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Assessing Technology Integration in Mentoring Practices during Student Teaching: Multi-Case Analyses

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With the challenge to prepare school age students for the increased use of technology that characterizes job needs of the 21st Century comes the pressing need for student teachers to be guided by knowledgeable cooperating teachers to mentor them in the use of technologies to meet this challenge. This research presents results of seven case studies that examined technology integration in mentoring practices during student teaching. Instruments identified both the technology performance and learning engagement of the cooperating teachers. Findings of the study support efforts to assess cooperating teacher' technology skills and experience for field experience placements if preparing to mentor teacher candidates toward technology use is a priority.

Keywords: technology integration, teacher practice, technology mentoring,

In professional preparation of teachers, student teaching is a critical component in establishing practices used in future settings (Guyton & McIntyre, 1990; Lanier & Little, 1986). The factory school model that prepared students for the relatively low-level jobs of the past is inadequate in preparing students for the increased use of technology and knowledge work that characterizes job needs for current times (Darling-Hammond, 2000). Student teachers need guidance from knowledgeable teachers in order to meet this challenge of preparing students for their futures (Moursund & Bielefeldt, 1999). Cooperating teachers play a pivotal in addressing this challenge.

When technology topics are woven into contextualized experiences during field experiences, student teachers are more apt to integrate technology into their instructional planning and classroom activities (Thomas, Larson, Clift & Levin, 1996). Student teachers noted higher use of technologies in which they have more confidence, and when the cooperating teacher uses the same technologies their proficiency and confidence

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increases (Pope, Hare & Howard, 2005). However, a national survey noted that most student teachers did not have opportunities to integrate technology applications in K-12 classrooms or work with cooperating teachers who could mentor them in use of these tools (Moursund & Bielefeldt, 1999). There is growing need for technology-using cooperating teachers to guide student teachers (Strudler & Wetzel, 1999).

AREA OF TECHNOLOGY INTEGRATION

Identifying ideal student teaching placements is akin to aiming at a moving target. Willis and Mehlinger (1996), Cooper and Bull (1995), and Ertmer, Gopalakrishnan and Ross (2001), noted that we are still in the process of discovering best practices and effective uses of technology for learning and teaching even as the technology pushes forward and creates more opportunities in new environments. The challenge lies in means for identifying or developing these cooperating teachers. Cochran-Smith's (1991) theory of student teaching based on a relationship of collaborative resonance between universities and schools provides a rich approach for the integration of technology in field experiences as a means for developing both the cooperating teacher and the student teacher in this evolving setting while identifying effective practices. Wang and Odell (2002) suggested a collaborative inquiry model could foster practice-based discourse in a community approach to mentoring of student teachers that would benefit mentors, novices, staff developers, and teacher educators. These collaborative approaches provide direction for creating educational programs that enrich the development of mentoring skills in cooperating teachers as well as the technology skills of both cooperating teachers and student teachers.

Studies based on these collaborative approaches have begun to explore professional development options for cooperating teachers to create technology-rich settings for student teachers (Dawson & Nonis, 2000; O'Bannon & Judge, 2005; Rosaen, Hobson, & Khan, 2003; Wetzel, Zambo, Buss, & Padgett, 2001). However little is known about how technology enriched collaborative approaches to professional development for cooperating teachers translates into mentoring practices for technology integration with student teachers. This study addresses that gap in knowledge and examines means for assessing technology integration in mentoring practices of cooperating teachers as they support student teachers in the use of technology.

MEASUREMENTS AND INSTRUMENTS

Research has indicated that effective technology use involves more than good technology skills. Effective teaching with technology moves toward more constructivist approaches that focus on cognitively challenging tasks and active engagement during the learning process (Becker, Ravitz, & Wong, 1999). In this study, the "Technology Effectiveness Framework" of Jones, Valdez, Nowakowski, and Rasmussen (1995), was used to assess the skills of the cooperating teachers. The framework posits that the intersection of two continua – learning and technology performance – can be useful in defining the effectiveness of technology practices that support student learning. The two continua form a grid where "learning" engagement is represented on the horizontal axis and progresses from "passive" on the low end to "engaged" on the high end. On the vertical axis, technology performance is represented from low to high.

In the current study, questions from Becker and Anderson's (1998) "Your Teaching Philosophy" survey instrument of teaching beliefs were used to define the component of learning engagement on the continuum (see Appendix A). Questions in the survey identify teaching philosophies ranging from "transmissive" in which teaching is equated

with telling and students are passive in the learning process, to "constructivist" in which teaching involves students actively engaged in the learning process. The survey was used with a national sample of over 4,000 teachers. Data were used in multiple reports for a research project investigating the extent to which teachers' use of computers impact teaching and learning. A validity study with 72 teachers was conducted of survey items correlated with observation and similar interview based criteria. For the items addressing aspects of constructivist philosophy and practice, the median index-to-factor correlation was 0.51 (for a detailed discussion of survey validity, see Ravitz, Becker, & Wong 2000).

The Staff Self-Evaluation Rubric (Bellingham Public Schools, 2001) was used to define the continuum of technology performance (see Appendix B). This instrument was based on the Mankato Scale (Johnson, 1999) and measures teachers' self-perception of their level of technology proficiency. Skills are identified at four levels: non-use, awareness, mastery, and advanced. In prior work with the school district, the reliability estimate (coefficient alpha) for this measure of technology performance was .78 (N = 223).

