

The effect of computer-mediated video on lesson analysis skills in early music education field experiences.

Kevin Shorner-Johnson

Society for Music Teacher Education
2009 Symposium on Music Teacher Education

Greensboro, NC

Traditionally, the teacher education curriculum has been perceived as having two components: theory (content knowledge) and practice (instructional delivery). The application of theory to practice has proven to be the most problematic link in the training of prospective teachers. The primary vehicle for achieving this transition has been the use of various types of apprenticeships, ranging from early field experiences to student teaching.

Field experiences are embedded in the history of American teacher education. The birth of the normal schools in the 19th century initiated the practice as a critical component of teacher education. Advocates often emphasized the importance of field experience by drawing comparisons between medical and teacher education. Just as medical students needed surgical experience in addition to knowledge of anatomy, so prospective teachers required actual classroom experiences in addition to pedagogical and subject knowledge. Without these experiences they were believed to be fundamentally disadvantaged (Fraser, 2007).

Field experience persisted as an important factor in teacher education through the progressive education movement of the early 20th century (Borrowman, 1965; Dewey, 1903), and it remains a fundamental part of certified teacher education programs today (AATE, 2000; NCATE, 2006). The National Council for the Accreditation of Teacher Education (NCATE) advocated that colleges of education and their school partners “design, implement, and evaluate field experiences and clinical practice so that teacher candidates and other school personnel develop and demonstrate the knowledge, skills, and dispositions necessary to help all students learn” (p. 28).

While clinical experiences have received near-universal support as a means of embedding teacher education knowledge in context, the results of research studies on their efficacy have been mixed. Though field experiences usually have an impact, little is known about what the impact is or the quality of that impact (Clift & Brady, 2005; Guyton & McIntyre, 1990). Several studies have found that participation in field experiences develop teacher performance (Sunal, 1980), competence (Allison, 1987; Darling, 1998; Grossman, 1991; Kagan, 1992), and motivation (Van Zoest, 1995).

However, problems have also been identified. For example, field experiences often contradict the attempts of teacher educators to improve and reform instruction with each successive generation of teachers. College students who have learned progressive pedagogical theories in their teacher education classes are often confused by the lack of effect such theoretical knowledge often has on the actual practice of teaching. This confusion often lead prospective teachers to give up their new pedagogical knowledge and continue the status quo (Goodlad, 1990; Grossman, 1991; Wragg, 1987; Zeichner & Tabachnick, 1981).

Teacher education institutions seeking to provide field experiences encounter practical problems as well. Careful placement of students in public schools consumes considerable faculty time, as does adequate supervision of the field experiences; this investment of time and resources may take time away from student instruction at the university (Leglar, 1988). Within a reasonable geographic radius of the home institution, it is often difficult to find enough suitable placements that are culturally diverse and offer exemplary instructional quality (Leglar, 1988; Simpson, 2006).

Even when scheduling and supervision are satisfactory, students who participate in field experiences face problems of observation, perception, and attention. Students in an observation environment encounter a multitude of stimuli within a school classroom (Kagan & Tippings, 1992). Overwhelmed, they tend to experience a great deal of difficulty in prioritizing information, viewing from a detached perspective, organizing information, and forming inferences about what is observed (Berliner, 1986; Carter, 1987; Carter et al., 1988; Carter, 1994; Sherin, 2001; Standley & Madsen, 1991). Stephens (2004) wrote that “live observations, despite their undisputed value, do not always provide novice and preservice teachers opportunities for focused critical analysis and deep reflection because the moment observed disappears as it happens” (p. 76).

In view of the limitations described above, the Association of Teacher Educators (2000) has stated that field experiences as they are currently structured do not reinforce what has been learned in the college classroom, fail to provide a diverse array of experiences, and do not offer adequate opportunities for analysis and reflection on the experience. Simply providing field experiences does not automatically ensure a meaningful learning experience. To enable students to engage in focused critical analysis of field experiences, teacher education practitioners and researchers have turned to various methods and tools to facilitate lesson analysis.

One of the most prominent tools is video, which offers the ability to isolate focus points, repeat viewing, capture contextual information, view across geographic and temporal boundaries, and facilitate reflective processes (Brame, 2004; Kagan & Tippings, 1992; Kinnear, McWilliams, & Caul, 2002; Leglar, 1992; Merkle & Hoy, 1985; Sherin, 2004; Wang & Hartley, 2003; Wragg, 1987). The development of multimedia technology

and the more recent integration of digital video technology with metadata have opened up new possibilities for improving the quality of field observations. Combining video stimuli, instruction, user responses, and feedback in a single environment could encourage reflection and help students resolve conflicts between what they have learned in the college classroom and what they observe in the school classroom.

