

INSTRUCTIONAL DESIGN AND ASSESSMENT

Distance Education: Using Compressed Interactive Video Technology for an Entry-Level Doctor of Pharmacy Program

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New responsibilities for faculty members and changing student perspectives have occurred with the establishment of an entry-level Doctor of Pharmacy program delivered by compressed interactive video (CIV). The purpose of this article is to describe the experiences of distant site faculty and make recommendations for the successful use of CIV technology in an entry-level Doctor of Pharmacy program. Information obtained from the literature was used in conjunction with the authors' experience to discuss the roles and responsibilities of a distant site facilitator, problems encountered when delivering instructional material via CIV, and recommendations for effective teaching via CIV. Future plans and research questions are also addressed.

Keywords: distance education, compressed interactive video

INTRODUCTION

Since January 1995, the College of Pharmacy at Nova Southeastern University located in Fort Lauderdale, Florida has delivered instructional material by compressed digital video 2-way conferencing technology or compressed interactive video (CIV). This technology has been essential for the delivery of the nontraditional, post-baccalaureate, Doctor of Pharmacy (PharmD) program. The postbaccalaureate program is transmitted to students located in Fort Lauderdale, Fort Myers, Jacksonville, Orlando, Sarasota, Tampa, and West Palm Beach, FL; and Ponce and San Juan, Puerto Rico. The class size at each distant site ranges from 2 to 25 students. To date, approximately 260 students have graduated from the nontraditional, post-baccalaureate, PharmD program.¹

The success of the nontraditional, postbaccalaureate PharmD program prompted the College of Pharmacy to integrate a pilot CIV distance education program into its existing entry-level PharmD curriculum. The learning format for the distant sites is synchronized with the entry-level PharmD program at the main campus in Fort Lauderdale. This synchronous format is defined as students attending class at the same time

and receiving the same instructional material (eg, lectures, handouts, examinations, etc), regardless of geographical location. The average class size for the entry level PharmD program at the Fort Lauderdale campus is approximately 120. With the addition of 2 distant sites, 1 in West Palm Beach (class size range: 35 to 45 students) and the other in Ponce, Puerto Rico (class size range: 25 to 30 students), the total entry-level PharmD class size is now approximately 180.¹ Since the majority of the instructors are located at the Fort Lauderdale campus, approximately 80% to 90% of instructional material is transmitted from the local site (Fort Lauderdale) to the distant sites (West Palm Beach and Ponce).

Due to a large number of entry-level PharmD applicants from the Palm Beach, Martin, and St. Lucie County areas of Florida, and Nova Southeastern University's mission to provide convenient, high-quality education, West Palm Beach was identified as the first distant site location.¹ The West Palm Beach distant site for the entry-level PharmD program was established in August 2000 and was developed 62 miles north of the main College of Pharmacy campus. The West Palm Beach Pharmacy program began with a faculty and staff consisting of a program director, a director of experiential education, an assistant professor of pharmaceutical sciences, an assistant professor of pharmacy practice, and an administrative assistant. Their responsibilities included facilitating an average of 19 semester hours of courses per semester per entry-level

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PharmD class, addressing student affairs issues, establishing sites for the professional experience program, developing a compounding laboratory, and developing a drug information and resource center.¹

Except for laboratory experiences, all courses in the entry-level PharmD curriculum are transmitted via CIV. Approximately 90% of this coursework is transmitted from Fort Lauderdale to the distant sites and the remaining 10% of instructional material originates from West Palm Beach. Laboratory experiences in the entry-level PharmD curriculum consist of pharmaceuticals, communications skills, and patient care management, and comprise approximately 10% of the entry-level PharmD curriculum. These experiences are replicated at the distant sites and are led by the distant site faculty. Patient case discussions in therapeutics courses are conducted separately at each distant site, and then final discussions are transmitted to all distant sites via CIV.

All students must attend the program full time. As previously described, the program is synchronous with the Fort Lauderdale program where all students attend class at the same time with the only difference being their geographical location. Only a synchronous learning opportunity is offered for traditional students in West Palm Beach. Thirty-eight students were enrolled for the first year of the program. By August 2001, the faculty was expanded, with the addition of an associate professor of pharmacy administration, an assistant professor of pharmacy practice, and a part-time instructor. Total student enrollment at the West Palm Beach campus was 71. In addition to the West Palm Beach extension, the College established a second distant site in Ponce, Puerto Rico, using the same synchronous CIV technology format.¹ This article describes the experiences of the distant site faculty at the West Palm Beach program during the first 2 years.