Two questions guided the study:

1. What practices did cooperating teachers report using as they mentored their student teachers toward technology use?
2. Does employing measures of cooperating teacher's technology performance and learning engagement provide insight into mentoring student teachers for technology integration?

METHOD

A cooperative inquiry methodology (Reason, 1998) was used to focus on cooperating teacher mentoring practices as they prepared student teachers to teach with technology. The inquiry was situated in the practice of the participants with opportunities for them to become fully immersed in the activities and experiences. The study was conducted in two phases. In the first phase, data were collected from all participants in the study. In the second phase, seven participants and their student teachers were purposefully selected for further case studies. This study presents data from the second phase of case studies.

SETTING

The setting was a large, metropolitan school district in the southwestern United States. The cooperating teachers were part of a school district/university mentoring program offering four monthly mentoring workshops during the semester they worked with student teachers. From a pool of 16 cooperating teachers, a cross section of seven were selected for further case study (Merriam, 1998) using the Technology Effectiveness Framework (Jones, et al., 1995). All worked in schools located in the same geographic quadrant of the school district that had greater than 50% minority populations, and above school district average populations of second language learners.

PARTICIPANTS

Participants included seven cooperating teachers and their respective student teachers. The years of teaching experience of the cooperating teachers ranged from 3 to 26 years with a mean of 10 years. The number of previous student teachers ranged from 0 to 3, with four indicating that this was their first student teacher. Two were from the elementary level, three were from middle schools, and two were from high school level.

DATA SOURCES AND ANALYSIS

Data were collected from multiple sources. Three sources were measures that included a technology self-evaluation rubric, questions from a teaching philosophy survey, and a final questionnaire. Seven sources addressed open-ended qualitative elements including online transcripts, semi-structured interviews with cooperating teachers, semi-structured interviews with student teachers, small group dialogues, artifacts from the workshops, and field notes. Selected data sources were collected from both cooperating teachers and their student teachers for triangulation.

Data were gathered over a semester-long student teaching experience. The instruments for the Technology Effectiveness Framework were administered in the third week of the semester. All interviews with cooperating teachers were conducted at respective school sites with most interviews occurring teachers' classrooms when students were not present or in nearby conference rooms. Student teacher interviews took place privately at the school sites during their final week of student teaching. The first author conducted all interviews, which were then transcribed and coded for analysis. Copies were then sent to the interviewees to check for accuracy and help ensure trustworthiness (Lincoln & Guba, 1985). All data results are reported anonymously and all participants are given pseudonyms.

Data for descriptive analysis of the case studies were generated through interviews, the final questionnaire, and the self-evaluation rubric. Descriptive statistics were compiled from the final questionnaire and the self-evaluation rubric using SPSS. Data on refinement of mentoring practice were gathered from interviews, workshop discussions, and online correspondence. They were analyzed for correspondence to workshop topics and reported.

Data on the mentoring practices were gathered from interviews, workshop discussions, and online correspondence. Practices confirmed during interviews with student teachers were identified and recorded in the taxonomic framework of Mentoring Toward Technology Use (Author, 2004).

PROCEDURES- PROFESSIONAL DEVELOPMENT WORKSHOPS

The series of four workshops were presented on a monthly basis during the semester of student teaching. School district and university personnel collaboratively designed them to provide information cooperating teachers needed as mentors, and to increase their skills with technology. The guiding vision was to address conceptual approaches to mentoring and constructivist contexts for technology use. Each workshop lasted a full day with half of the session for mentoring topics and half for hands-on technology topics. The mentoring activities in the workshop were constructed to provide basic information needed to fulfill their task as cooperating teachers while introducing mentoring concepts that moved beyond traditional foci of support and advice toward development of a deeper understanding of teacher learning. Technology activities were designed to move beyond showing software and basic skills to engagement in collaborative constructivist oriented activities where technology was used to build new knowledge and share that knowledge via group presentations.

The first session was three weeks into the semester and provided an introduction to the study noting that it was an inquiry to begin identifying strategies used in mentoring student teachers toward technology use. In addition to district procedural requirements for the cooperating teachers, mentoring topics focused on varying styles for teaching and learning that impacted mentor/student teacher communications. The concept of "prior

knowledge" was discussed noting that it works as a lens filtering information and knowledge construction during the learning process. For technology topics, a concept mapping software was modeled in a large group setting to record their ideas on expectations for their role as cooperating teachers. They worked in small groups with the software to organize a map of their "prior knowledge" recording their perceptions of the task of preparing student teachers. They registered in the online interface for the workshop and posted introductory messages

In the second session, information was provided on the culminating activity for the workshops: a presentation focused on one example in which they mentored their student teachers to use technology in a lesson. Time was spent in small group sessions recording the technology practices and strategies they were using with their student teachers. Digital cameras were provided to take pictures both individually and in groups and learn how to insert and resize those photos in word-processing and slide show documents to record "a day in their life." This proved to be quite valuable, as many knew how to take the photos but did not know how to insert them into various types of documents. The mentoring segment focused on outcomes of the mentoring process. In a "Stepping Stones" activity each teacher selected a stone representing a mentor in their life and discussed the qualities that made the mentor so memorable. Information was also presented on the differences in perception between the cooperating teacher and student teacher, followed by a carousel activity to help identify the difference between opinion and evidence statements in evaluations.