Development of the Technology

For this study, an online video tool was developed to enhance students' field experiences. The tool was designed from four research-based principles: segmentation and analysis, opportunities for practice, immediate conditional feedback, and attention cueing. Previous research on expert, novice, and postulant processing has found that novices and postulants are separated from experts in their ability to segment and analyze important events (Hanson & Hirst, 1989; Kagan & Tippings, 1992). The developed computer program sought to support event segmentation and analysis by allowing users to create "video bookmarks" and to insert event times directly from the video. These features allowed users to track and store the times of significant events.

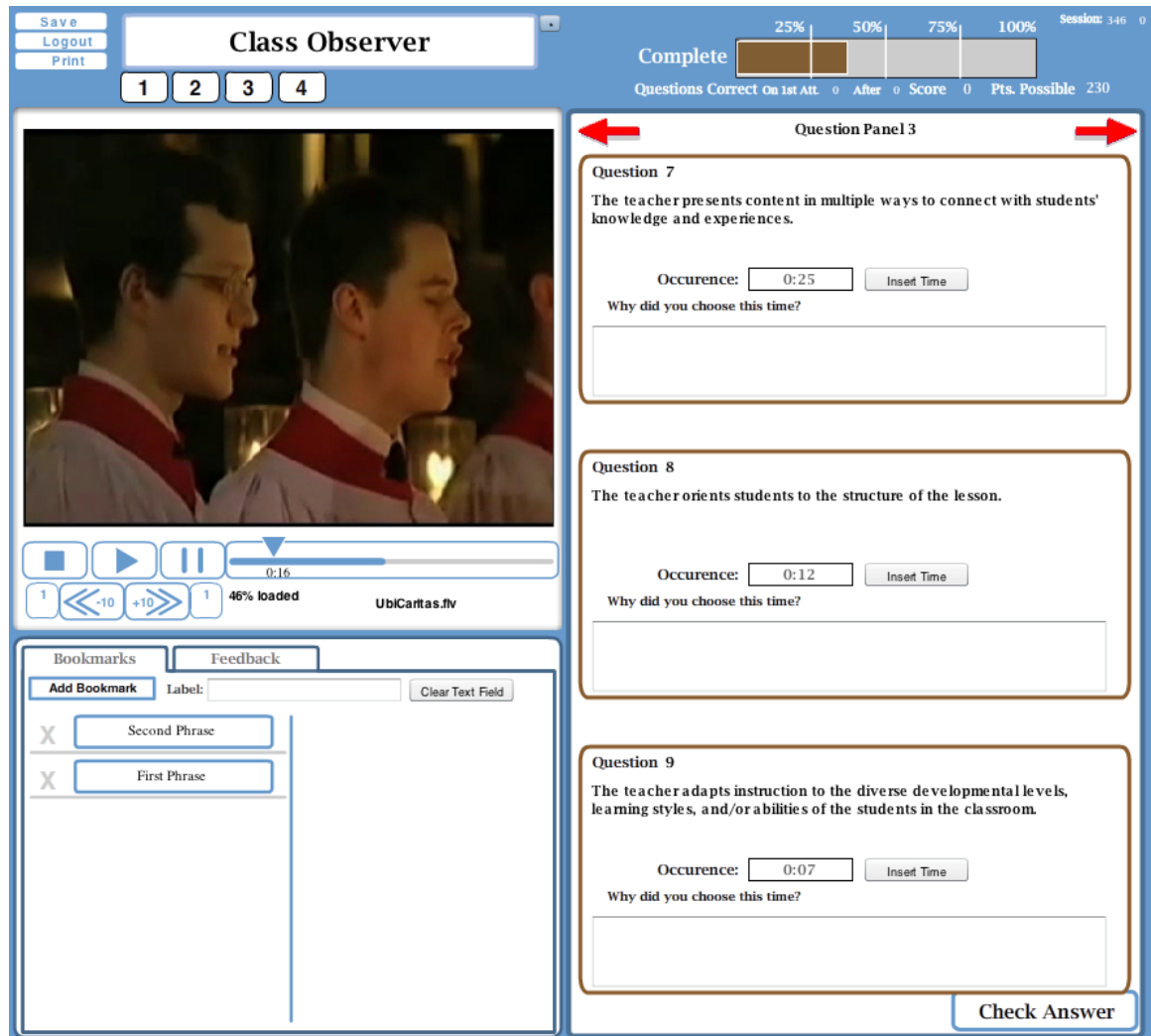
Research on learning has found that repeated opportunities to practice a skill can enhance that skill. Researchers in the field of video research have found that one of the primary advantages of the use of video is the opportunity to control playback and repeat viewing. Therefore, playback, rewind, fast-forward, pause, and stop controls were added to this video application to allow for opportunities for practice.

