demand for the class can grow at an alarming rate. It is often beneficial to require on-campus students to submit their work during class, taking full advantage of the built-in economy of scale.

Distance education necessitates pre-planning, but it is important not to do so at the expense of the course instruction. Wolcott (1993) found that instructors that focused on the course content and syllabus tended to ignore and undervalue instructional activities. Both are necessary in distance education, even more so than traditional live, on-campus instruction. Distance students need to plan ahead, since they are often working full-time, have more commitments outside of work, and periodically travel. They often complete much of their course work during the weekends, so assignments must be planned to allow sufficient time to complete tasks.

The logistics of the lecture itself are also often different in the distance environment. Research shows that instructors cover course content faster in televised classes than they do in normal face-to-face classrooms (Tykwinski and Poulin, 1991). Often both the student and instructor view the class as a production that should flow seamlessly, much like a television show. The camera forces a level of formality on the instructor. As a result, instructors are less likely to wander and students are less likely to interrupt. Some researchers have said it is best to limit continuous lectures to 15-20 minutes at a time, benefiting both on- and off-campus students (Hart, et al, 1992; Musial and Kampmueller, 1996). Having periodic stopping points can help initiate down time for students to reflect and solve problems (Tykwinski and Poulin, 1991).

Logistical Opportunities

List-serves and discussion boards can prove to be incredible time savers for instructors. Questions, such as "What chapters are on the exam?" can be answered once via an email list-serve. Questions that are asked every semester can be answered as FAQs. Student discussion boards can be a great educational resource without major time requirements.

Electronic drop boxes or a special email address for homework assignments can also be a time saver. The electronic grade books available with many software packages (such as Blackboard or Web CT) can eliminate the end-of-the-semester flood of “What grade did I get on the final exam?” or “What is my grade in the class?”. Often the grade reporting functions of these packages are the most utilized features by students.

As instruction begins, distance students often feel excluded. One student remark that “It feels kind of eerie watching a class as a distance student.” She felt almost like a supernatural observer. For other students, this environment is desirable. Many students in distance education learning environments become more independent learners and are less dependent on the instructor (Mielke, 1992; Musial and Kampmueller, 1996; Smith, 1994). While this appears to be true for most distance students, others fall on the opposite extreme – they “tune out,” possibly since to these students the experience does not feel like a real class, or technological barriers prohibit them from participating in the course.

Instructors can take steps to reduce feelings of non-involvement. Distance students can be asked to email a self-introduction to the class. Learning job titles and company names can make the disembodied voices seem more a part of the class to the other students. Pairing distance students with on-campus students or other distance students for class activities, homework, or projects can improve the quality of the work and the sense of belonging. A particularly effective arrangement is to have the distance students provide reviews of the on-campus student presentations. The student presenters appreciate the real world feedback and the reviewers enjoy the opportunity to mentor others.

Student Attention Challenges

Many students have grown up passively watching television, and slip into this mode when course materials are recorded. There is often a marked decrease in students taking notes and plugging-in to class. This becomes more exaggerated when course notes are provided before the lecture, which is often necessary when teaching at a distance (Schlenker, 1994). Student attention is one of the many challenges that faculty have had to wrestle with while teaching distance education.

Attention deficits may be a result of the distance format. Studies have shown that if the level of travel is not a factor, students and instructors tend to prefer face-to-face classroom instruction and want personal contact (Smith and McNelis, 1993; Musial and Kampmueller, 1996), with learners preferring conventional instruction over interactive distance education (Smith, 1994) - although these studies are somewhat dated and made at a time when technology was not as sophisticated. Students prefer personal contact, while instructors prefer being able to read the non-verbal cues from the students in the classroom, even if instruction quality is believed to be similar.

Lack of feedback from distance students is certainly a problem, and may also decrease the levels of classroom attention. Other researchers (Mariola and Manley, 2002) have also expressed the difficulty of having no immediate physical feedback available from distance students. They found it was necessary to encourage individual communication

with the students. Some feel the only way to achieve any type of feedback is to insist on active classroom participation from distance students, and expect regular student participation and interaction, especially to keep the instructor from being the sole source of knowledge (Grasinger, 1999). McCarthy's (2004) 4MAT technique states that at the beginning of the instruction the teacher must take on the roles of a motivator and a witness. This technique would allow the students to become active in the instruction.