THE DISTANT CLASSROOM

The distant classroom is defined as a classroom that does not have the instructor present in the classroom during delivery of instructional material. The classrooms at all locations are equipped for CIV and can function either as a local or distant classroom. Electronic communication between sites is enabled by CIV technology using 3 integrated services digital network (ISDN) lines for high-speed transmission. The lecture material is simultaneously projected onto large screens at the local and distant sites. During instruction, the local site students can see the instructor and lecture material at the same time, while distant students can see only the instructor or the lecture material at any given time.

At each lecture podium, the instructor has at his or her disposal a CIV control panel, a computer, a document camera, a digital white board (Smartboard®), a videocassette recorder (VCR), and a digital versatile disk (DVD) player. In the classroom there are video cameras, television monitors, and microphones. The CIV control panel allows the instructor and/or CIV technician to adjust the video cameras, mute or unmute the sound, and alternate images from the computer, document camera, digital white board, VCR, and/or DVD player. There are 2 video cameras: one to broadcast the instructor's image and another to broadcast an image of the classroom and students. The video cameras can be adjusted to focus on different areas of the classroom or to zoom in on the instructor or students. Television monitors located in the distant classroom provide an alternative to the large screen for the students to watch the lecture. There is also a television monitor in front of the lecture podium that enables the instructor to view students at the distant sites. The instructor can view only one distant site at a time. Hand-held microphones and ceiling microphones distributed throughout the classrooms facilitate communication between the distant site students and the local site instructor. See Figure 1 for a diagram of the classroom.

During transmission of instructional material, the instructor, CIV technician, and students are present in the local classroom. At the distant sites, a facilitator, CIV technician, and students are present in the distant classroom. Thus, the major difference in the personnel who are present at the local classroom compared to those present in the distant classrooms is the presence of either an instructor or facilitator. When there is more than one distant site involved in transmission, control of the audio and video originates from a central location at the main campus in Fort Lauderdale.²

ROLE OF THE FACILITATOR

For the first 2 years of the distant program, 7 faculty members from the WPB campus shared responsibility for facilitating the courses. Course facilitation was required for approximately 19 hours per week for each pharmacy class per semester. For each faculty member, facilitation time in the classroom ranged from 5 to 20 hours per week.

Essential Functions

Distant site facilitation is a multifaceted position with the primary goal of providing leadership and instruction to pharmacy students. Table 1 describes the essential activities of a distant site facilitator. From our experience and the literature, students at distant sites

