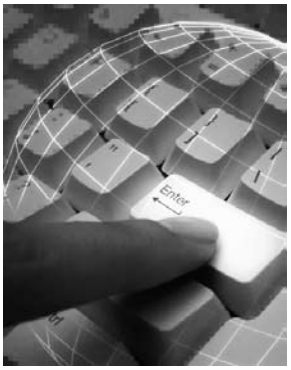

Voices in Videoconferencing: Technology Integration in Teacher Education Courses

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Abstract

This manuscript describes the efforts of several instructors who incorporated videoconferencing in their teacher education courses at two large universities in the southeastern United States. Professors preparing teachers to teach elementary and middle school examined their interactive videoconference experiences linking preservice teachers with students in real classroom settings. Three projects are described. The first project involved "teleobservation" whereby professors co-taught with K–6 classroom teachers while preservice teachers observed. The second project focused on a middle-grades English Language Arts professor whose preservice teachers observed middle school students in real time. In the third project, a university professor served as a live audience for an elementary Reader's Theatre performance. The lessons learned through the evaluation of these three projects are discussed.

Introduction

This article describes nascent efforts to incorporate videoconferencing in teacher education courses at two large universities in the southeastern United States. Within new endeavors, lessons are learned; successes are celebrated; and in order to ensure more effective implementation in the future, problematic issues encountered in the past must be considered. Such was the case in this collaborative inquiry as teacher educators examined interactive videoconference experiences linking preservice teachers with students in real classroom settings.

Rationale

At the university level, quality teaching includes consideration of both content and pedagogy; however, professors face the challenge of incorporating accessible technology logically, integrally, and meaningfully. Mishra and Koehler (2005) propose a framework emphasizing the "connections, interactions, affordances and constraints between and among content, pedagogy and technology" (p. 11). The model, Technological Pedagogical Content Knowledge (TPCK), is suggested as a basis for considering specific factors crucial for effective technology-infused instruction. Mishra and Koehler (2005) state:

> …developing good content requires a thoughtful interweaving of all three key sources of knowledge—technology, pedagogy and content…Productive technology integration in teaching needs to consider all three issues not in isolation, but rather in the complex relationships in the system defined by the three key elements (p. 14).

This collaborative inquiry examines the successes and challenges of linking technology, pedagogy, and content (videoconferencing, methods courses, subject knowledge) within preservice education courses. Requirements set by the International Society for Technology in Teacher Education (ISTE) and National Educational Technology Standards for Teachers (NETS•T) guide colleges and universities in their efforts to enable teacher education candidates to meet six educational technology standards prior to graduation. According to NETS•T (2002), the responsibility for providing aligned technology rests squarely on the shoulders of university faculty and cooperating schools. Additionally, standards set by the National Council for Accreditation of Teacher Education (NCATE) require preservice teachers to demonstrate technology proficiency, while at the same time holding faculty accountable for the purposeful and seamless integration of technology throughout their university teaching (NCATE, 2002).

Related Literature

Incorporating technology within teacher preparation learning experiences requires not only intensive planning, but also an extensive investment of time and energy by the instructors who facilitate them. One mode of technology gaining use in preservice education is videoconferencing. According to the Northwest Educational Technology Consortium (NETC, 2005), "Videoconferencing is a live, two-way, interactive electronic means of communication. Two or more people in different geographic locations can engage in face-to-face audio and visual exchanges using cameras, monitors, and document software" (NETC, 2000).

Generally, technology is used to enrich classroom experiences, although, according to Hulbert and McBride (2004), use of this technology actually creates further learning opportunities for multiple audiences who either participate in or learn from videoconference events and then apply the understandings gained to future endeavors. For instance, university students might observe teachers across multiple settings delivering instruction while dealing with the realities of classroom interruptions and unexpected events. Following the videoconference transmission, there are many possibilities for extending the learning experience of preservice teachers. For example, they could interview the observed teachers and the students, review videotaped versions of live sessions for multiple purposes, and reflect upon the value of videoconference technology integration both in their university courses, as well as plan for its use in their future classrooms.