The third session began with small group recorded sessions sharing strategies they were using with their student teachers as they mentored them toward technology use. Internet resources such WebQuests were shared to support their work, and time was allotted for further exploration. The mentoring segments focused on synectics: an approach using metaphors and analogies to clarify concepts. They created their own ending to the phrase "Being a cooperating teacher is like…" and shared their work in a group forum.

The final session was their multimedia presentations of the lessons in which they mentored their student teachers toward technology use. Their student teachers had just finished the semesters and were invited for a luncheon. In the afternoon they worked in groups with their student teachers on a digital video project to create public service announcements focused on technology in education.

RESULTS

During the first workshop, cooperating teachers completed the two instruments used for the Technology Effectiveness Framework. Each instrument took bout 15 minutes to complete. Scores from questions on "Your teaching Philosophy" (Becker & Anderson, 1998) were averaged, resulting in a "learning engagement" score. The possible score range was from 1 to 5. Lower scores indicated a more traditional transmissive teaching philosophy with students as passive learners. Higher scores indicated a more constructivist-compatible teaching philosophy in which students were actively engaged in learning activities. Scores from the fourteen items on the Staff Self-Evaluation Rubric (Bellingham Public Schools, 2001) were averaged resulting in a technology performance score. The possible score range was from 1 to 4. Lower scores indicated a low level of use, and higher scores indicated higher levels of use including teaching students how to use the technologies.

Results are presented in three areas: description of the cases, practices in mentoring student teachers toward technology use, and insights regarding the framework instruments and cooperating teacher practice.

THE CASES

Each case was comprised of a cooperating teacher and her/his student teacher. Purposeful sampling was used to select cooperating teachers at various levels of technology use and with different approaches to teaching. Table 1 shows the scores for the cooperating teachers along with the technology performance scores of their student teachers who completed the same technology performance instrument after their interview.

Table 1. *Cooperating Teachers' Engaged Learning and Technology Performance Score*

Cooperating Teacher	Learning score [b] (range 1-5)	Technology score [a] (range 1-4)	Student Teacher	Technology score [a] (range 1-4)
Ms. Soto	2.25	2.92	Ms. Jeffers	2.43
Ms. Sorens	2.75	2.93	Mr. Jarvis	2.57
Mr. Sotelo	3.13	2.57	Ms. Johan	2.43
Ms. Solmon	3.38	3.00	Mr. James	2.57
Ms. South	3.63	3.14	Mr. Jurek	3.57
Mr. Sowell	3.88	2.00	Mr. Jensen	2.50
Mr. Somers	4.00	3.29	Ms. Jenks	2.71
Group Mean	3.29	2.84		2.73

Note. [a] "Staff Use of Technology Self Evaluation Rubric" used to compute technology performance score [b] "Your Teaching Philosophy" survey used to compute learning score.

The selection criteria for the sample also included a range of grade levels. Table 2 indicates the grade levels of the cooperating teachers and provides descriptive data on the number of previous student teachers, the years of teaching experience, their current degree and their access to computers.

Table 2. *Cooperating Teachers' Descriptive Data*

Cooperating Teacher	Grade/ Subject	Previous Student Teachers	Years Teaching	Highest Degree	Computers in Classroom	Access to Lab
Ms. Soto	4	0	5	B.S.	3	Yes
Ms. Solmon	5	0	8	B.A.	5	Yes
Ms. Sorens	7, US History	0	3	B.A.	7	Yes
Mr. Somers	8, Geography	0	6	B.A.	7	Yes
Ms. South	8, Geography	3	14	M.A.	7	Yes
Mr. Sotelo	9-12, Biology	2	8	M.A.	1	No
Mr. Sowell	9-12, Lang. Arts	2	26	M.A.	1	No

The list shows the participants sorted according to their levels of learning engagement:

Ms. Soto, low engaged learning and mid technology use, elementary level;
Ms. Sorens, low engaged learning and mid technology use, middle school;
Mr. Sotelo, mid engaged learning and low technology use, high school;

Ms. Solmon, mid engaged learning and mid technology use, elementary;
Ms. South, mid engaged learning and high technology use, middle school;
Mr. Sowell, high engaged learning and low technology use, high school; and
Mr. Somers, high engaged learning, and high technology use, middle school.

COOPERATING TEACHER PRACTICES IN MENTORING STUDENT TEACHERS

This section addresses the first research question. In this study, cooperating teachers were asked specifically about practices they used in mentoring their student teachers toward technology use. Reported practices are shown in Table 3, which is organized in a taxonomic display of mentoring practices supporting technology use (Author, 2004). Each reported practice was also confirmed by student teachers during their interviews. The table includes the "technology" performance scores of the cooperating teachers.

All cooperating teachers reported practices of referring student teachers to onsite computer coordinators and other teachers as well as encouraging use of technology during the student teaching experience. Practices reported by less than half (3 or fewer) of cooperating teachers included lending laptops and software for lesson preparation at home, showing technologies not already used by the cooperating teachers (e.g. "Quick Pads" - portable word-processing devices for individual student use, etc.), demonstrating how to manage digital files, team-teaching during lessons, and lending support during student teacher technology lessons. The majority of the cooperating teachers in this study consistently reported using the remaining twenty-one practices.