Finally, researchers have found that conditional feedback and attention cueing can improve the learning process. In this technology tool, a login process and method was built to separate college faculty and graduate student responses from those of

undergraduates. College faculty and graduate students were asked to login prior to undergraduates and submit responses to an observation video. These responses were combined and analyzed by the computer program and used as feedback to undergraduate users. Attention cueing was provided, by a button that allowed users to jump directly to a significant event that college faculty had identified in their responses.

The computer program was designed using MySQL, PHP, and Flash (see Figure 1). MySQL was used to develop and manage an online database that stored user and expert responses, questions, and video information. PHP scripts were written to protect the confidentiality of videos and video information, allow for user login and customization, and to develop extended markup language (XML) files that sent database information to the user interface. Finally, Flash was used for the development of the user interface. Flash has a demonstrated aptitude for the handling of video and allowed the user to click through multiple screens without having to reload or refresh the webpage.

Figure 1 Screenshot from the ClassObserver system



A user logged into the computer program using a username and password (passwords were changed on a weekly basis to prevent logins between sessions). A successful login, took users to a page that allowed users to create a new “session” or open a previously saved “session.” If a user chose to create a new session, the user was prompted to choose the relevant video and observation form.

Once opening options were selected, users opened a page that used the Flash interface. Users were allowed to play, pause, stop, rewind, and fastforward the loaded video; create bookmarks; navigate through the loaded observation form; enter responses;

and, check these responses and view response feedback. Once an observation form was completed, users were able to print a paper version of the observation form and save their responses to the online database for later retrieval.

Development of the Observation Form

The Multi-State Observation Instrument was constructed from an in-depth analysis of teacher performance standards from every state that had these standards. After contacting every state department of education in the United States, it was determined that 33 states had state-level teacher performance standards. Teacher performance standards were obtained and every teacher performance domain and indicator was entered into a database for analysis. An accumulated 225 teacher performance domains and 1,492 indicators were collected in the database for analysis. A web-based content management system was then built to allow a panel of reviewers to categorize and classify the domains and indicators. Using a panel of 6 reviewers (2 public school teachers, 1 former school administrator, and 3 college professors), domain and indicator categories were developed over 2 rounds of analysis.

After the first round of analysis, 13 domain categories emerged. A frequency analysis was conducted to determine the number of states that had at least one domain within each domain category and the total number of domains within each domain category. The four dominant domain categories that emerged from this analysis were Classroom Management (27/33 States), Instruction (24/33), Assessment (23/25), Instructional Planning and Delivery (21/33 states), Knowledge of content & pedagogy (12/33 states), and instruction (24/33 states).

In a second round of analysis, indicators were read, grouped, and definitions were constructed for the most significant indicator groups. Indicators were then categorized into 104 categories using the category definitions. A panel of reviewers provided feedback and recommendations on the categorization of the indicators. Again, a frequency analysis was conducted to determine the number of states that had at least one indicator within each indicator category and the total number of indicators within each indicator category.

The categories of Classroom Management, Instruction, and Knowledge of Content & Pedagogy formed the major organization framework of the observation form. Observation form questions were constructed from each of the dominant indicator category definitions.

