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Using a Student-Centered Model for Assessing Preservice Teachers' Use of Technology in Student Teaching

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A student-centered assessment model used at a large university appeared to encourage preservice teachers' use of technology in the K-12 classroom. The model allows preservice teachers to have discretion over the content, form of assessment, and time period in which they complete technology proficiencies. Considerations for model implementation, including forms of assessment (third-party attestations, field-based assignments, and portfolios), are discussed.

Teacher education programs (TEPs) have struggled for many years to implement practices that foster the development of technological proficiency and support effective integration of technology into instruction (Maeers, Brown, & Cooper, 2000; Stetson & Bagwell, 1999). Many programs have as a minimum requirement, an introductory technology course. Research (Hargrave & Hsu, 2000) suggests, however, that a stand-alone technology course is insufficient to support the transfer of technology use into the field.

Many TEPs have expanded the integration of educational technology into their program by requiring preservice teachers (also referred to as student teachers) to not only meet technology proficiencies in educational computing classes, but also to demonstrate proficiencies through work in various education courses (Lloyd, Merkley, & Dannenbring, 2001; Pope, Hare, & Howard, 2002). While this approach may encourage additional use of technology in university coursework, there still may be little or no transfer of technology use into student teachers' field experiences.

Facilitating the application of technological skills learned through university coursework to teaching practices is an integral component of effective teacher education (Niederhauser, Salem, & Fields, 1999). Nevertheless, a number of challenges are presented when a TEP is designed to integrate preservice teachers' technology skills into their field practice (Strudler, McKinney, & Jones, 1999).

To support the assessment of student teachers' integration of technology into fieldwork, clear guidelines need to be established regarding mandatory technological proficiencies, methods by which student teachers demonstrate mastery, required technological resources, and a model for authentic assessment. This article describes technology proficiencies that were required of preservice teachers in a TEP, and the multi-method approach of support for, and assessment of, integration of technology skills into field experience.

TEACHER EDUCATION PROGRAM AND TECHNOLOGY REQUIREMENTS

This TEP is a fifth year, full-time, one-year post baccalaureate program with an option to earn a Master's Degree. The program had 57 single subject (mathematics, science, language arts, and social sciences) and 53 multiple subject preservice teachers seeking licensure as K-12 teachers. The student teachers in this program ranged in age from 21 to 40 years old, as some student teachers recently graduated from a four-year institution, while others re-entered the university after years in other occupations, or in the home. The program typically enrolls less than 10% minority student teachers and 10% males.

Preservice teachers in the TEP engage in field placements throughout the year concurrently with university coursework. In the fall, student teachers have a 16-week half-day field placement, in which they teach in the morning and attend courses in the evening. In the spring, student teachers continued taking courses in the evening while concurrently engaging in their full-time field placement. The spring placement was typically in a different grade level and school from their field experience in the fall.

As a part of TEP and licensure requirements, preservice teachers must meet the technology standards specified by the California Commission on Teacher Credentialing. To assist in meeting the technology component of these standards, California created the California Technology Assistance Program (CTAP) that certifies preservice and inservice teachers at three different levels of technological proficiency. CTAP requirements for the first two levels of certification (described later) served as a means for the TEP to assess whether student teachers met technology proficiencies.

The first level of CTAP certification consists of basic skills (how to use common software programs such as Word®, e-mail, Internet browsers, and PowerPoint®). These skills are taught in a technology course offered near the beginning of the TEP concurrently with student teachers’ part-time field placements. The technology instructor took advantage of preservice teachers’ concurrent field experience by requiring field-based assignments that afforded student teachers the opportunity to make connections between basic skills learned in the technology course and the significance of these skills to their fieldwork.