Student Attention Opportunities

The importance of changing the class format every 20 minutes or so to retain student attention has been well established (Haller, et al, 2000). The technology available increases the ways in which this can be done. Instructors can break up a lecture by showing some photos or calling on a distance student to provide their perspective from industry. Students desire more visual aids, such as lecture outlines, structured overviews, and graphical illustrations, allowing for more active learning (Smith, 1994; Musial and Kampmueller, 1996).

One method of facilitating participation and activity is to leave blanks in the notes that needed to be filled in. The authors have had varying experience with this technique. In one instance a student complained when he missed a multiple choice question. The answer was blank in his notes, so in his opinion it wasn't a fair question. Pointing out that the information in the blank was filled-in and mentioned during the lecture, and that it was in the book, did not seem to be sufficient for this student.

In other instances, the addition of "red text" to lecture notes was useful. This text would usually revolve around some concept or problem solution the instructor wants the student to think about without having a description or answer in front of them. This text is eliminated from the notes that are provided to the students before the lecture, but appears in the notes as the lecture is given. When students see the red text they know it is not in the lecture and is something they need to write down. Since the topic has been talked about it before the text appears, the note taking usually does not interfere much with the learning, but helps to reinforce the concepts. An extra benefit of the red text note taking is that it gets the students engaged in the lecture, even if only to get their body moving and their mind focused again. Certainly, the success of this technique depends on the type of class and the willingness of the students to become involved.

Another technique used by some distance instructors is to withholding notes until just before or after the lectures. Students complained with fury, and still do not take notes. Two good approaches to this problem including discussing the need for note taking skill (i.e., "your boss is going to tell you to do something and isn't going to provide written notes") and a simple example of the learning effort of hearing and writing information (i.e., at the beginning of class provide some data then later compare the retention of the data for people who only heard it versus those who also wrote it down).

Academic Honesty Challenges

Unfortunately, academic dishonesty is a concern for university faculty. Monitoring for cheating during an exam with all of the students physically in the classroom is a challenge. Considering distance students at remote locations adds an entirely new level of difficulty. Issues of fairness are also a concern, since many on-campus students may feel they are being held to a higher standard, since they are being proctored while distance students are placed on the “honor system”.

Academic Honesty Opportunities

Some instructors require students to take exams at qualified testing centers, often at universities or in company training departments. However, this requirement significantly reduces the students’ flexibility and may even prove prohibitive for some students. Many distance students dislike driving to remote locations to take a test, and often feel it decreases the advantages and flexibility of distance education. Some students feel insulted by being asked to be proctored, since they are working professionals and consider themselves to be ethical. Other approaches include open-book exams or eliminating exams from the grading structure. A less extreme approach to control the time allowed for test taking is using fax machines or emails. From the time a student receives the exam, they have a certain amount of time to take the exam. The time stamp on the fax or email message determines if the student has met the time requirement, although having numerous students all faxing their test back at the same time presents additional challenges.

Conclusion

The paper presented a broad overview of some of the main issues that need to be considered while developing lectures for hybrid class-rooms. This has assumed greater significance in the context of the increasing popularity of distance education. It is clear that the prevalence of distance education has influenced the expectations of the engineering educator and students. In order to integrate distance students with the traditional on-campus student population, it is imperative to modify teaching styles and lecture plans. This is a challenge that presents many obstacles, both technical and psychological. However, distance education provides many opportunities to improve the learning experience for everyone involved. The paper presented some of the key challenges and opportunities associated with three categories – technology, logistics, and student behavior. In subsequent papers the authors will discuss each of the three issues in detail, in the context of some of the research questions that were outlined in this paper.

References

1. Evans, E., and Murray, S., 1998, “A Technology Assessment Survey for Web-Based Higher Education Programs,” *1998 American Society for Engineering Education Conference*, Seattle, WA, June 1998.
2. Evans, R.; Murray, S.; Daily, M.; and Hall, R., January 2000, “Effectiveness of an Internet-Based Graduate Engineering Management Course,” *Journal of Engineering Education*.
3. Gosmire, D., and J. Vondruska, 2001, “Distance Teaching and Learning Academy,” *TechTrends*, Vol. 45, No. 3, pp. 31-34.