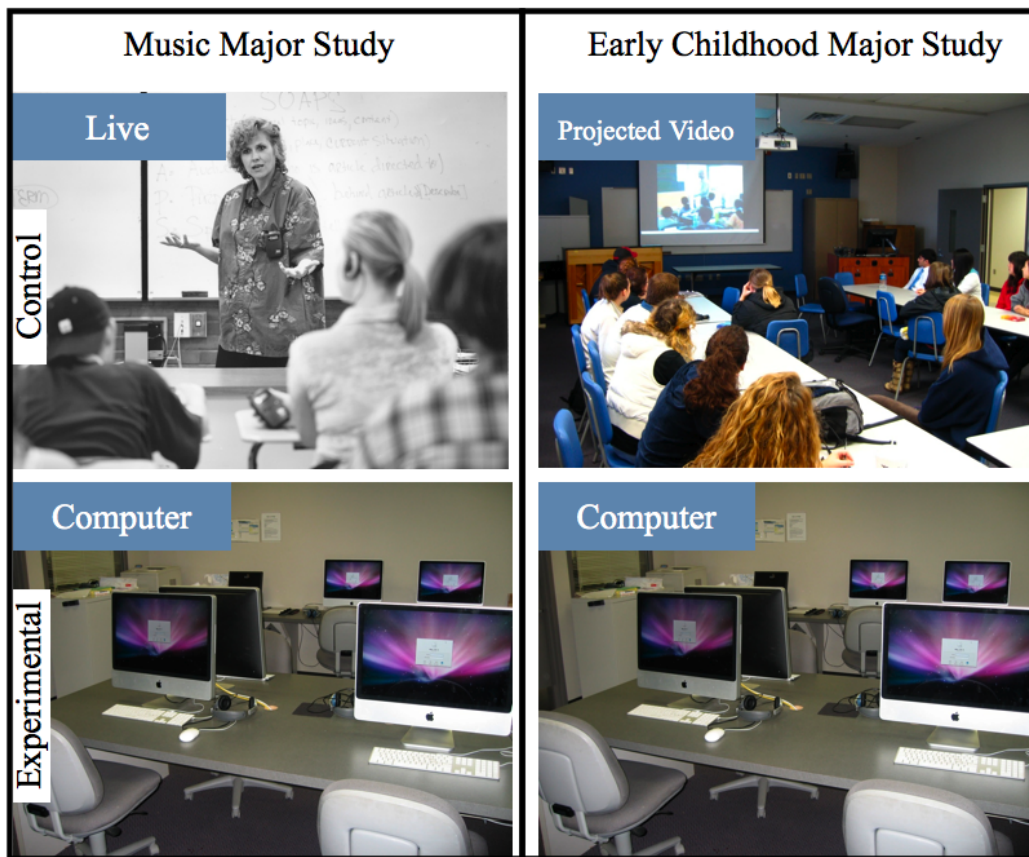
Research Study

The purpose of the research study was to examine the effect of computer-mediated video observations on the development of teaching-analysis skills in preservice teachers. The following questions guided the study: 1) Are live-classroom or computer-mediated observations more effective in developing critical analysis skills? 2) Does student background, gender, or experience with technology have a discernable effect? 3) What are the qualitative differences, identified by the subjects, between live and virtual observations? and, 4) What improvements in the researcher-designed computer program were indicated?

A pretest, posttest design was used. Subjects were enrolled in three intact classes of college students: one class of junior-level music majors in a Foundations of Education class (n=19), and two classes of sophomore-level early childhood majors in music

methods classes (n=28). Eight treatment periods were used with each group. Using various delivery systems, all subjects were asked to observe and analyze the same lessons: music majors traveled to observed in a live-classroom environment or reported to the campus computer lab for the computer-mediated treatment; one treatment group of early childhood majors also observed via an online computer-mediated video in the computer lab; and the second treatment group of early childhood majors used projected video in their regular classroom (see Figure 2).

Figure 2 Treatment conditions



At the beginning and end of the study, all subjects took a pretest or posttest in the control environment. In the Music Major Study, all participants took the pretest and posttest in the live-observation environment. Early childhood majors participated in the

pretest and the posttest in the projected video environment. All participants observed the same teacher teaching the same grade level of students (5th grade) for the pretest and the posttest observations.

Six different measures were used to address the four research questions. With regards to the effectiveness of treatment conditions, pretest and posttest data was collected and analyzed. To determine the discernable effect of student background, gender, or technology experience, a demographic survey was administered to determine meaningful factors for analysis. With regards to the qualitative differences of treatment experiences, data were collected using a 1) summative experience survey, 2) analysis of time spent in activities, and 3) the capture and analysis of online (Music Major Study) and spoken (Early Childhood Study) reflective discussions. A computer-mediated focus group was used to determine what improvements could be made to the researcher-designed tool. Due to the limitations of this paper, only the pretest-posttest, resource analysis, items from the summative experience survey, and the verbal discussion will be explored.

Pretest and posttest observations were measured using a panel of raters chosen to represent a broad array of experience in music education and/or music teacher education. Four raters had experiences as college faculty members, practicing music teachers, or as a school administrator. The raters used a three-point scale of irrelevant, relevant, or detailed reflection to judge student responses. After introductory trials and discussion, raters achieved a reliability rating of $r = 0.82$ using the interrater reliability formula (Boyle & Radocy, 1987).