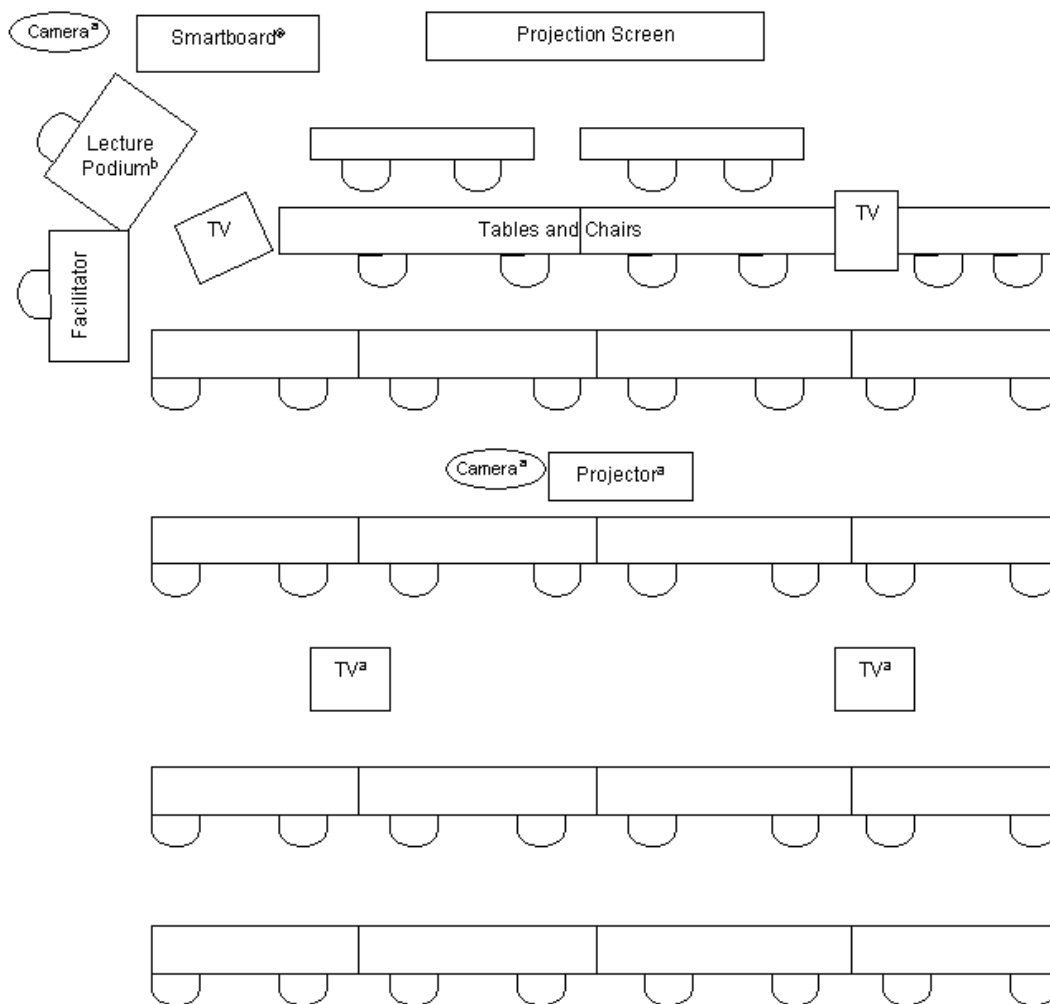


Figure 1. Diagram of a distance education classroom. (a) The projector, cameras, and rear TV monitors are suspended from the ceiling. (b) The lecture podium has a CIV control panel, computer, document camera, VCR, DVD player, handheld and lavalier microphones.

rely on distant site facilitators for academic and emotional leadership.³ Thus, faculty members invest additional time outside of the classroom for student advising and development. At least once a semester, distant site faculty meet with their assigned student advisees to discuss the students' academic performance, outline steps for overcoming areas of difficulty, and inform them of professional opportunities. Also, distant site facilitators motivate distant students and maintain their enthusiasm for the program.⁴ Distant site facilitators do not answer questions regarding course content. Any questions regarding course content are deferred to the instructor teaching the material. Overall, distant site facilitators have accepted full responsibility for ensuring and promoting the educational and professional development of the distant students.

Classroom Management

Based on our experience, facilitators manage both the technology and students at the distant sites. While a CIV technician is either present or available during delivery of instructional material, instruction is improved when facilitators are skilled at the basic operations of the CIV equipment. Responsibility for who manages the distant site classroom becomes unclear because there is both an instructor and facilitator(s) present in the local and distant classrooms, respectively. We have learned that it is not possible to expect the instructor to simultaneously maintain control of the local classroom, efficiently present material, and manage the behavior of students in the distant classrooms. Therefore, the distant site facilitators must assist by

Table 1. Essential Functions of a Distant Site Facilitator

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- Serve as a liaison between the students and course coordinator/content professor
 - Act as the distant site's "eyes and ears"
 - Address student concerns
 - Duplicate and distribute course materials
 - Assist students in asking and answering questions during transmission
 - Facilitate classroom instructional activities (ie, small group discussions)
 - Maintain a professional classroom decorum
 - Proctor examinations
 - Maintain the integrity and security of examinations
 - Ensure delivery of examinations and assignments to the course professor
 - Communicate course grades and performance to both students and administrators
 - Review exams with students
 - Conduct study groups or review sessions for students
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maintaining control of their respective distant site. This may include taking attendance, minimizing distractions or excessive talking, dismissing students from class for unprofessional behavior, enforcing the dress code, and forbidding food and drink in the distant classroom.

