

Issues and Challenges for the Distance Independent Environment

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Instructors are familiar with an infrastructure that supports both instructor and students occupying the same classroom, and with most instructional delivery taking place while they are all present. This same-time/same-place delivery system is currently the norm, and few instructors are familiar with other types of delivery.

In this article, the author outlines changes in infrastructure that are frequently necessary when one breaks from the traditional same-time/same-place model. Not all of these are applicable to all implementations of distance independent education.

The author hopes that this article will serve as a basic guideline to the issues that an instructor must tackle in moving from the same-time/same-place model to various forms of distance independent education.

Framing Distance Education Activities

There are many types of distance independent education and many aspects to the delivery of a distant independent course. It is useful to adapt Robert Johansen's grid of time/place intersection (Johansen et al. 1991) to some of the possible models of "classroom" activities (see Fig. 1).

We can further break down classroom activities in terms of the direction of communication and level of interactivity. Classroom communication can be one-way (broadcast), where an instructor gives a lecture without any direct response from the students. It can be two-way, as in a seminar where students talk approximately as much as the instructor. Or it can be partially interactive, where student response is limited, and most of the classroom time is monopolized by the instructor (as in lecture classes with occasional student questions).

In distance settings the level of interactivity is partly limited by the technology used. We often refer to the vehicle used to deliver student image and/or voice back to the instructor as the "backchannel." Examples of backchannels include questions posed in class (same-time/different- or same-place), handing in of assignments or

sending of e-mail (different-time/different-place), and phone calls (same-time/different-place). When the bandwidth of the backchannel is equal to the bandwidth of the main delivery channel, it is possible (though not necessary; this depends upon teaching styles) to have a fully interactive classroom. When the bandwidth of the backchannel is narrower (audio-only, for example) the classroom cannot be fully interactive. When backchannels are "different-time" (as with students sending e-mail questions back to the instructor), that part of the instructional process cannot be fully interactive.

When we examine distance independent learning environments, we need to be careful to note the level of interactivity permitted by the technological infrastructure, as well as the level of interactivity chosen for instructional purposes. Together these two interactivity variables serve to limit the possible teaching styles. For example, one cannot try to teach a seminar if the infrastructure provides only the level of interactivity designed for a lecture.

Because the instructional process is not solely limited to classroom time, it is also useful to examine support activities that are not part of the "classroom." Instructor office hours, student group meetings, and library services all pose problems when one moves into the distance education environment, and we outline some approaches to the delivery of these educational support services later in this article.

Infrastructure and Resources Needed

When examining the infrastructure and resources needed to support distance independent education, it is useful to separate these out into those needed to support the equivalent of classroom instruction, those needed to support interaction between the individuals involved in the educational process, and those needed to provide instructional support material. This article discusses the first two in this section, and the third in a subsequent section.

Same place	Traditional classroom	Instructional lab
Different place	Fixed room remote delivery, video or phone conference	Self-paced instruction

FIG. 1. Johansen's time/place grid applied to distance independent instruction.

Different-time/different-place environments tend to be relatively simple. These environments may require significant production in creating course material, but actual delivery and interaction are usually easy and straightforward. In this type of delivery system, user "classrooms" are either a videotape player or a computer workstation, and the student can usually control the pace of instruction. In this environment, all interaction between individuals is essentially "off-line," so the support tools needed tend to be tools like e-mail and methods for handing in papers.

Same-time/different-place environments are more complex. In this type of delivery system, most classrooms have been outfitted with expensive cameras, lighting, and sound. Physical arrangement of the classroom has emphasized fitting all students within the camera frame, often at the expense of seeing facial expressions. Other considerations for such a classroom include eliminating natural light—which tends to be uneven and unpredictable—as well as eliminating glare on the screen.

Because lighting, sound, and wiring of distance classrooms have been complex, outfitting just one of these classrooms has been extremely expensive—often hundreds of thousands of dollars. Experimentation moving away from fixed classrooms into more portable set-ups (see Maurita Holland's *Collaborative Technologies in Inter-University Instruction*, 1996) has had mixed results; at this time, such set-ups still require significant technician support. Those considering investing in distance education programs must weigh the trade-offs between significant capital outlay in outfitting a fixed classroom against the technical support currently required to provide a portable set-up. One also must factor in the rapid changes in technology which may force a shift in the type of infrastructure needed. For example: The need for classroom satellite feeds may be supplanted by the need for multiple phone lines to handle ISDN services; Internet feeds which were not present in most fixed distance classrooms are likely to be essential in the near future. Investment in today's state-of-the-art technology without careful concern about technological changes may leave an institution supporting a white elephant several years hence (see Stuart Sutton's *Planning for the Twenty-First Century: The California State University*, 1996).