No significant differences emerged between the two conditions in the Music Major Study. Both groups significantly ($p < .05$) increased their scores from the pretest to the posttest (see Figure 3). In the Early Childhood Study, there were no significant differences between treatment groups, however an analysis of a question subset revealed significant differences ($p < .05$) between treatment conditions (see Figure 4). The mean score of the computer-mediated group declined slightly from pretest to posttest whereas the projected video group increased their mean score from pretest to posttest.

Figure 3 Pretest to posttest gains in the Music Major Study

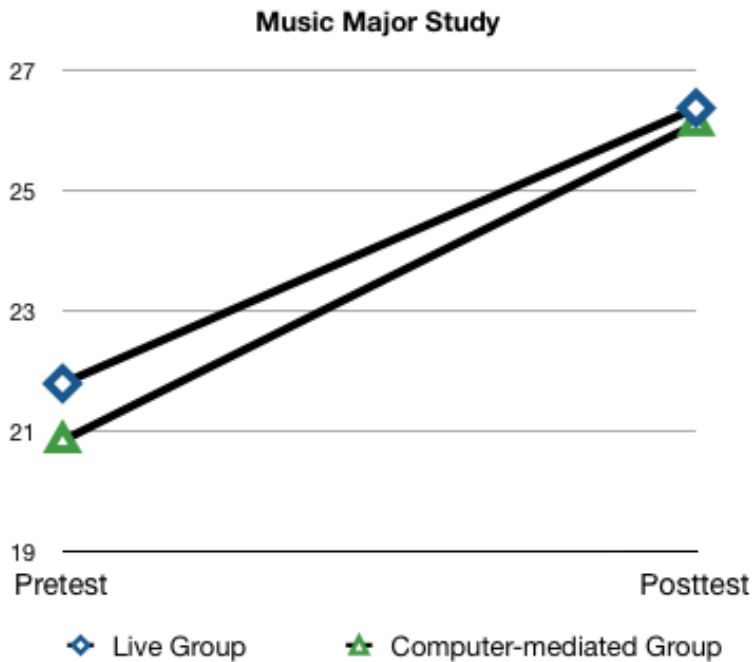
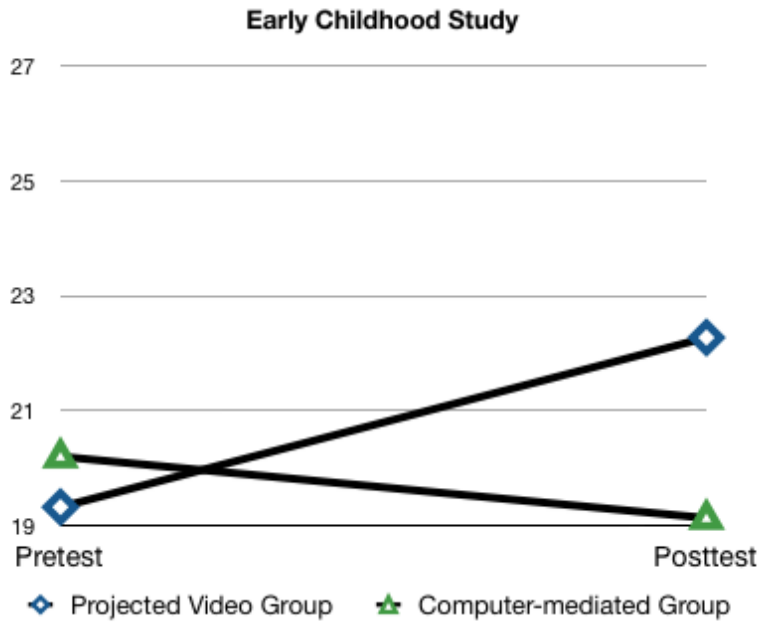


Figure 4 Pretest to posttest gains in the early childhood study



Time commitment

The amount of time spent in each treatment condition was tracked to examine the demand that each condition placed upon student resources. In the Early Childhood Study, differences were negligible as classroom constraints demanded that all students remain in the classroom for the study, thus all students spent an equal amount of time each week.

In the Music Major Study, those participants in the live condition spent mean amounts of 46 minutes observing, 66 minutes traveling, and 40 minutes completing the observation form. The computer-mediated group in the Music Major Study spent a mean time of 59 minutes each week completing observations. Thus, the live group spent an additional 88 minutes each week to complete field experiences.