Since students at the distant sites respond better when the instructor is involved with distant site classroom management, it is critical that the instructor support the actions of the distant site facilitators. As distant site facilitators, we have drawn attention to students who appear confused or act inappropriately by using the camera to zoom in on those students. This cues the instructor to call upon these students to clarify issues and allows the instructor to regain control of the distant classroom. If the instructor does not acknowledge notable behavior at the distant sites, distant students are more likely to either continue their unprofessional behavior or become discouraged when problems are not addressed. The end result is dissatisfaction with the instructor and/or the program. To prevent this from occurring, both the distant site facilitators and the instructor must work together to maintain control of all learning sites.

Problems Encountered With CIV

As described below, many of the problems reported in the literature when using CIV technology for instruction have also been observed at Nova Southeastern University College of Pharmacy. Some examples and potential solutions used at Nova Southeastern University College of Pharmacy are also discussed.

Depersonalization of the instructor is likely at the distant site. This occurs because the students do not see the instructors "live." Similar to watching television, students become detached from the image that is projected. For example, students at the West Palm Beach campus act as if the lecture is a television show or a

movie. This problem is magnified by distant students' feelings that instructors do not pay attention to them. This problem can be remedied if the instructor acknowledges the students at the distant site by stating, for example, "It looks empty at site X. Where are the other students?" or "Who is the student in blue that just walked into the classroom 20 minutes late?" Pop quizzes and mandatory attendance have also been effective methods of ensuring student attendance and attention.

The behavior of the instructor towards distant students can significantly affect their conduct. Distant students have described feeling like "second class citizens" and being seen as inferior to their local site classmates. At the inception of the West Palm Beach program, instructors who were either unfamiliar and/or uncomfortable with the technology excluded or ignored the distant students during their presentation of instructional material. Most often, instructors were focused on their interactions with the local students, leaving the distant students to passively follow along. Including the distant students in classroom activities required a significant alteration of teaching style for many instructors, as well as some mastery of the technology. As comfort with the technology grows, some instructors are more apt to include the distant students in classroom activities.

Distant students find it more difficult to concentrate for long periods of time and have shorter attention spans when watching a television for several hours.^{5,6} However, 80% (28/35) of students in an elective at our College of Pharmacy reported that they did not have a difficult time concentrating on material delivered by CIV.

As observed at our College of Pharmacy and reported in the literature, distant students and instructors

have very few visual cues, which makes the classroom more formal and hinders relationship building.^{7,8} Methods used to build relationships with instructors and students at the College include using chat rooms, holding planned interactions, and delivering instructional material through an interactive game format (eg, Jeopardy®). Using facilitators knowledgeable in the class subject area also promotes interactive activities. For example, in a geriatrics elective, interactive games and journal assignments are led and graded by facilitators knowledgeable in geriatrics and/or internal medicine.

Student anxieties are increased when they see themselves projected onto a large screen and/or hear their voices on the speakers, especially when called upon to answer questions or when asking questions.⁹ This type of performance anxiety reduces the chance of interactivity occurring between the instructor and the students at the distant sites. Midpoint survey results from an elective delivered via CIV at the College showed that 48% (17 of 35) of students preferred *not* to ask questions during class and 57% (20 of 35) preferred to ask questions of the instructors outside the classroom. While only 37% (13 of 35) reported that they did not ask questions in class because their image or voice would be transmitted, this is contrary to what is actually observed in the distant classroom. In general, students have verbally disagreed or shown disapproval when facilitators approach distant students with the microphone. Students have also been observed to cover their faces or change their behavior when they realize their image is being transmitted from the distant site. This behavior improves as distant students become accustomed to the CIV technology.

Instructors may believe that distant students are not willing to participate in class. This can occur because it is more difficult to see distant students' facial expressions and movements and because of increased reliance on the audio response of distant students to measure interaction. Since audio responses from the distant classroom can be delayed or decreased for several reasons, instructors may believe distant students are not interested. Instructors should allow a 5- to 15- second delay before expecting a response from the distant sites. Delays in response occur due to the need to "unmute" distant microphones when facilitators keep their sites muted to avoid background noise and/or feedback; the time required to deliver a microphone to the student, if needed; and the time delay in sound transmission due to the CIV technology or audio difficulties.^{9,10}

RECOMMENDATIONS FOR TEACHING VIA CIV

Overcoming the challenges of teaching via CIV requires substantial effort on the part of the instructor. Focus should be placed on changing teaching methods (pedagogy) rather than trying to disregard the technology.¹¹ Some of these adjustments include developing a different teaching philosophy, identifying successful learner characteristics at distant sites, designing interactive courses, modifying teaching strategies, and revising student evaluation and assessment.⁴ For any faculty member committed to excellence in teaching, the rewards from the additional time invested in development are invaluable. Based on our experience and review of the literature, the following recommendations can be made to ensure optimal instruction via CIV.