Videoconference Use in Teacher Preparation Programs

The accessibility of videoconference technology on university campuses supports innovative learning and collaboration within teacher preparation programs. Infrastructure and equipment are increasingly user-friendly, less expensive, and easy to maintain. Videoconference technology allows teacher educators to supervise interns in distant locations, to facilitate master teacher observations, and to increase student opportunities for interaction with and observation of diverse populations within authentic classroom settings.

Videoconferencing to supervise. Using videoconference technology as a tool for preservice teacher observation in practicum situations has increased dramatically in recent years (Falconer & Lignugaris-Kraft, 2002; Sharpe, Hu, Crawford, Gopinathan, Moo, & Wong, 2000; Venn, Moore, & Gunter, 2000). The use of two-way, interactive videoconferencing in supervising clinical experiences has been proven effective across different settings and disciplines, between distant locations (saving travel time and money for university supervisors), and for the purpose of providing immediate feedback to students (Falconer & Lignugaris-Kraft, 2002; Garrett & Dudt, 1998; Gruenhagen, McCracken, & True, 1999). Gruenhagen, McCracken, & True (1999) suggest that videoconference supervision at remote locations not only allows preservice teachers to complete internships within their home communities, but also fosters increased university visibility and university/school collaboration in distant areas.

Videoconferencing to observe. While distance travel (Abel, 1960; Hoy & Merkley, 1989) can support face-to-face observations of classroom teaching by preservice teachers across multiple settings, Van Horn (1999) suggests that guiding preservice teachers during videoconference observations offers advantages. For example, the provision of commentary and discussion by a preservice teacher educator about a classroom teacher's behavioral and classroom management skills highlights issues that might otherwise go unnoticed by inexperienced observers. Additionally, Kinnear, McWilliams, and Caul (2002) used videoconference technology allowing preservice teachers to observe and further analyze classroom learning experiences facilitated by their peers (student interns), as well as by veteran teachers.

Videoconferencing to diversify. Colleges and universities in rural areas face challenges as they seek to arrange practicum experiences within diverse classroom settings. Phillion (2003) argues that videoconference technology is highly effective for facilitating interactions between preservice teachers and diverse student populations. Purdue's School of Education linked preservice teachers in rural Indiana with a bilingual class in a diverse inner-city school in East Chicago. In addition to observing student learning and actual classroom interactions, preservice teachers also taught groups of elementary students from a distance via videoconference communication. In doing so they extended the classroom teacher's foundational lessons with virtual whole group and small group instruction based on plans created collaboratively with their university professor. Through these live feeds, preservice teachers performed skits, taught bilingual lessons, utilized PowerPoint presentations, and discussed topics for shared writing experiences with third graders. University students also created a virtual reading center allowing interaction with small groups of elementary school readers.

Videoconferencing continues to link communities of educators within supervision and observation experiences and across diverse settings. The following descriptions specifically detail the efforts of university professors who sought to learn more about the capabilities of videoconference technology while integrating it within their preservice education courses.

Project Descriptions

Details about each of the following projects are presented through the voices of the professors who initiated videoconference integration. As novices often do not have the experience to effectively predict outcomes, the university professors involved in these projects learned through discovery. Each professor initially analyzed project outcomes and more carefully evaluated videoconference integration within this collaborative inquiry. The first project involved "teleobservation" whereby professors co-taught with K–6 classroom teachers while preservice teachers observed. The second project focused on a middle-grades English language arts professor whose preservice teachers observed middle school students in real time. In the final project, a university professor served as a live audience for an elementary Reader's Theatre performance. A videotape of the performance served as a teaching tool in her methods courses.