When looking across the totals of the reported practices, a trend develops: as the "technology" performance scores for the teachers rise, so do the reported number of mentoring practices used with student teachers. In addition, the teachers with the four highest technology performance scores also shared refinements of their beliefs in mentoring practices that reflected learning from the professional development activities. The cooperating teachers with the three lowest technology performance scores did not indicate any refinements of their beliefs in mentoring practices during the study.

INSIGHTS REGARDING THE FRAMEWORK INSTRUMENTS AND COOPERATING TEACHER PRACTICE

This section addresses the second research question: Does employing measures of cooperating teacher's technology performance and learning engagement provide insight into mentoring student teachers for technology integration?

Using the "learning" scores addressing constructivist practices, further analysis suggests several trends. First, the teachers with the five highest scores all indicated learning from their student teachers. Second, in addition to learning from their student teachers, three of the five shared incidents in which they were mentored in technology use by their student teachers.

Learning from student teachers. Five of the seven teachers indicated they learned from their student teachers. Mr. Sotelo remarked, " You know, I have picked up some things from [Ms. Johans] as far as content." Ms. Solmon commented, "I think I learn more through him because…when he says he doesn't understand something, we both kind of learn. I'm learning from him." In the second interview, Ms. South noted: "Teaching and student-teaching is a two-way street. We learn from each other. He's not just here to learn from me, but I'm also learning from him – and I learn a lot from him." Mr. Sowell shared, "You can teach old dogs new tricks. I'm learning from [Mr. Jensen]. He has some really super great lessons."

Table 3. Mentoring Practices Reported by Case Study Cooperating Teachers

Practices	Mr. Sowell	Mr. Sotelo	Ms. Soto	Ms. Sorens	Ms. Solmon	Ms. South	Mr. Somers
Technology Performance Score	2.00	2.57	2.92	2.93	3.00	3.14	3.29
System Information Practices							
Explore hardware resources		X	X		X	X	X
Explore software resources			X		X	X	X
Access computer lab			X	X	X	X	X
Show school data/communication		X	X	X	X	X	X
Resources/Materials Practices							
Lend hardware for home use				X		X	X
Lend software for lesson preparation				X		X	X
Guide to other resources for learning (print based, web-based)		X	X	X	X	X	X
Give materials and templates		X	X	X	X	X	X
Refer to onsite computer coordinator	X	X	X	X	X	X	X
Refer to other teachers	X	X	X	X	X	X	X
Instructional Practices							
Discuss curriculum connections			X	X	X	X	X
Offer suggestions			X	X	X	X	X
Show software – one-on-one		X	X	X	X	X	X
Allow practice time with the software			X	X	X	X	X
Show other technologies		X	X				X
Productivity Practices							
Show grading programs		X	X	X	X	X	X
Lesson plans on computer		X	X	X	X	X	X
Share templates		X	X			X	X
Show file management		X					
Model network communication	X	X	X	X		X	X
Modeling Practices							
Model presentations		X	X	X		X	X
Model active student activities			X		X	X	X
Team-teach			X				X
Reflect after lessons		X	X	X	X	X	X
Support and Challenge Practices							
Communicate a vision			X	X		X	X
Establish expectations			X	X	X	X	
Lend support on lessons			X	X			X
Encourage use	X	X	X	X	X	X	X
Pose challenges	X			X		X	X
Challenge yourself				X	X	X	X
Totals	5	16	25	23	19	26	28

Finally, Mr. Somers, who scored high in engaged learning and technology performance, shared knowledge he gained as his student teacher problem-solved her way through a cooperative learning technology lesson. He noted that problems arose during a lesson and the student teacher quickly switched from using multiple machines to sharing one computer in rotation for group work, and he became aware of new dynamics in learning. He articulated:

> We ended up projecting it with the cart in front and kind of letting each team do their own thing, but we did it in front of everyone so they could hear what decisions they made, which made some other teams change their decision before they got there. So, it was a great dynamic, and it was a wonderful experience.

The teachers who did not identify any learning from their student teachers noted "[the student teacher] came in not knowing a lot." These two teachers had the low "learning" scores in this study.

Reciprocal mentoring from the student teacher. In addition to learning from their student teachers, three of the teachers shared incidents in which they were mentored in technology use by their student teacher. Ms. South shared her experience in being mentored one-on-one as she learned new features in a software program. She said,

He knows PowerPoint so much better. When I do something in PowerPoint I have to look it up in my book. He was teaching me how to put some things on PowerPoint that I didn't know. And I knew it was in that book somewhere, but he knew right where to go and find it and so he showed it to me. It's not demeaning to him that you don't know it. He'll go ahead and teach you, and so, I learn a lot from him.

Ms. Solmon provided an example in which she was mentored by her student teacher with "just-in-time" support for the use of new equipment. She had observed him using the equipment in lessons with students and decided to try it with the students. As she was struggling in front of the class trying to use the equipment, Mr. James came in the room. She narrated how he mentored her through the process:

He had to show me how you use it. This is the way this goes and then we spent about five minutes trying to turn things around because I'm left handed and he's right handed (laughter). Finally, I had to move all kinds of desks just so I could do certain things with it. But, he was very helpful, showing me how to use that technology.