Plan Interaction

Instructors should implement classroom activities to engage distant site students during lectures.⁴ Whenever responses are solicited from a distant class, the entire distant site or a specific distant student should be addressed directly. Instructors who ask questions by stating the site and/or student name are more successful at soliciting responses compared to instructors who ask the question to the class at large. This also improves interactivity by using a consistent approach for interactions between the distant sites. An example would be to state: "What does Mr. or Ms. Student at the West Palm Beach site think about this?" In our therapeutics series, the use of a randomized list of student names to call upon promotes attendance, class participation, and pre-class preparation of material at the local and distant sites. Calling names off a roster allows the chance for random roll call to be taken and does not allow outspoken students to obtain more participation points than reserved students. More importantly, calling on students from all sites minimizes the perception of isolation by the distant students. For students too timid to ask questions during class, instructors at the College have asked students to write down 2 things they learned during lecture and any questions they still have at the end of class. These responses are forwarded to the instructor to assess the effectiveness of teaching and increase interactivity outside of class.

Build Relationships with Students

Instructors should build and maintain relationships with students outside of the classroom. The ideal way to establish a relationship with distant students is to visit the distant sites early in the course.⁹ Interactions with instructors increase during an on-site visit and

continues after the instructors return to their home sites.^{6,11} Once distant students meet the instructor in person, the television or movie star persona of the instructor diminishes. Thus, students are more likely to initiate future communications with the instructor during or outside of class time. Students at West Palm Beach have reported feeling that the instructor cares about the distant students when they travel to the distant sites.

Other strategies have been suggested to build relationships with distant students. They are: initial or periodic face-to-face meetings, exchanging individual journals among locations, use of Internet course tools to exchange information (eg, WebCT, Blackboard, chat rooms, bulletin boards), formation of groups comprised of students from different sites, student led discussions, utilization of a list-serve, and/or providing virtual or telephone office hours.⁸ While it would be ideal for students from different sites to interact with each other, this is not as critical as student interactions with the instructor.³ Even with the use of the Internet and list-serves, distant learners can still feel alienated by the instructor.⁵ One study showed that even with the availability of alternate means of interaction, students did not use these methods, but they did report increased satisfaction with the course.³ At the College of Pharmacy, a classroom with technical capabilities was designated for distant students wishing to schedule virtual office hours with the instructor. These office hours allowed students to use CIV to interact with the instructor on a one-to-one basis. After 2 years of the distant program, distant students have rarely used this method of communication due to the difficulties with scheduling an appointment time. List-serves have also been developed to improve communication; however, students seldom use this method.

Instructors should also engage all personnel who support a successful learning experience for the distant students. To maximize interaction with students, instructors teaching in a distant program should also develop open communications with faculty, facilitators, and staff involved with their course at the distant sites. For instance, communications must take place regularly with the CIV technician, support staff, and most importantly, the distant site facilitator.^{9,10} This lets the facilitator know ahead of time about any specific planned interactive exercises and allows smooth operation during class time. Instructors who regularly communicate with the distant sites have improved delivery of instructional material, communication of announcements, administration of examinations, and decreased student frustration compared to instructors who do not communicate with the distant sites.

Allow Additional Time

In order to adjust for any technical difficulties that may occur, instructors should include extra time to present instructional material. This accounts not only for technical issues (audio or visual difficulties, microphone handling), which can cause loss of interaction up to 36% of the time, but time for student interaction and questions.³ To make the most of instructional time in the classroom, student announcements should be limited to the time in between classes. A timer that is projected onto the screen or monitor can increase instructor and student awareness of when class will resume either between classes, during breaks, or after group discussions. Instructors have been encouraged to arrive promptly at the end of the preceding class in order to use the time in between classes for the setup of any necessary equipment or programs. This ensures that class will start on time and that valuable lecture time is not lost due to technical difficulties. Basic etiquette that includes the procedure on how students and facilitators should use the microphone and the mute feature should be determined.¹² This minimizes the time that can be lost while waiting for students to respond.