Project One: Videoconferencing and Elementary Social Studies Observation

This project involved three university professors, two of whom co-taught with K–6 classroom teachers in a local county while preservice teachers viewed the lessons on campus via Polycom videoconference equipment and discussed them afterward with the third professor. For discussion purposes, this teleobservation process is described from three perspectives: Voices one and two represent perspectives of the professors who co-taught at the public school, while voice three denotes the third professor who remained on campus with preservice teachers facilitating their discussion about the social studies instruction, classroom management, and behavioral management techniques that they observed.

Voice One: A Professor Teaches in a Third Grade Classroom

> During February, most of our preservice teachers are asked to teach a lesson related to Black History. Thus, I chose to model teach a lesson about Rosa Parks to third graders in a local elementary school. My goal was to make Parks' activism come to life. Through videoconference technology, the preservice teachers observed me as I taught social studies to elementary school students. A colleague who teaches the same methods course remained on campus to facilitate reflective discussion about what the preservice teachers observed.
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> Just before the camera rolled, the term "in action" gained new meaning as the following happened: A fight erupted in the hallway, a student suffered an asthma attack, and a parent appeared at the classroom doorway to retrieve her sick child's books from inside his desk. Because students' chairs were arranged in a school bus formation to simulate Rosa Parks' experience, the desks were pushed to the sides of the room, making it difficult for anyone to locate the needed texts. The lesson continued as the third grade students participated in multiple activities. In addition to simulating a visit to a Civil Rights Museum, they participated in a dramatic role-play, and interacted with a relevant PowerPoint presentation about Rosa Parks, Claudette Colvin and the Civil Rights Movement. A brief formal assessment concluded the lesson.
>
> The lesson intentionally included a break for lunch during which the third grade students left the classroom with their teacher's assistant. This juncture provided the preservice teachers with the opportunity to talk to the classroom teacher and me about the teaching and learning that had just occurred. We discussed needs of particular students, the content of the lesson, and also adjustments that were made spontaneously to the lesson plan during actual teaching. Additionally, we discussed plans for what would ensue when students returned. After the lesson concluded, my colleague led a discussion with the preservice teachers.

Voice Two: A Professor Teaches in a First Grade Classroom

> As I entered Mrs. Smith's first grade classroom, Jack, the technician from our university, was setting up

the mobile Polycom equipment cart. When the students returned from their music class, we were ready to begin our social studies exploration. Planned collaboratively with the classroom teacher, she and I co-taught a lesson about rainforests and their locations. Students then visited three workstations and completed activities about deforestation and how it affects the people and places where it occurs. With the help of the teaching assistant, an adult was present at each station where students examined maps, viewed a video further extending their understandings about deforestation, and completed a cause and effect map synthesizing their understandings. I was not worried about my university students in my social studies methods course who remained on campus because I knew that my social studies colleague was guiding their viewing during the entire "teleobservation" experience and facilitating a discussion afterward.

Voice Three: A Professor Remains on Campus and Guides the Preservice Teacher Discussion

During the two pilot teleobservation experiences in elementary social studies methods courses described thus far, videoconference technology allowed university students to observe two professors model teach integrated lessons to actual elementary school students. While professors co-taught with classroom teachers, university students met in two technology-enhanced classrooms, observed teaching, and considered student learning as they discussed what transpired with one another under my direction and guidance. The overall experience was extremely worthwhile. However, unexpected outcomes led us to reflect upon the lessons that we learned during our first attempt at establishing virtual links between preservice teachers and elementary school students in actual classroom settings.

Project One: Methods

Project one professors asked the preservice teacher candidates to complete reflective summaries, the first data source, following each teleobservation experience. The reflective summary questions included: 1) In what ways was today's videoconferencing session successful? 2) In what ways was today's videoconferencing session not successful? 3) What would you change about today? Why? 4) What did you learn today? and, 5) What questions do you have about the teacher's instruction?