4. Grasinger, M.F., 1999, "Successful Distance Learning: Teaching via Synchronous Video," *College Teaching*, Vol. 47, No. 2, pp.70-73.
5. Haller, C.; Gallagher, V.; Weldon, T.; and Felder, R., September 2000, "Dynamics of Peer Education in Cooperative Learning Workgroups," *Journal of Engineering Education*.
6. Hart, R.A., P.B. Hart, O.E. Benavides, 1992, "Establishing Rural IT IS Distance Education Programs: The California State University, Fresno Experience," *Annual Meeting of the Association for Educational Communication and Technology Conference*, ERIC Document Reproduction Service No. ED 346 846.
7. McCarthy, B., 2004, "The 4 MAT System," Oak Brook, Ill, Excel (<http://www.aboutlearning.com>).
8. Mariola, E., and J. Manley, 2002, "Teaching Finance Concepts in a Distance Learning Environment – A Personal Note," *Journal of Education for Business*, Vol. 77, No. 3, pp. 177-180.
9. Mielke, D.G., 1992, "Distance Education: A New Paradigm for Physical Education and Health," *American Alliance for Health, Physical Education, Recreation, and Dance Conference*.
10. Musial, G. G., and W. Kampmueller, 1996, "Two-Way Video Distance Education: Ten Misconceptions about Teaching and Learning via Interactive Television," *Action in Teacher Education*, Vol. 17, pp. 28-36.
11. Paris, J.F., 1999, "A Broadcasting Protocol for Compressed Video," *Proceedings of the 1999 EuroMedia Conference*, pp. 78-84.
12. Schrum, L., 1996, "Teaching at a Distance: Strategies for Successful Planning and Development," *Learning and Leading with Technology*, Vol. 23, pp.30-33.
13. Smith, K.M., 1994, "Two-way Video Distance Education: Responding to Learning Styles for Preparing Teachers," *39th Annual International Reading Association Conference*.
14. Smith, D.L. and M.J. McNelis, 1993, "Distance Education: Graduate Students' Attitudes and Academic Performance," *American Educational Research Association Meeting*, ERIC Document Reproduction Service No. 360 948.
15. Tykwinski, J.R., and R.C. Poulin, 1991, "North Dakota Interactive Video Network: A Practical Guide to Teleconferencing and Distance Education," *Bismarck - North Dakota University System*, ERIC Document Reproduction Service No. ED 348 945.
16. Viechnicki, K., S. Brenner, W. Singleton, B. Beach, C. Sexton, and M. Flemister, 1995, "The Appalachian Distance Learning Project: A Qualitative Evaluation Model," *Annual Meeting of the Association of Teacher Educators*.
17. Wolcott, L.L., 1993, "Faculty Planning for Distance Teaching," *American Journal of Distance Education*, Vol. 7, No. 1, pp. 26-36.

SUSAN L. MURRAY

Dr. Murray currently serves as an Associate Professor of Engineering Management at the University of Missouri – Rolla. Her research interests include engineering education, work design, productivity improvement, safety engineering, and human factors. She received her B.S. and Ph.D. in industrial engineering from Texas A&M University and her M.S. in industrial engineering from the University of Texas-Arlington. Prof. Murray is a registered Professional Engineer in Texas and a member of ASEE.

DAVID ENKE

Dr. Enke is an Assistant Professor of Engineering Management at the University of Missouri – Rolla. His research interests include financial engineering, investment, market efficiency, engineering economics, and engineering education. He received his Ph.D. in Engineering Management from the University of Missouri – Rolla. He is a member of ASEE.

SREERAM RAMAKRISHNAN

Dr. Ramakrishnan is an Assistant Professor of Engineering Management at the University of Missouri – Rolla. His research interests include distributed simulations, simulation-based control, and stochastic modeling of manufacturing processes and systems. He received his Ph.D. in Industrial Engineering from Penn State University and his M.S. in Industrial Engineering from Binghamton University, New York. He is a member of ASEE.