Some instructors have expressed dissatisfaction with the number of interruptions made by the distant sites. Interruptions by distant students may be due to decreased instructor availability immediately after class or by office hours. The students at West Palm Beach do not feel that they have easy access to instructors, so they like to have the material explained thoroughly during class time. Instructors should be aware that distant students and facilitators try to minimize unnecessary interruptions.

During the first year of our distant program, distant students were asked not to schedule their early experience rotations on Mondays or Fridays. This time would be reserved for make-up sessions in the event of an interrupted transmission during regular class time. This was used several times. Since the technology has improved, this request is no longer necessary.

Advance Preparation of Material

Instructors should have all instructional material completed and distributed at the start of the class. A great source of frustration expressed by distant students occurs when instructional materials are not available prior to the start of class. Thus, preparation of all instructional material should be completed with ample time for delivery of course materials to and for duplication of the material at the distant sites. By providing instructional materials to students in advance, the students' fear of missing information when visual aids do not

transmit clearly is alleviated. Any supplemental information should also be distributed prior to class to minimize the anxiety of distant students. To ensure optimal delivery of instructional material, faculty members are encouraged to have all instructional material for the entire semester ready to distribute to all students on the first day of class. Some course coordinators also use WebCT for distribution of course materials.

Prepare Material for Transmission

Instructors should adjust the appearance of instructional material for CIV. Due to the resolution of televised images; font sizes should be enlarged for adequate visibility by the distant sites.¹³ For PowerPoint® presentations, the most effective font size for title text is a minimum of 40 and for slide text, a minimum of 28. Ideally, title text should be 44-54 fonts and slide text 32-36 fonts for PowerPoint® presentations. A general rule for slide text in a PowerPoint® presentation is a maximum of 6 lines with a maximum of 6 words per line. To minimize distractions, PowerPoint® backgrounds with movement or audio should be avoided. For other documents, the optimum number of characters in a line that can be read at the distant sites is less than 27 and the number of words is 30. Also, intricate slides, pictures, or diagrams do not project well to the distant sites. The ideal fonts are those with minimal curves, such as Arial or other sans serif fonts. Fonts like Times New Roman or other serif fonts have more curves that may blur when transmitted, thus, making them difficult to read. Material used on a document camera should have adequate margins to avoid cutting off the image.^{12,14} Color schemes for visual aids should be basic with significant contrast between the background and the text (ie, black and white, blue and white). Bright color combinations, such as yellow and white, should be avoided because they can blur when transmitted to the distant sites.

Enhance Instructional Delivery

Instructors should also adjust their presentation style and appearance for CIV. To prevent sending a blurry image, instructors should avoid swift, jerky movements. The use of CIV results in loss of natural motion because the cameras are only able to focus precisely when the subject is still. Hence, if instructors pace, their movement may result in transmission of a swerving image that can be bothersome to the distant site students and may even cause motion sickness. Instructors should develop techniques to maintain eye-to-eye contact with distant students by looking directly into the appropriate camera. Speaking clearly, distinctly, and slowly is important. Distant students are

much more sensitive to voice qualities, such as pitch, tone, volume, pausing, and pacing.⁹ Appropriate dress consists of solid, neutral to medium colors that do not merge into the classroom décor. Tweeds, large stripes, polka dots, busy patterns, or brilliant whites should not be worn. Whites cause shimmering at the distant sites. Wearing a jacket or vest is recommended to allow proper placement of a lavalier microphone.^{10,12,14,}

Students have reported that keeping the camera focused on the instructor increases interactivity.⁶ However, distant students can only see one image at a time, either the PowerPoint® presentation, document camera, or the instructor. This makes it difficult to always send an image of the instructor. For this reason, transmitting a document or computer graphic for longer than 15 seconds should be avoided, unless the instructor can be shown simultaneously.⁶ An instructor at our College has successfully used a computer-connected video camera (WebCam) to simultaneously transmit their image and the instructional material. This allows distant students to observe the instructor and transmitted image at the same time, which may enhance learning.² When a WebCam is not used, CIV technicians will often assist by periodically changing the camera from the document or image to the instructor. However, there are instances in which transmitting a graphic for longer than 15 seconds may be necessary. This may occur when distant students need to transcribe new material that is being presented. This is not a problem for local students who can view the instructor and the image at the same time. If instructors do not ensure that enough time is given for distant students to write down new information, additional delays may occur when class is interrupted to ask the instructor to re-transmit or repeat information.