Field notes were the second data source. The professors who remained on campus and the professor who taught at the school recorded field notes following each teleobservation experience. The field notes were semi-structured in that the professors were looking for what was successful and unsuccessful about the video conference in relation to technology, content, and pedagogy. On the other hand, the semi-structured field notes were not intended to be restrictive. The professors' field notes freely mentioned observations noted during the video conference from two perspectives, the preservice teachers' lens and the elementary students' lens.

Project one professors used content analysis with the aforementioned data sources. Content analysis was helpful in examining patterns and trends in documents (Stemler, 2001); therefore, this method of analysis was chosen for use with the reflective summaries and field notes. According to Silverman, during "content analysis, researchers establish a set of categories and then count the number of instances that fall into each category" (2001, p.123). Professors looked for responses in relation to imposed categories, coded the data, and then counted the instances for each different type of answer.

Project One: Lessons Learned

After reviewing their field notes, the teacher education professors who participated in this project came to important conclusions as they considered their pilot explorations with videoconference technology. First, adequate technology support must be available to allow the university and classroom co-teachers involved to focus on the content and pedagogy, rather than the technology. Ideally, this support must be arranged well in advance of actual videoconference transmissions. In this pilot project, the technical support team from the university visited the participating elementary school several days in advance allowing for a "trial run."

In retrospect, despite conducting a "trial run," the need for careful placement and sufficient availability of multiple microphones did not take place. In one classroom where instruction occurred, three groups of children worked on different tasks in stations around the room's periphery. It was difficult to hear the students in all groups because each station did not have a microphone nearby. Prior planning *with* the technology support team regarding microphone placement among multiple groups of children would have ensured better auditory quality. This interpretation about sound and microphone placement was gleaned from both the campus-based instructor field notes and the students' reflective summaries.

Next, the school's network bandwidth must be compatible with the university's bandwidth. Additionally, investigating bandwidth usage during the time projected for videoconference transmission is essential. During the videoconference broadcast described in this project, several elementary classrooms were simultaneously viewing streaming video. Sharing limited bandwidth resulted in two undesirable outcomes—poor picture quality and fragmented video transmission to the university campus. Poor audio and picture quality were the two unsuccessful events most frequently mentioned in the reflective summaries.

Additionally, collaboration between university instructors and classroom teachers led to preservice teacher learning, linking theory with practice within real classroom settings. This notion of "showing rather than telling" during the videoconference allowed large numbers of students to observe lessons in a way that did not disrupt the elementary students' classroom. Preservice teachers' reflective summaries also included comments about the credibility earned by instructors who taught actual children, rather than lecturing about teaching methods on the university campus.

A final lesson that appeared in the field notes focused on the value of reflection. Reflection within this project occurred in two forms: instructional reflection for the preservice teachers and self-reflection for the instructors. In addition to allowing university students to ask the classroom teacher about individual children, instructional choices, and classroom/behavior management techniques, follow-up discussion extended the students' reflection process with probes and questions suggested by the third methods professor who facilitated the experience on the university campus. Discussion forums posted on Blackboard's course management system sustained the reflection process for preservice teachers. Secondly, the professors who planned and facilitated this pilot teleconference project participated in self-reflection. This process was extended as all three professors considered their experiences through joint discussions and preparation of this collaborative manuscript.

Project Two: Videoconferencing and Middle Grades English Language Arts Observation

In this project, a middle-grades English language arts professor provided her preservice teachers with a real, yet distant and unfamiliar, middle

school classroom experience that included talking with middle school students and their teacher about writing and writing to learn in social studies. This scenario is presented in the voice of the professor.