Summative experience survey

A survey was developed to question participants about their experience within their treatment condition and the effect that students felt that this condition had upon their

development. Students were asked to rate the extent to which they felt that the field experience assisted them in developing their knowledge about music teaching. While the mean response on a five-point scale was higher for the Music Major Study than the Early Childhood Study, there were no significant differences between ratings.

Participants were asked to rank order how significantly their experience in the research study contributed to their knowledge about ten specific areas that were targeted by the observation form. While many items were ranked similarly across treatment conditions, two differences emerged as most salient (Table 1). All treatment groups from both studies ranked knowledge about Teacher Delivery as the most significant growth area except for the live group from the Music Major Study, which ranked this item fifth. Also, participants in the Music Major Study ranked knowledge about Use of Class Time as the first or second item, whereas participants in the Early Childhood Study ranked this item 9th.

Table 1 Ranking of Categorical Knowledge Gained

Music Major Live	Music Major Computer-Mediated
1) Use of Class Time	1) Teacher Delivery
2) Planning Objectives	2) Use of Class Time
3) Student Engagement	3) Instructional Strategies
4) Instructional Strategies	4) Motivational Strategies
5) Teacher Delivery	5) Student Engagement
6) Central Concepts	6) Use of Resources
7) Motivational Strategies	7) Central Concepts
8) Classroom Settings	8) Planning Objectives
9) Use of Resources	9) Assessment and Feedback
10) Assessment & Feedback	10) Classroom Settings
Early Childhood Projected Video	Early Childhood Computer-Mediated
1) Teacher Delivery	1) Teacher Delivery
2) Motivational Strategies	2) Instructional Strategies
3) Instructional Strategies	3) Student Engagement
4) Planning Objectives	4) Motivational Strategies
5) Use of Resources	5) Assessment & Feedback
6) Student Engagement	6) Use of Resources
7) Central Concepts	7) Classroom Settings
8) Assessment & Feedback	8) Planning Objectives
9) Use of Class Time	9) Use of Class Time
10) Classroom Settings	10) Central Concepts

Advantages and disadvantages

Participants were asked to comment on the advantages or disadvantages of their treatment condition. A categorical analysis of responses revealed that the most frequently cited advantage of live experience included the tangible and holistic experience (8) and the ability to have personal interactions with the teacher (5). Participants in the live experience condition most frequently cited travel (5), their impact on the classroom (5), and resource commitments of time and money (4) as disadvantages of live field experience.

Among computer-mediated groups in the Music Major and the Early Childhood Studies, participants frequently cited control over video playback (9 Early Childhood; 9

Music Major) as an advantage of watching field experiences using computers. A music major stated, “the video allows you to pause and rewind, which allows you to compare teachers and teaching strategies, as well as watch the teacher several times while focusing on a different aspect of teaching.” Both groups cited the camera's field of view as a limitation of video-based field experiences (Music Major 8; Early Childhood 4).

Early childhood participants in the projected video group cited group interaction (5) and the opportunity to observe classroom practices in action (3) as advantages of their experience. Regarding group interaction, one participant said:

I believe the video group had an advantage because we got to discuss out loud what we liked and disliked about the lessons and what worked and did not work. It made me consider things I would not have if I had not thought about them if someone else had not suggested them.

The most prominent disadvantage cited by the projected video group was that of video and audio quality (4). Students most specifically cited problems in the quality of audio and the ability to pick up every word that a teacher or student says as a weakness of the video experience.

Participants were asked to respond to the prompt, “To what extent were you happy with the experience that you had” with 1 being “very dissatisfied” and 5 being “very satisfied” on a 5 point scale. The music major computer-mediated group had the highest mean satisfaction rating (4.18). Next, in descending order of mean satisfaction were the music major live experience group (3.89), the early childhood video group (3.86), and the early childhood computer group (3.8).

Discussion analysis

Discussions were captured and analyzed in both the Music Major Study and the Early Childhood Study. Participants in the Music Major Study participated in an open-ended weekly online discussion. Participants in the Early Childhood Study participated in a weekly in-person discussion during 10 minutes following each treatment session. Due to the low participation rate (< 50% of required posts were completed) of subjects in the Music Major Study, these data were not considered for analysis.