Any questions asked, either from the local or distant sites, should be repeated. This applies predominantly to those questions asked at the local site because the instructor and local students may hear the question clearly, but the question is lost during transmission to the distant sites. Students at the distant sites often become frustrated when they hear the answer to an unknown question. Also, repeating the original question prevents distant students from asking that same question again. Therefore, it is good practice for the instructor to repeat all questions regardless of the site of origination.

Develop Basic Operational Skills

Instructors involved in presenting information using CIV technology should be adept at the basic operations of the equipment. This includes managing minor

Table 2. Summary of Common Problems and Possible Solutions for CIV Teaching

Common Problems

- Depersonalization of the instructor
- Stereotyping distant students
- Strained relationship building
- Difficulty concentrating
- Increased student anxieties

Possible Solutions

- Planned interaction with distant site classrooms
- Use of additional measures for relationship building
- Account for additional time to present instructional material
- Provide instructional material prior to the start of the semester
- Adjust instructional material for optimal transmission
- Enhance instructor delivery of instructional material
- Develop basic skills for the operation of CIV equipment
- Maintain consistency across all sites

issues such as adjusting the volume, microphone (mute or unmute), and camera settings. In addition, instructors should be able to switch between applications such as the computer, the document camera, the digital white board (Smartboard®), the VCR, and the DVD player. Instructors planning to use any of the above mentioned peripheral equipment should test their floppy disks, CD-ROMs, videocassettes, and/or DVDs to ensure operation and to prevent delays during class. This also allows the faculty member the opportunity to identify illegible overheads or incompatible computer programs and the time to develop alternative plans if needed.¹³ Hands-on training is critical for both instructor and students. A pre-class session where the class meets informally to use the delivery technology and learn about the roles and responsibilities of the distant faculty members, facilitators, and technical support staff members should be considered.⁸ New student orientation at our College includes a session during which the director of information technology or the CIV technician is available to explain how the CIV system operates and to answer questions. These sessions can also include discussions on the role of CIV in education, as well as in their career.

Maintain Consistency Across Sites

Any decisions affecting the students should be consistent across all sites. Students from local and distant sites often communicate with each other and knowledge of differences between deadlines, time required to return grades, etc, disturbs the students. All examinations, grades, homework, and answer keys should be returned in a timely manner and simultaneously to students at local and distant sites.

While the above recommendations are focused on improving instruction to distant students, it is important not to overlook students in the local classroom. Results from the development of a compressed video program for a telecommunications course showed that traditional classroom activities were compromised when trying to involve the distant site.⁵ Students at the instructor's home site were distressed when the instructor taught from distant sites.⁶ This observation is also consistent with our experience. Faculty members are encouraged to teach from the distant sites at least once a month. Currently, 80% to 90% of instructional material originates from the Fort Lauderdale campus. When Fort Lauderdale instructors teach from West Palm Beach or when West Palm Beach instructors teach from West Palm Beach, the students in Fort Lauderdale recognize the subtle differences in instruction that occur when they become the distant site students. Successful instruction via CIV uses interactive techniques that should consistently involve students at all sites. See Table 2 for a summary of the common problems encountered via CIV and possible solutions to improve teaching with CIV technology.

FUTURE PLANS AND RESEARCH QUESTIONS

Based on the first 2 years of experience with CIV technology and the increasing number of students, the West Palm Beach program established an "academic facilitator" position. Currently, 2 full-time faculty members serve as academic facilitators. This relieves the other West Palm Beach faculty from the shared facilitation responsibilities and allows them to focus on clinical, teaching, or scholarly activities. Other responsibilities of the academic facilitator may include facili-

tating laboratory discussions for classes such as communication skills and patient care management, grading quizzes to enable prompt return to students, serving as faculty advisors, teaching lectures, and engaging in scholarly activities. The academic facilitators at the West Palm Beach program have earned their PharmD degrees and completed residency and/or fellowship training. Due to the decreased number of distant site faculty members and support personnel, we have found that it is preferable to have distant site facilitators with advanced training due to the other duties and obligations they may be required to assume. Students have responded more favorably to facilitators who have earned a PharmD degree compared to other staff members who may facilitate classes. However, to perform their essential functions during class, distant site facilitators do not need additional training other than in operation of the CIV equipment. At NSU, the advantages and disadvantages of having a distant site versus an academic facilitator present in the classroom is an area that requires further examination.