Professor's Voice

> As a middle grades English Language Arts professor, my Teaching Writing Across the Curriculum class is comprised of preservice middle-grades language arts and social studies teachers. Each year, I re-examine ways to infuse technology naturally into the course. In this project, my preservice teachers observed a middle school classroom in real time. Our goal was to view a writing lesson within a social studies context to examine the teacher's pedagogy. My students had prepared questions to ask both the teacher, Mrs. Grant, and her students at the end of the telecast.
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> Prior to the live broadcast, Mrs. Grant and I ensured that the technology was working at both locations. However, when the time arrived to begin the teleconference, the university screen projection failed, so we lost our ability to communicate with the middle school classroom. As a result, my 25 preservice teachers crowded around my small computer screen, but of course most students could not see. Also, without the large screen projection, Mrs. Grant's class could not see us.
>
> Quickly I shifted from panic mode, determined to somehow make this experience work, and I directed my students to listen carefully. Intermittently we reviewed what we heard going on in the middle school classroom and discussed the teacher's pedagogical choices. The students immediately noted Mrs. Grant's teaching strategies and praised the variety of the methods she used. They lauded her ability to focus the students, her depth of preparation, and her use of writing to teach social studies. They wrote in the class notes for that day that Mrs. Grant was "casual, relaxed, and very engaged" with the students in the middle school classroom and served as a positive model for my university students.
>
> I then used another strategy to salvage our connection time. I asked my university students to role-play the questions they had intended to ask the middle school students and how we thought the students might respond. At the end of Mrs. Grant's school day, we reconnected (this time with full projection and audio) and discussed the class.
>
> A few weeks later, a second videoconference was more effective, but again, we were plagued by a technology glitch. Despite extensive pre-planning and practice, Mrs. Grant and her students could not hear us; however, they could see us, and we could see and hear them. To respond to our desire to talk directly with her students, Mrs. Grant had arranged for them to come to the computer and camera in groups of 3-4 so that we could ask them questions about themselves as writers and about the statewide writing test they had completed since our previous videoconference.
>
> Again, determined not to be foiled, we formulated and wrote our questions via instant messages. Then the middle school students answered our questions into the camera, a process they clearly enjoyed and giggled about. My preservice teachers devised excellent questions and quickly typed them so that the middle school students could read and respond. After adapting to the new process, all went smoothly. As time went on, the middle school students became more articulate and talked more, while my university students' questions become more probing and direct.

Project Two: Methods

The data sources in project two included published class notes taken by a class member during the post-videoconference class discussion, post-video conference anonymous online surveys, students' individual reflections in their learning logs and semester-end evaluations and professor field notes and reflections.

To analyze the various data sources, the project two professor printed out all the data, combed it to select and color-code significant quotations that reflected lessons learned, and determined and categorized the emerging themes. After triangulating the data to crosscheck for theme alliance, three themes emerged as the over-arching ones of the study.

Project Two: Lessons Learned

An examination across these data revealed three important lessons. 1) *Accept the risks and glitches of the technology.* Time after time, students noted in their post-videoconference online survey and in their written reflections that "when it worked the way it was supposed to, it was really great." However, risks always exist, no matter the technology. One student commented, "Technology is not perfect, and it is important…to have a backup plan for another way of [achieving the goal]." 2) *Have technological assistance so that the class can go on if the equipment fails.* As reflected in the class notes and survey responses, preservice teacher students noted the importance of having readily available technology assistance. Both the preservice teachers and the professor's experiences and discussion revealed that teachers must have technological support accessible, especially when using equipment and systems that are new and unpredictable. 3) *Be flexible and adaptable.* As teachers, we all know being adaptive in a videoconference environment is a must. A backup plan should be ready so that students have an effective learning experience even when equipment fails. In their learning logs and class notes, it was clear that my preservice teachers were highly cognizant of my moment of angst when the equipment did not function as expected. They closely observed how I segued to a new plan. As one preservice teacher observed, "We had a little bit of technical difficulty one day, but that provided an opportunity to see how teachers can improvise…it was cool the ways both [educators] managed to work with the inconveniences and keep class on track."