Both of these teachers were comfortable with a reciprocal mentoring approach to student teaching and commented on the technology skills they learned from their student teachers.

Finally, Mr. Sowell, who had the lowest technology score in the group and had not used any computer-aided presentations or activities in his teaching, shared an example where his student teacher modeled integration of technology into a lesson: "One lesson that we did do was when I was doing "The Crucible," [Mr. Jensen] went on the website and found some information concerning "The Crucible" and did a presentation of some of the characters, the costumes, the things of the day."

DISCUSSION

In this study, the measures used for assessing cooperating teachers' technology performance and learning engagement provided useful insight into the mentoring practices they reported using with their student teachers. The growing need for technology–using cooperating teachers (Strudler & Wetzel, 1999) and the short supply of them (Moursund & Bielefeldt, 1999) poses a challenge for identifying effective placements for student teachers. Findings from this study suggest an approach for addressing this challenge of identifying and developing these cooperating teachers. The measures used in this study provided a framework for assessing cooperating teacher

technology integration mentoring practices. Findings suggest that a combination of good technology skills and a move toward constructivist practices provide greater opportunities for student teachers to be mentored in strategies for effectively using technology in the classroom.

The technology mentoring practices of the cooperating teachers suggest several themes. First, the technology skills of the cooperating teacher impact the quality of technology mentoring for student teachers. Those cooperating teachers with reported greater skills indicated more mentoring practices for technology integration into professional practice with their student teachers. Second, the cooperating teachers indicating a higher belief in constructivist practices also noted learning from their student teachers, which supports research from Dawson and Nonis (2000) who found reciprocal benefits in their study as classroom teachers and preservice teachers shared knowledge about teaching and technology at their varied levels of expertise during practicum experiences. Wink and Putney (2002) further refined this concept as reciprocal mentoring and noted, "the notion of the more experienced or capable other can alternate depending on the situations and setting" (p.161). In this study, student teachers used strategies such as "stepping in," just-in-time support, and modeling to mentor their cooperating teachers in developing technology skills. In these examples, the student teachers were clearly the "more capable other" as they mentored their cooperating teachers. Third, the collaborative approach between the university and school lent support to Cochran-Smith's (1991) collaborative resonance theory in that it created a rich setting for developing both the cooperating teacher and the student teacher while, in this study, identifying integration of technology mentoring practices in field experiences.

IMPLICATIONS

Findings from this study suggest that methods for assessing skills of cooperating teachers should be considered if preparing to mentor teachers toward the use of technology is a goal. Technology performance and learning engagement should be factors considered when selecting mentor teachers as we move toward the goal of technology integration in field experiences. The instruments, framework, and collaborative approach used in this study provide promising practices for identifying positive placements where student teachers can be mentored toward the use of technology in their teaching. Working collaboratively with field-based partners yields rich opportunities to develop approaches that can benefit mentors, student teachers, staff developers, and teacher educators.

Using instruments that highlighted areas for focus (technology and engaged learning in this study) provided opportunities for cooperating teachers to self-assess those skills and, in some cases, spurred motivation for them to grow and refine those skills during this study. While self-reports have limitations, they also offer a non-threatening starting point for drawing attention to areas for awareness and growth. The technology performance and learning engagement assessments used in this study offered cooperating teachers an opportunity to identify where they were in the process, and become aware of next steps as they read through the descriptors. Results from this study benefit educational institutions seeking to better understand how the qualities of cooperating teachers impact the student teaching experience so that they can more fully prepare preservice teachers for teaching in digital classrooms.

REFERENCES

Author (2004). Mentoring toward technology use: Cooperating teacher practice in supporting student teachers. *Journal of Research on Technology in Education,* 37(1), 85-109.

Becker, H. J., & Anderson, R. E. (1998*). Teacher's Survey: Combined versions 1-4.* Retrieved June 22, 2006 from the Center for Research on Information Technology & Organizations Web site: http://www.crito.uci.edu/tlc/html/questionnaires.html

Becker, H. J., Ravitz, J. L., & Wong, Y. T. (1999). Teacher and teacher-directed student use of computers and software. Retrieved January 18, 2006 from the Center for Research on Information Technology & Organizations Web site: http://www.crito.uci.edu/tlc/findings/computeruse/

Bellingham Public Schools (2001, August 1). *Staff use of technology: 2001 Self-evaluation rubric.* Retrieved January 18, 2002 from the Bellingham Public Schools Web site: http://www.bham.wednet.edu/technology/StaffSlfAssmt05.htm

Bransford, J. et al. (Eds.) (2000). *How people learn: Brain, mind, experience, and school.* Washington D. C: National Academy Press.

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher, 18*(1), 32-42.

Carter, K. (1990). Teachers' knowledge and learning to teach .In W. R. Houston (Ed.), *Handbook of research on teacher education* (pp. 314-338). New York: Macmillan.

Cochran-Smith, M. (1991). Reinventing student teaching. *Journal of Teacher Education, 42(2*), 104-118.

Cooper, J. M., & Bull, G. L. (1997). Technology and teacher education: Past practice and recommended directions. *Action in Teacher Education, 19*(2), 97-106.