Group discussions from the Early Childhood Study were analyzed and coded based on recommendations of grounded-theory research (Chamaz, 2006). Discussions were recorded, transcribed, and analyzed using two different rounds of coding. In the first round, comments were coded as positive, negative/corrective, or comparative. In the second round of coding, themes were developed from an analysis of the content of group discussions.

The analysis revealed that student discussions were relatively similar in their affective disposition (positive, negative, or comparative). The thematic analysis analyzed themes across broad categories of teacher-focused (194), lesson-focused (196), and effect-focused conversations (56). Across broad thematic categories, students most often discussed strategies used (117), teacher demeanor (56), teacher delivery (55), or the presence/absence of an objective (41).

Within the most prevalent category of strategies, students most often recognized strategies of modeling and journaling. Students found the elementary classroom observations easier to observe and segment into distinct activities and strategies than secondary ensemble rehearsals. One student stated, “the [elementary] observation was

easier for me to see . . . it's easier to pick out every little thing that he's doing, versus . . . a high school band class.”

Conclusion

This study found no significant differences between groups on the posttest measure in either study (Early Childhood or Music Major). However, the Early Childhood Study revealed a significant difference between control (project video) and experimental (computer-mediated) groups on a posttest subset of instruction-related questions. This significant finding is representative of a divergent trend from pretest to posttest between the control and experimental groups.

Within the Early Childhood Study, the projected video group improved from pretest to posttest while the computer-mediated group regressed. While these growth/decline trends were non-significant, a measure of effect size using Cohen's *D* demonstrated that the effect was moderately strong ($d = 0.72$). Therefore, given a larger sample size statistically significant differences may be found.

These findings may indicate the importance of shared experiences in early childhood major field experiences when first encountering music classrooms. While the computer-mediated group used individual computer screens, individual headphones, and watched the video at different rates of speed, the projected video group viewed video on a shared screen at a common rate of speed. These elements in the projected video group may have created a shared experience that allowed for richer discussion and reflective dialogue among early childhood majors.

The absence of significant differences between music major treatment conditions raises important resource questions to music teacher educators. The live experience group

spent nearly 12 more hours traveling to, attending, or completing field experiences than the computer-mediated group. However, on the posttest measure, there were no significant differences between these two groups.

Finally, responses to the ranking of categorical knowledge gained in field experiences revealed that different observation conditions made different aspects of observations more salient and meaningful. Video conditions may focus more attention on aspects of the teacher and teacher delivery whereas live experience brings more contextual factors into view.

Participants in the Music Major Study identified a higher ranking of knowledge gained about use of classroom time than did early childhood majors. Music majors may be more cognizant and aware of how teachers segment a music class period and allocate time to different aspects of instruction. These students often have their own experiences with which to compare time allocations in music classes.

Bibliography

- Allison, P. C. (1987). What and how preservice physical education teachers observe during an early field experience. *Research Quarterly for Exercise and Sport*, 58(3), 242-249.
- Association of Teacher Educators (2000). *Standards for field experience in teacher education*. Retrieved February 25, 2008 from <http://www.ate1.org/pubs/Standards.cfm>
- Berliner, D. C. (1986). In pursuit of the expert pedagogue. *Educational Researcher*, 15(7), 5-13.
- Borrowman, M. L., ed. (1965). *Teacher education in America: A documentary history*. New York: Teachers College Press.
- Boyle, J. D., & Radocy, R. E. (1987). *Measurement and evaluation of musical experiences*. New York: Schirmer Books.
- Brame, J. K. (2004). Veteran teacher continuing professional growth through guided self-evaluation using digital video. (Doctoral dissertation, East Carolina University). *Dissertation Abstracts International*, AAT 3148835.
- Carter, K. S. (1987). Processing and using information about students: A study of expert, novice, and postulant teachers. *Teaching and Teacher Education*, 3(2), 147-157.
- Carter, K. (1994). Preservice teachers' well-remembered events and the acquisition of event-structured knowledge. *Journal of Curriculum Studies*, 26(3), 235-252.
- Carter, K., Cushing, K., Sabers, D., Stein, P., & Berliner, D. C. (1988). Expert-novice differences in perceiving and processing visual classroom information. *Journal of Teacher Education*, 29(3), 25-31.
- Charmaz, K. (2006). *Constructing grounded theory: A practical guide through qualitative analysis*. London: Sage Publications.
- Clift, R. T., & Brady, P. (2005). Research on methods courses and field experiences. In M. Cochran-Smith & K. Zeichner (Eds.), *Studying teacher education: The report of the AERA panel on research and teacher education* (pp. 309-424). Mahwah, NJ : Lawrence Erlbaum.
- Darling, R. B. (1998). The value of a pre-internship observation experience. *Teaching Sociology*, 26(4), 341-346.
- Dewey, J. (1903). The relation of theory to practice in education. In *The Third Yearbook of the National Society for the Study of Education* (pp. 9-30). Chicago : University of Chicago Press.