Having the instructor and the students in different physical locations—or time-slots—necessitates a change in presentation style from that of the conventional classroom. This includes change in presentation material, instructor dress and delivery style, and in the interaction between students and instructor.

Audiovisual support materials are important in a distance setting in order to give remote students more to look at than a "talking head." But existing instructional aids often must be redesigned for the distance setting. In situations where delivery is via NTSC (National Television Standards Committee) television screens, lettering that was designed for overhead transparencies will frequently need to be made larger and heavier. Continuous-tone color slides will lose detail and color accuracy when converted to NTSC signals. If the delivery system is digital, moving image material—such as videos—will often become choppy due to video compression.

Instructor dress and movement become far more important in a distance setting. Solid shirt colors such as red create an annoying flare on NTSC video. Compressed video signals tend to break up when confronted with too much moving detail within an image, so patterned shirts should be avoided when using digital transmission. Instructor movement and gesticulations cause similar problems, and movements that necessitate camera re-framing often prove difficult to watch. Instructional styles that rely upon the teacher as a performer usually do not translate well into this medium, and until other means are found to convey excitement about course material, distance courses may appear boring in comparison with a similar course taught by the same dynamic instructor.

In the conventional classroom setting, the instructor frequently makes eye contact with students, is able to respond to puzzled looks, and can alter the pace of a lecture in response to non-verbal interaction with students. Obviously this is not possible in a distance setting without a video backchannel. But even in settings with two-directional video, the non-verbal interaction differs significantly from a same-time/same-place classroom.

In a fully interactive distance education environment, most two-way interaction is mediated by a cameraperson. The cameraperson at the remote site controls which students the instructor will see, and consequently which non-verbal cues the instructor will view. The cameraperson also controls who the instructor is likely to call upon, because unless someone off-camera is extremely vocal, the instructor is likely to call upon only those students who he/she is able to see. We examine the role of the camera operator in more detail shortly. Students also must learn to face the camera when addressing an instructor or other students at the remote site. Placing cameras directly above the monitor showing the remote site and situating both far enough from students so that the

camera angle can capture student gazes is important to the classroom set-up.

Role of Instructor and Instructional Support

Moving from conventional classroom instruction to distance independent education is not a simple or cheap proposition. Generally, distance education will require new instructional support personnel, new roles for traditional instructional support personnel, and new tools for instructional support and collaboration.

The origination of distance instruction requires production support personnel. These are likely to be staff with audiovisual skills sometimes augmented with telecommunications training. Support personnel with technical skills must handle camera work and sound. In same-time/different-place environments, technicians also need to handle analog or digital connections between the sites, and must respond quickly if and when those connections go down. For different-time/different-place environments, technicians will often be required to edit the material so the delivery looks smoother, and other types of support personnel need to be responsible for the logistics of distribution.

In a higher education environment, the personnel who provide instructional support are usually either graduate students (in roles such as research assistants or teaching assistants), or employees of the library or computing center. A distance independent environment will often force these personnel to take on very different types of tasks. As mentioned above, the maintenance of online course resources is a significant task, one likely to be too big for an instructor to handle him/herself; it is likely that this task will fall instead to other traditional instructional support staff. Some schools are likely to experiment with having computer support personnel (those with instructional design experience) provide at least some support for online course material. Others will see this type of support as being an extension of the services that libraries have traditionally provided, and will assign library staff to work with faculty on aspects of providing this type of online course material (see Charles Faulhaber's *Distance Learning and Digital Libraries: Two Sides of a Single Coin*, 1996). But ultimately, responsibility for providing and maintaining online course material will fall on the shoulders of those who traditionally provide the most direct teaching support for the instructor—research assistants and teaching assistants. In their new roles, RAs and TAs will have to learn about converting file formats, organizing and presenting information, controlling access, and updating and maintaining a body of information. Student assistants may also find themselves having the responsibility for preparing course materials for classtime display, and will be responsible for learning some of the display preparation suggestions outlined in the previous section (“Classroom Presentation Differs”).

In same-time/different-place classroom situations, teaching assistants may be called upon to operate cam-

eras or choose who speaks at the remote site. Again, this marks a shift from the traditional set of responsibilities, and will likely involve learning new skills both in facilitating interpersonal interactions and in control of equipment.