Darling-Hammond, L. (2000). Futures of teaching in American education. *Journal of Educational Change, 1,* 353-373.

Dawson, K. & Nonis, A. (2000). Preservice teachers' experiences in a K-12/university technology-based field initiative: Benefits, facilitators, constraints, and implications for teacher educators. *Journal of Computing in Teacher Education, 17*(1), 4-12.

Ertmer, P. A., Gopalakrishnan, S., & Ross, E. M. (2001). Technology-using teachers: Comparing perceptions of exemplary technology use to best practices. *Journal of Research on Technology in Education, 33*(5). Retrieved August 3, 2006, from http://www.iste.org/Content/NavigationMenu/Publications/JRTE/Issues/Volume_331/Number_5_Summer_2001/Number_5_Summer_2001.htm

Guyton, E., & McIntyre, D. J. (1990). Student teaching and school experiences. In W. R. Houston, M. Haberman, & J. Sikula (Eds.), *Handbook of research on teacher education* (pp. 514-534). New York: Macmillan.

Johnson, D. (1999). *The indispensable teacher's guide to computer skills: A staff development guide.* Worthington, OH: Linworth Publishing.

Jones, B. F., Valdez, G., Nowakowski, J., & Rasmussen, C. (1995). *Plugging in: Choosing and using educational technology.* Retrieved August 3, 2005 from North Central Regional Educational Laboratory Web site: http://www.ncrel.org/sdrs/edtalk/toc.htm

Lanier, J. E. & Little, J. W. (1986). Research on teacher education. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed.) (pp. 527-569). New York: Macmillan.

Lincoln, Y. S. & Guba, E. G. (1985). *Naturalistic inquiry.* Beverly Hills, CA: Sage.

Merriam, S. (1998). *Qualitative research and case study applications in education* (Rev. ed.). San Francisco: Jossey-Bass.

Moursund, D., & Bielefeldt, T. (1999). *Will new teachers be prepared to teach in a digital age? A national survey on information technology in teacher education.* Retrieved January 11, 2006 from: http://www.mff.org/publications/publications.taf?page=154

O'Bannon, B., & Judge, S. (2005). Implementing partnerships across the curriculum with technology. *Journal of Research on Technology in Education, 37*(2), 197-216.

Pope, M., Hare, D., & Howard, E. (2005) Enhancing technology use in student teaching: A case study. *Journal of Technology and Teacher Education, 13*(4), 573-618.

Ravitz, J., Becker, H., & Wong, Y. (2000). *Constructivist compatible beliefs and practices among U. S. teachers.* Retrieved November 6, 2006, from: http://www.crito.uci.edu/TLC/FINDINGS/REPORT4/startpage.html

Reason, P. (1998). Three approaches to participative inquiry. In N. K. Denzin, & Y. S. Lincoln (Eds.), *Strategies of qualitative inquiry* (pp. 261-291). Thousand Oaks, CA: Sage.

Rosaen, C., Hobson, S., & Khan, G. (2003). Making Connections: Collaborative Approaches to Preparing Today's and Tomorrow's Teachers to Use Technology. *Journal of Technology and Teacher Education 11*(2), 281-306.

Strudler, N. & Wetzel, K. (1999). Lessons from exemplary colleges of education: Factors affecting technology integration in preservice programs. *Educational Technology Research & Development, 47*(4), 63-81.

Thomas, L., Larson A., Clift, R., & Levin, J. (1996). Integrating technology in teacher education programs. Actio*n in Teacher Education, 17,(*4), 1-8.

Wang, J. & Odell, S. J. (2002). Mentored learning to teach according to standards-based reform: A critical review. *Review of Educational Research, 72*(3), 481-546,

Wetzel, K., Zambo, R. Buss, R. & Padgett, H. (2001, June). *A picture of change in technology-rich K-8 classrooms.* Paper presented at the meeting of the National Educational Computing Conference, Chicago, IL.

Willis, J. W., & Mehlinger, H. D. (1996) Information technology and teacher education. In J. Sikula, T. Buttery, & E. Guyton (Eds.), *Handbook of research on teacher education* (2nd ed.) (pp. 978-1029). New York: Macmillan Library Reference.

Wink, J., & Putney, L. (2002). *A vision of Vygotsky.* Boston, MA: Allyn & Bacon.

APPENDIX A
LEARNING ENGAGEMENT INSTRUMENT

PART J. YOUR TEACHING PHILOSOPHY

J1. **The following paragraphs describe observations of two teachers' classes, Ms. Hill's and Mr. Jones'. Answer each question below by checking the box under the column that best answers that question for you.**

V3
V4

Ms. Hill was leading her class in an animated way, asking questions that the students could answer quickly; based on the reading they had done the day before. After this review, Ms. Hill taught the class new material, again using simple questions to keep students attentive and listening to what she said.	Mr. Jones' class was also having a discussion, but many of the questions came from the students themselves. Though Mr. Jones could clarify students' questions and suggest where the students could find relevant information, he couldn't really answer most of the questions himself.