Currently, the majority of classes are broadcast from the Fort Lauderdale campus. As the number of distant site faculty increase, a larger number of lectures will originate from the distant sites. As a result, faculty members at the main campus may have increasing distant site facilitation responsibilities until an "academic facilitator" position is created at the Fort Lauderdale campus. The current instructional dynamics will also change because the majority of students are located at the main campus in Fort Lauderdale. Thus, continued development of teaching strategies for the delivery of instructional material via CIV must take place.

While CIV technology has been able to provide pharmacy education to those who may be geographically limited, it remains to be determined whether delivery of educational material via CIV will produce similar academic outcomes compared with those achieved through traditional delivery of instructional material. Future research should be conducted to evaluate and assess entry-level PharmD student performance in a traditional learning environment compared to the performance of students receiving instruction through CIV. Use of CIV technology was evaluated by a retrospective review of student performance in a pharmacotherapy series. The courses were taught during the third year of an entry-level PharmD program. A total of 79 students were reviewed. There were 33 students at the local site and 46 students at 2 distant sites. There was not a significant difference in mean GPA prior to enrollment in the course series ($P>0.05$). Differences in grades achieved for students

taking integumentary, bone and joint, neurosensory, and psychiatry courses at the local site compared to the distant sites were not significant ($P>0.05$ for all courses).¹⁵ While this information is a positive indication that the delivery of instructional material via CIV is effective, the critical question is whether there is a difference in learning outcomes regarding the analysis, synthesis, and evaluation of clinical problems.

Our students will receive all 3 years of their didactic coursework via CIV. Currently, all student learning is assessed using traditional examination methods in each course in the curriculum. In a pharmacetics course, a comparison of test performance based on geographical location (Fort Lauderdale compared to West Palm Beach, $P = 0.23$) and relationship to the instructor (distant compared to local, $P = 0.89$) did not show a significant difference in performance.² A similar evaluation of examination performance is being conducted for a therapeutics course. Another study evaluating students in pharmacotherapy and pharmacokinetic courses demonstrated that there were no differences in student performance based on whether the instructor was at a distant or local site. However, there was an unfavorable difference in student responses on teaching evaluations for distant instructors compared to those for live instructors ($P<0.0014$).¹⁶ The use of a comprehensive examination at the completion of 3 years of didactic coursework has been implemented to assess student academic performance prior to starting their fourth year rotations. The primary purpose of this examination is to assess the achievement of established educational outcomes. This examination will also be used to evaluate differences in performance based on geographical location of didactic education. A comparison of student performance in clinical rotations during the fourth year will also be stratified by geographical location. A determination of the relationship of baseline characteristics (ie, prepharmacy grade point average, Pharmacy College Admission Test scores, demographic information) with academic performance between distant and local students is also planned. Other assessments used to evaluate the level of student concern with technology (eg, technical problems, quality of audiovisuals, etc) are ongoing.

An alternative viewpoint is that distance education actually does not affect student learning.¹⁷ Thus, rather than focusing research on performance outcomes, research should be focused on student attitudes towards CIV, differences in student responsibilities, successful learner characteristics at distant sites, economic considerations, instructor effectiveness, and course design.¹⁷ Other issues that should be addressed include

ownership of instructional material and changes in faculty workload due to additional preparation time needed to develop coursework delivered by CIV or travel to and from the distant sites.¹²

CONCLUSIONS

There are many challenges to overcome with delivery of instructional material by CIV. First, students and faculty members should understand the roles and responsibilities of the distant site facilitators, distant site faculty members, instructors, and CIV technicians. Second, instructors should be aware of and adjust for the problems that are encountered when delivering instructional material via CIV. By planning interactions with all sites, using additional measures to build relationships with students, accounting for additional time to present instructional material, preparing instructional material ahead of time, adjusting teaching styles and presentation materials, understanding how to use CIV equipment, and ensuring consistency across all sites, instructors can ensure successful teaching in a CIV classroom.

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