Project Three: Videoconferencing and Readers' Theater Performance

In this project, two university professors assisted classroom teachers in a rural county by developing and implementing Reader's Theater with nine classes of fourth graders. This professional development effort responded to a request by fourth grade teachers, not only to improve their students' reading proficiency, but also to integrate drama and poetry across the content areas of science and social studies. We used videoconferencing as a tool to meet several goals: 1) to provide fourth grade readers with a real world audience for their Reader's Theater performance, 2) to provide implicit professional development for classroom teachers, and 3) to demonstrate the benefits of Reader's Theater and interdisciplinary instruction for preservice teachers in methods courses.

Professor's Voice

> To address the goals listed above, I worked with one fourth-grade teacher who agreed to have her students

perform an excerpt from Martin Luther King, Jr.'s "I Have a Dream" speech, a natural fit with what students were learning in social studies. While Reader's Theater performances were often videotaped, the students had not performed before a live audience. The distance to the school and my teaching commitments precluded my being there in person. In addition to the live broadcast, the performance was videotaped to allow preservice teachers in both reading and social studies methods courses the opportunity to view an authentic example of curriculum integration.

On the day of the broadcast, a College of Education technology assistant traveled to the elementary school to set up the required equipment and to broadcast the presentation back to the university. A graduate student was on hand at the university to finalize technical issues related to the broadcast. Unfortunately, no one connected with the project realized the importance of scheduling the use of the public school's bandwidth because this issue had never arisen. At the time of the Reader's Theater performances, another teacher in the school was using streaming video, which greatly affected the quality of the broadcast. The technology assistant had to make multiple adjustments in order to achieve a positive result. In spite of preplanning and technology assistance at both the school and the university, the quality of the videoconference broadcast was disappointing. Contributing factors were related to the full-streaming video interference causing frame loss and fragmentation of both audio and video.

Prior to the performance, I positioned myself so that students could see and hear me on their monitor. I greeted them and they responded. I told students that I was excited to have the opportunity to be their audience. The teacher gave a few directions to the students that would facilitate the broadcast. She told the students to use good audience skills and not to flip through their scripts while a group was reading because the microphone would pick up the noise. She went on to say, "You all have worked hard. Dr. Matthews will be so proud of you." The graduate student adjusted the volume because it was difficult to hear. The teacher directed the first group of students to move to the front of the classroom where they were to perform. She also cautioned students to watch out for electrical cords. As the group performed, it was difficult to hear what the students were saying. After the first group of students sat down, the technology assistant changed the position of the microphone in order to improve the sound quality. The second group then performed. The graduate student assisting with transmission at the university increased the volume because several of the students still could not be heard. When he did this, the sensitive microphone picked up a lot of background noise. The rattling of scripts by the performers was obvious. This likely was due to the new placement of the microphone, which seemed to be sensitive to extraneous noises. At some point during the broadcast of the third group's performance, a loud sneeze interfered with my ability to hear the readers. Nevertheless, for a first effort, I was pleased with the result in spite of the technical difficulties.

> Because she was attending a conference in Arizona, my colleague was unable to participate in the videoconference, so immediately after the broadcast, I typed my notes and e-mailed them to her. When she returned from the conference, we viewed the video of the fourth grade students' Reader's Theater performances. We reflected and discussed what we learned from the videoconference endeavor and planned how to extend this work. As novices, our purpose was to further our own learning about technology integration. However, as we honestly shared with our university students our nascent experiences using videoconferencing technology, we also provided them with an example of authentic classroom curriculum integration. Finally, because risk taking is essential to learning and to advancing beyond the novice stage, we modeled for them that professors are learners as well as teachers.

Project Three: Methods

The professors involved in this third project considered several different data sources in order to determine the effectiveness of their videoconference broadcast taping and viewing. In addition to reviewing the field notes recorded during and after the Reader's Theater performance videoconference taping, notes were recorded by each professor after viewing the videotape and compared with notes they recorded after the tape was shared with preservice teachers. Data analysis was facilitated by use of the constant-comparison method (Lincoln & Guba, 1985; Strauss, 1987) used to confirm themes and categories leading to final conclusions about lessons learned.