	Definitely Ms. Hill's	Tend towards Ms. Hill's	Can't decide	Tend towards Mr. Jones'	Definitely Mr. Jones'
a. Which type of class discussion are you more comfortable having in class?	❑	❑	❑	❑	❑
b. Which type of discussion do you think most students prefer to have?.....	❑	❑	❑	❑	❑
c. From which type of class discussion do you think students gain more knowledge?.....	❑	❑	❑	❑	❑
d. From which type of class discussion do you think students gain more useful skills?	❑	❑	❑	❑	❑

J3. **Different teachers have described very different teaching philosophies to researchers. For each of the following pairs of statements, check the box that best shows how closely your own beliefs are to each of the statements in a given pair. The closer your beliefs to a particular statement, the closer the box you check.** Please ✔ only one for each set.

ALL

a.	"I mainly see my role as a facilitator. I try to provide opportunities and resources for my students to discover or construct concepts for themselves."	❑	❑	❑	❑	❑	"That's all nice, but students really won't learn the subject unless you go over the material in a structured way. It's my job to explain, to show students how to do the work, and to assign specific practice."
b.	"The most important part of instruction is the content of the curriculum. That content is the community's judgment about what children need to be able to know and do."	❑	❑	❑	❑	❑	"The most important part of instruction is that it encourage "sense-making" or thinking among students. Content is secondary."
c.	"It is useful for students to become familiar with many different ideas and skills even if their understanding, for now, is limited. Later, in college, perhaps, they will learn these things in more detail."	❑	❑	❑	❑	❑	"It is better for students to master a few complex ideas and skills well, and to learn what deep understanding is all about, even if the breadth of their knowledge is limited until they are older."
d.	"It is critical for students to become interested in doing academic work—interest and effort are more important than the particular subject-matter they are working on."	❑	❑	❑	❑	❑	"While student motivation is certainly useful, it should not drive what students study. It is more important that students learn the history, science, math and language skills in their textbooks."

e. "It is a good idea to have all sorts of activities going on in the classroom. Some students might produce a scene from a play they read. Others might create a miniature version of the set. It's hard to get the logistics right, but the successes are so much more important than the failures."	❑	❑	❑	❑	❑	"It's more practical to give the whole class the same assignment, one that has clear directions, and one that can be done in short intervals that match students' attention spans and the daily class schedule."

Permission

Message
From: hjbecker@uci.edu
Subject: Re: request for permission to use material
To: grove@nevada.edu

Sure. You're welcome to use or adapt any of the survey questions from the Teaching, Learning, and Computing survey. No need for a document; please I'd rather that you just use this email for documentation.

Hank Becker
* *

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TLC: 1998 National Survey: http://www.crito.uci.edu/tlc

APPENDIX B
TECHNOLOGY PERFORMANCE INSTRUMENT
STAFF USE OF TECHNOLOGY- SELF EVALUATION RUBRIC

Please judge your level of achievement in each of the following competencies. Check the number that best reflects your current level of skill attainment. (Be honest, but be kind.) This tool is designed to help understand your current level of skills with computer technologies and to plan for professional development.

1. Basic Computer Use
___Level 1 - I do not use a computer.
___Level 2 - I use the computer to run a few specific, pre-loaded programs.
___Level 3 - I run two programs simultaneously, and have several windows open at the same time.
___Level 4 - I trouble-shoot successfully when basic problems with my computer or printer occur. I learn new programs on my own. I teach basic operations to my students.

2. File Management
___Level 1 - I do not save any documents I create using the computer.
___Level 2 - I select, open and save documents on different drives.
___Level 3 - I create my own folders to keep files organized and understand the importance of a back-up system.
___Level 4 - I move files between folders and drives, and I maintain my network storage size within acceptable limits. I teach students how to save and organize their files.

3. Word Processing
___Level 1 - I do not use a word processing program.
___Level 2 - I occasionally use a word processing program for simple documents. I generally find it easier to hand write most written work I do.
___Level 3 - I use a word processing program for nearly all my written professional work: memos, tests, worksheets, and home communication. I edit, spell-check, and change the format of a document.
___Level 4 - I teach students to use word processing programs for their written communication.

4. Spreadsheet
___Level 1 - I do not use a spreadsheet.
___Level 2 - I understand the use of a spreadsheet and can navigate within one. I create simple spreadsheets and charts.
___Level 3 - I use spreadsheets for a variety of record-keeping tasks. I use labels, formulas, cell references and formatting tools in my spreadsheets. I choose charts that best represent my data.
___Level 4 - I teach students to use spreadsheets to improve their own data keeping and analysis skills.

5. Database
___Level 1 - I do not use a database.
___Level 2 - I understand the use of a database and locate information from a pre-made database such as Library Search.
___Level 3 - I create my own databases. I define the fields and choose a layout to organize information I have gathered. I use my database to answer questions about my information.
___Level 4 - I teach students to create and use databases to organize and analyze data.

6. Graphics

___Level 1 - I do not use graphics with my word processing or presentations.
___Level 2 - I open, create, and place simple pictures into documents using drawing programs or clipart.
___Level 3 - I edit and create graphics, placing them in documents in order to help clarify or amplify my message.
___Level 4 - I promote student interpretation and display of visual data using a variety of tools and programs.