Students in remote sites pose problems for conventional types of instructional support that take place outside the classroom. Office hours, discussions between students at different sites, and reserve readings all create challenges for distance-independent instruction. Desktop videoconferencing tools—such as CUSeeMe—have been used successfully for office hours and small-group meetings, but often are poor substitutes for personal interactions where the various parties can interactively explore a project. Collaborative tools such as shared whiteboards allow users at remote sites to mark up and interactively see each others' comments on the same page. Tools like Pro-Share and Timbuktu allow a user to run a computer application at one site and make this viewable by someone at a remote site. These collaborative tools in conjunction with a desktop video connection begin to approach the minimum functionality needed to substitute for certain types of student-instructor or student-student meetings.

Reserve readings and other course materials pose a difficulty for many distance independent courses. Students at remote sites will often have library services inferior to those at the point of origin. Trying to distribute time-sensitive printed materials is difficult enough in a single-site environment; it is extremely difficult to maintain timeliness in distributing to remote sites. The obvious solution (only for material which can be easily converted to machine-readable form) is for the instructor to make this material available to remote students over the Internet. But converting and mounting such resources can pose intellectual property and logistical headaches; elsewhere this author has documented the wide variety of difficulties in maintaining a World Wide Web site as part of a distance education course (Besser, 1995, 1996).

Libraries need to consider how they may change their services to accommodate distant students. Until all curriculum support materials are available online, it will be impossible for libraries to offer a full set of services to remote students. Placing material online can pose copyright problems. And delivering material that is already online may force the library to renegotiate vendor contacts, e.g., site licenses for indexing and abstracting services may not permit delivery to a distant learning student in another state. In some cases, administrators may choose to treat remote students like some universities treat students not pursuing a degree—providing them a lower tier of library services.

Many university libraries are exploring the use of electronically delivered reserve materials, which are likely to prove very useful for distance education. Others are contemplating a more aggressive role—more akin to knowledge management—helping instructors organize online delivery of all curricular support material.

The multiple instructional support staff visible in distance situations tends to confuse students about division of responsibilities. In certain implementations, all affiliated staff are seen as authority figures, and it is not unusual for students to address curriculum or policy matters to the cameraperson. To minimize this problem, it is important for the instructor both to be easily accessible and to clarify the roles of support personnel.

Multi-Campus Sites

When distance independent classes are offered to students at more than one institution or campus (same-time/different-place), this can pose a variety of problems. Foremost among these is the problem of scheduling. Even if both institutions have a similar length of academic term (quarter or semester), it is very unlikely that these will start on the same date, end on the same date, have the same exam periods, and take the same dates for holidays, vacations, and breaks. Methods for handling this include: Eliminating formal classroom time whenever any one group has time off, the instructor presenting a non-sequence-dependent class session to a set of students whenever another set has time off (which might mean several additional class contact periods for the instructor), or the careful timing and preparation of different-time/different-place lessons (such as review videotapes) to act as "catch-up" sessions whenever a group misses a class session.

Courses offered on multiple campuses often run into trouble with differing administrative rules. Sometimes there is a disparity in how course credit units are handled in the departments at the different sites. Often an institution is slow to authorize an instructor who is not a regular faculty member of that institution. Frequently the best way to minimize bureaucratic problems is to cross-list courses so that—at least on paper—it appears that students are taking courses within a department on their home campus, but this requires planning well in advance, as well as strong departmental cooperation.

Locus of Control

The closer students are to the instructor—both in time and in space—the more control the instructor exerts. In a same-time/same-place classroom, the instructor exercises significant control. In a same-time/different-place classroom, the instructor often cannot see if students are paying attention. And in most different-time/different-place environments, the instructor cannot even tell whether the student viewed the material on display.

In 1995, this author taught a same-time/different-place class where he alternated origination between the two sites. After an initial period of fascination with the new technology, students in the same classroom as the instructor invariably paid careful attention, while stu-

dents in the remote site were constantly fidgeting and not as attentive. In this particular case, it was clear that the physical presence of the instructor directly affected student attention.

In same-time/different-place environments, technicians wield a significant influence over who is seen or heard. The cameraperson's framing determines who the instructor will see, and consequently affects both the instructor's impression of student response (as seen in facial expressions), as well as who the instructor will call on during periods of student questions or interaction. Students who can get the attention of the camera operator are more likely to be heard than those who do not.

Conclusion

It is a mistake to think that the installation of distance education classrooms is the prime ingredient in offering distance independent instruction. These classrooms require careful planning both in their technical capabilities and in their physical set-up. Appropriate delivery vehicles need to be selected to match the levels of interaction expected. Teaching in such an environment requires a host of new instructional support personnel and methods, as well as rethinking teaching strategies.

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