- Fraser, J. W. (2007). *Preparing America's teachers: A history*. New York: Teachers College Press.
- Goodlad, J. I. (1990). Connecting the present to the past. In J. I. Goodlad, R. Soder, K. A. Sirotnik (Eds.), *Places where teachers are taught* (pp. 3-39). San Francisco : Jossey-Bass.
- Grossman, P. L. (1991). Overcoming the apprenticeship of observation in teacher education coursework. *Teaching and Teacher Education*, 7(4), 345-357.
- Guyton, E., & McIntyre, D. J. (1990). Student teaching and school experiences. In W. R. Houston (Ed.), *Handbook of research on teacher education* (pp. 514-534). New York : Macmillan.
- Hanson, C., & Hirst, W. (1989). On the representation of events: A study of orientation, recall, and recognition. *Journal of Experimental Psychology: General*, 118, 136-147.
- Kagan, D. M. (1992). Professional growth among preservice and beginning teachers. *Review of Educational Research*, 62(2), 129-169.
- Kagan, D. M., & Tippings, D. J. (1992). How U. S. preservice teachers “read” classroom performances.. *Journal of Education for Teaching*, 18(2), 149-158.
- Kinnear, H., McWilliams, S., & Caul, L. (2002). The use of interactive video in teaching teachers: An evaluation of a link with a primary school. *British Journal of Educational Technology*, 33(1), 17-26.
- Leglar, M. (1988). *Early field experiences in music teacher education: Report of a survey of U. S. colleges and universities*. Paper presented at the Music Educators National Conference, Indianapolis, IN.
- Leglar, M. (1992). Use of interactive multimedia in music teacher education programs. *Florida Technology in Education Quarterly*, 4(3), 53-58.
- Merkley, D., & Hoy, M. P. (1985). Teacher-on-television: A new mode of preservice classroom observation. *Phi Delta Kappan*, 66(5), 373-374.
- National Council for the Accreditation of Teacher Education, (2006). *Professional standards for the accreditation of schools, colleges, and departments of education*. Paper presented at the , . Retrieved December 5th, 2007 from <http://www.ncate.org/public/standards.asp?ch=4>
- Sherin, M. G. (2001). Developing a professional vision of classroom events. In T. Wood, B. S. Nelson, & J. Warfield (Eds.), *Beyond classical pedagogy: Teaching elementary school mathematics* (pp. 75-93). Hillsdale, NJ : Lawrence Erlbaum.

- Sherin, M. G. (2004). New perspectives on the role of video in teacher education. In J. Brophy (Ed.), *Using video in teacher education* (pp. 1-27). New York : Elsevier Science.
- Simpson, M. (2006). Field experience in distance delivered initial teacher education programmes. *Journal of Technology and Teacher Education*, 14(2), 241-254.
- Standley, J. M. & Madsen, C. K. (1991). An observation procedure to differentiate teaching experience and expertise in music education. *Journal of Research in Music Education*, 39(1), 5-11.
- Stephens, L. C. (2004). Designing and developing a video-case based interactive program for English language arts teacher preparation. In J. Brophy (Ed.), *Using video in teacher education* (pp. 73-102). New York : Elsevier Science.
- Sunal, D. (1980). Effect of field experiences during elementary methods courses on preservice teacher behavior. *Journal of Research in Science Teaching*, 17(1), 17-23.
- Van Zoest, L. R. (1995). *The impact of small-group discussion on preservice teachers' observations and reflections*. Paper presented at the American Educational Research Association conference, San Francisco, CA.
- Wang, J., & Hartley, K. (2003). Video technology as a support for teacher education reform.. *Journal of Technology and Teacher Education*, 11(1), 105-138.
- Wragg, E. C. (1987). Lesson analysis. In M. J. Dunkin (Ed.), *The international encyclopedia of teaching and education* (pp. 706-715). Oxford : Pergamon.
- Zeichner, K. M., & Tabachnick, B. R. (1981). Are the effects of university teacher education washed out by school experience? *Journal of Teacher Education*, 32, 7-11.