7. E-mail

___Level 1 - I have an e-mail account but rarely use it.
___Level 2 - I send messages using e-mail – mostly to district colleagues, friends, and family. I check my e-mail account on a regular basis and maintain my mail folders in an organized manner.
___Level 3 - I incorporate e-mail use into classroom activities. I use e-mail to access information from outside sources.
___Level 4 - I use e-mail to request and send information for research.

8. Research/Information-Searching

___Level 1 - I am unlikely to seek information when it is in electronic formats.
___Level 2 - I conduct simple searches with the electronic encyclopedia and library software for major topics.
___Level 3 - I have learned how to use a variety of search strategies on several information programs, including the use of Boolean (and, or, not) searches to help target the search.
___Level 4 - I have incorporated logical search strategies into my work with students, showing them the power of such searches with various electronic sources to locate information which relates to their questions.

9. Desktop Publishing

___Level 1 - I do not use a publishing program.
___Level 2 - I use templates or wizards to create a published document.
___Level 3 - I create original publications from a blank page combining design elements such as columns, clip art, tables, word art, and captions.
___Level 4 - I design original publications that communicate to others what I've learned.

10. Video Production

___Level 1 - I do not use a video camera.
___Level 2 - I create original videos for home or school projects.
___Level 3 - I create original videos using editing equipment.
___Level 4 - I use computer programs to edit video presentations and I teach my students to create and edit videos.

11. Technology Presentation

___Level 1 - I do not use computer presentation programs.
___Level 2 - I present my information to classes or groups in a single application program such as a word processor, a spreadsheet, or a publishing program.
___Level 3 - I present my information and teach my class using presentation programs such as Powerpoint or SuperLink, incorporating various multimedia elements such as sound, video clips, and graphics.
___Level 4 -I teach my students how to use presentation software. I facilitate my students' use of a variety of applications to persuasively present their research concerning a problem or area of focus in their learning.

12. Internet

___Level 1 - I do not use the Internet.

___Level 2 - I access school and district websites to find information. I follow links from these sites to various Internet resources.

___Level 3 - I use lists of Internet resources and make profitable use of Web search engines to explore educational resources.

___Level 4 - I contribute to my school or district websites. I teach students how to effectively use the resources available on the Internet.

13. Responsible Use/Ethics

___Level 1 - I am not aware of any ethical issues surrounding computer use.

___Level 2 - I know that some copyright restrictions apply to computer software.

___Level 3 - I understand district rules concerning student and adult use of e-mail and internet. I know the programs for which the district or my building holds a site license. I understand the school board policy on the use of copyrighted materials.

___Level 4 - I model ethical use of all software and let my students know my personal stand on this issue.

14. Technology Integration

___Level 1 - I do not blend the use of computer-based technologies into my classroom learning activities.

___Level 2 - I understand the district technology plan supports integration of technology into classroom activities, but I am still learning about what strategies will work and how to do it. I accept student work produced electronically, but do not require it.

___Level 3 - From time to time, I encourage my students to employ computer-based technologies to support the communicating, data analysis and problem solving outlined in the district technology plan.

___Level 4 - I frequently model and teach my students to employ computer-based technologies for communication, data analysis, and problem-solving as outlined in the district technology plan.

*This scale was borrowed and modified with permission from the original Mankato (MN) Schools scale.

Student teachersâ€™ intentions and actions on integrating technology into their classrooms during student teaching: A Singapore study. Journal of Research on Technology in Education, 42(2), 175â€“195.Google Scholar. Chuang, H. (2010).Â A systems-based approach to technology integration using mentoring and communities of practice. Technology, 58(2), 175â€“190. doi: 10.1007/s11423-008-9095-4.Google Scholar. Kose, E. (2009).Â New technology and digital worlds: Analyzing evidence of equity in access, use, and outcomes. Review of Research in Education, 34(1), 179â€“225. doi: 10.3102/0091732X09349791.CrossRefGoogle Scholar. West, R. E., Rich, P. J., Shepherd, C. E., Recesso, A., & Hannafin, M. J. (2009). technology integration is needed that is robust to the many barriers that teachers face as. they learn to use technology and align their beliefs with new instructional practices.Â pedagogy, and beliefs needed to integrate technology in a student-centered manner. Mentoring in the context of technology integration. Mentoring has been found to overcome many of the common barriers to technology. integration (Bullock 2004; Franklin et al. The article gives a cosmetic analysis of the use of case technologies in teaching the discipline of the humanities. The analysis is built on considering solutions of case study tasks in groups at seminars. The article considers the use of information and communication technology in solving case study tasks.Â To meet the basic objectives of the described course, students have used the process of solving cases for the performance of various kinds of activity in the job. In addition, they had to use innovative technology, for the adoption of a decision of a problem. Programs such as Power Point, Prezi, and Excel must be used when one solves cases during the course. Student performance in case discussions is usually assessed. The extent of participation is never the sole criterion in the assessment â€“ the quality of the participation is an equally (or more) important criterion. There are many opportunities to assess studentsâ€™ performances when they are using case-based learning approaches. Here are some assessable activities students might engage in as they work on their investigationsÂ However, when submitting an analysis, the student must ensure that it is neat and free from any factual, language and grammar errors. In fact, this is a requirement for any report that a student may submit â€“ not just a case analysis [1, 7, 12, 13]. Performing case study gives students the following benefits, it: 1) allows students to learn by doing.