Project Three: Lessons Learned

As discussed throughout the description of this third project and gleaned from the data analysis process noted in the previous section, several lessons learned will guide planning for future videoconference broadcasts. These lessons include: 1) Ensure that no one at a school site will compete for bandwidth during a broadcast. This may require getting a commitment from the principal and the school technology coordinator and also ensuring that teachers have been notified that the bandwidth is "on reserve." This should not be a problem if everyone knows well in advance because broadcast time is limited. 2) Broadcast from a location that has good lighting so that all participants can clearly be viewed by the remotely located audience. 3) Use multiple microphones and determine the best locations for them prior to the live broadcast. 4) Locate the camera so that all performers can be seen. 5) Schedule a practice session before the live broadcast to ensure that lighting, microphones, and cameras all function as planned.

Conclusions

Overview of Preservice Teachers' Lessons Learned

Although this manuscript did not originally intend to focus on what the preservice teachers learned, learning similarities occurred for preservice teachers among the projects that are important to consider. Subsequent to analyzing the qualitative data, it was clear that preservice teachers learned some valuable lessons in relation to the TPCK framework in that the preservice teachers did, in fact, learn about technology, pedagogy, and content knowledge (Mishra & Koehler, 2005).

Technology: Participating in the power of videoconference technology. During the first project, preservice teacher candidates mentioned that viewing a classroom in real time was a significant experience. The preservice teachers mentioned that having professors model practices

and theories that were discussed in the university classroom made this an even more influential experience for them. One student commented, "Today was successful because we were able to watch our teacher actually teach a class, using strategies and materials that we have discussed in class." While the technology certainly had its glitches in all the projects, the preservice teachers in all the projects remarked on the possibilities they could see for their own future classrooms. Specifically in the third project, preservice teachers talked about the value of shared teaching and learning across distance and from different cultural environments.

Pedagogy: Modeling teacher flexibility and teacher risk-taking. In project one, an edited videotape could not offer the unplanned and spontaneous events—the fight, the upset parent, and the asthma attack—that the videoconferencing experience offered to the preservice teachers. The preservice teacher candidates were able to see that the fight was stopped with a firm reminder of behavior, the child with the asthma attack received care, and the parent was assured that her son's desk and homework would be identified. One student commented, "I also learned that you cannot always plan for everything, which is why every teacher should be flexible." In project two, both Mrs. Grant and the professor had to make on-the-spot shifts in their agreed upon plan because of the technology glitches. However, they made it work, and the preservice teachers noticed and remarked on that shift. With the benefit of videoconferencing, the preservice teacher candidates witnessed teacher flexibility and impromptu decision making in real time. These are skills teachers use daily.

Content Knowledge: Observing and learning effective content-based instruction in real time. The majority of the preservice teachers in project one mentioned that they learned social studies content. For example, a preservice teacher revealed, "I was unaware that Rosa Parks was not the first person to refuse to give up her seat that a young girl [Claudette Colvin] was the first, but she did not receive as much publicity because of her age." In project two, the preservice teachers also noted the effective use of writing in a social studies class and the teacher's commitment to its integration.

All of the videoconferencing projects also had another common thread, communication with elementary and middle school students and/or teachers. The first project had an opportunity for the preservice teachers to ask the elementary classroom teacher and the teaching professor questions via videoconferencing after each lesson. Following each lesson, an online discussion board was also active for preservice teachers to use if questions occurred to them at a later date. Modeling this use of open discussion and providing answers and advice was a benefit to preservice teachers. Not only did live broadcasts of Reader's Theater presentations, in project two, afford preservice teachers opportunities to view student presentations in real time, the presentations also allowed live exchanges among the children, the classroom teacher, and the preservice teachers. As the preservice teachers queried the children and classroom teacher about the process they used to prepare for the Reader's Theater performance, the preservice teachers gained a better understanding of the steps that classroom teachers use to progress from Reader's Theater script introduction to the final presentation. In the second project, preservice teachers treasured the fact that they were able to communicate so readily with middle school students through this technology. At this stage in their development (the year before student teaching), they discovered that they could, indeed, have interesting, articulate, professional conversations with students about writing. This was eye opening for the university students, and they enjoyed the practice.

Overview of Instructors' Lessons Learned

In addition to the learning gained by preservice teachers, the university professors involved in this inquiry enhanced their own understandings about the use of videoconference technology. As novice learners in "uncharted waters," the professors modeled risk-taking behaviors essential for new learning and also demonstrated that all experts are also novices within settings and situations where their expertise is less proficient.

In the first project, through the use of videoconferencing, professors taught specific social studies content while preservice teachers observed. The professors used various pedagogical approaches including guided observation. Then, after the broadcasted lessons ended, preservice teachers asked questions of the university instructors and classroom teachers, thus enhancing their understandings of classroom practice.

In the second project, videoconferencing was used to share writing content with middle school students and preservice teachers. Through technology, the professor modeled an interactive instructional method while the university and middle grades students engaged in conversations. Additionally, the technology allowed preservice teachers to observe the lesson with a professor guiding their post observation discussions and reactions.

In the final project, a university professor served as a live audience for fourth grade students performing a Reader's Theatre script. In this project, videoconferencing was the channel for instruction in several ways: First, elementary students honed reading and presentation skills as they performed for a real-world audience. Second, a videotape of the session allowed preservice teachers and fourth grade teachers, within the school where the broadcast took place, witness and analyze an example of curriculum integration as well as further their understandings of content knowledge and effective instructional methods.

Implications

Harris (2005) suggests integration of "appropriate curriculum-based technological applications more pervasively in all of their varied forms" (p.121). Recommendations such as these further bolster our conviction to integrate videoconference technology in our university teaching. The lessons learned through the evaluation of these projects will guide our future planning.

Plan well in advance. Allow ample time for the instructional team to design the project, including what will be taught and the pedagogy that will be used to deliver instruction. After the initial planning, allow time for reflection before coming together again to finalize all aspects of the project related to content and pedagogy.

Arrange for appropriate technical support. Appropriate technical support is vital to success. Meet with technical assistants several times and work as a team of equal partners to plan the seamless integration of the technology. If the technology assistant clearly understands every aspect of the project, he or she will be able to envision possible trouble spots and make suggestions for how to avoid them.

Conduct a trial run. Working closely with the technology assistants, conduct a trial run. Testing the planned set-up may result in other issues emerging that must be resolved in order for success to be achieved. As an example, in the Reader's Theater project, more careful preplanning and a trial run would have resulted in a better outcome because issues related to lighting, microphone placement, and bandwidth needs could have been resolved ahead of time.

Reflect after the videoconference. After the project ends, allow time for each team member to reflect about what transpired. What went well? Where were the trouble spots? Was the pedagogy appropriate? How might the project be changed to affect a better outcome? Then, come together again as a team to share reflections and to refine the project as needed.

Videoconferencing can be an effective tool when used in teacher preparation programs. Preservice teachers can benefit from watching and analyzing professors and teachers as they model efficacious instructional practice. Providing opportunities for university students to observe actual

classrooms in real time followed by guided reflection and discussion can extend learning and strengthen understanding of the craft of teaching. Additionally, as professors model flexibility and risk-taking while functioning in the role of novices, their students can gain a deeper understanding of the nature of learning as an ongoing process.

Even though the differences among the projects are obvious, commonalities exist. Each consists of the three elements—technology, pedagogy and content—as outlined in Mishra and Koehler's model (2005). While pedagogical approaches and content knowledge differed, videoconferencing was the common technological tool used to enhance the learning experiences for preservice teachers, elementary and middle grades students, practicing teachers, and university professors. The instructors in each project used effective forms of pedagogical methodology to teach content via videoconferencing. When the content, pedagogy, and technology intersected, instruction occurred more authentically than if all three were introduced in isolation.

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