CTAP LEVEL TWO, FIELD-BASED TECHNOLOGY PROFICIENCIES

The second level of CTAP certification pertains to technology use within a K-12 setting, and lends itself more readily to integration of technology into the field. The CTAP level two, field-based technology proficiencies address three broad areas: (a) communication and collaboration with electronic media (e.g., e-mail, discussion boards, chat rooms); (b) planning, designing, and implementing learning experiences (i.e., planning a lesson for K-12 students, teaching that lesson, and then reflecting on their performance); and (c) assessment and evaluation (e.g., creating or using existing online quizzes or WebQuests, sharing grades electronically through a grade book or spreadsheet).

Communication and Collaboration

The communication and collaboration component of the second level of CTAP certification stresses using electronic media for presentations (e.g., HyperStudio®, PowerPoint®), and using web-based tools for collaboration (e.g., threaded discussions, chat rooms). It also encourages collaboration among preservice teachers to create and teach curricular units using appropriate technology. In addition, preservice teachers are encouraged to observe and take part in school site technology committee planning activities in order to understand how technology needs in schools are evaluated, and the process by which school sites attempt to satisfy these needs.

Planning, Designing, and Implementing Lessons

The second category of CTAP level two, field-based technology proficiencies highlights planning, designing, and implementing learning experiences. These technology proficiencies emphasize crafting lessons that promote effective use of technology to develop information literacy and problem-solving skills. Level two proficiencies also include creating technology lessons addressing multiple learning styles, building supportive learning environments in the classroom and technology lab, and constructing activities that effectively use available technological resources.

Assessment and Evaluation

The assessment and evaluation component of level two CTAP proficiencies focuses on the use of electronic evaluation processes and employment of computer applications to manipulate, analyze, and communicate assessment data. In addition to collecting data from their students' assessments, preservice teachers were also encouraged to analyze best technology-based practices and reflect on their own performance.

METHODS OF ASSESSMENT

While many of the technology skills associated with the level one CTAP proficiencies were acquired through assignments completed as part of the fall technology course, a follow-up assessment was needed to ensure that preservice teachers were incorporating these new skills into their student teaching. To facilitate this follow-up assessment, the instructor of the technology course presented the level two CTAP technology proficiencies to the student teachers as the fall term was ending, and provided examples of the variety of ways that preservice teachers could meet the CTAP requirements while student teaching. During this presentation, preservice teachers were informed of three potential methods for providing evidence that they had completed the CTAP proficiencies. These methods included field-based assignments, third party attestation, and credential portfolio.

Field-Based Assignments

Preservice teachers were provided with the opportunity to show evidence of their technological proficiency by completing field-based assignments requiring technology use with students in a K-12 school setting. After a preservice teacher taught a lesson, an artifact (e.g., lesson plan, handouts, screenshots from a grade book) was returned to the technology instructor that illustrated successful completion of a proficiency. An example of a field-based assignment was the use of Excel® to calculate students' grades and then communicate progress to parents. For this assignment preservice teachers could post grades publicly (observing appropriate practices of protecting student anonymity), write letters to parents, or send reports through e-mail. These documents served as artifacts for this assignment. Another example of a field-based assignment included teaching a lesson (the artifact was the lesson plan) with technology that developed information literacy or addressed various learning styles.

One field-based assignment the TEP designed to meet numerous technology proficiencies involved planning an integrated curricular unit that used technology. Through assignments in one methodology course, teams of three to four student teachers from the same school site worked as a lesson design team. Their task was to develop a three to five-day integrated curricular unit that demonstrated integration of skills related to multiple technology proficiencies. It was the technology instructor’s intention that this would encourage integration of technology across the curriculum.

Third Party Attestation

A third party attestation is commonly used in the business world to verify the validity of a claim. For the TEP, a third party was able to observe and attest that a student teacher had met one or more of the CTAP technology proficiencies. Approved third party attesters included cooperating teachers who are CTAP level two certified, or university student teaching supervisors who were trained to judge the appropriateness of student teachers’ work from a technological, pedagogical, and subject matter content perspective.

The third party attestation form, which was jointly completed by the preservice teacher and the attester, included information regarding the technology proficiency met, a description of the activity, and the attester’s signature (see Appendix A).

Using third party attestation as a means to meet technology proficiencies was preferred by many student teachers over the more structured field-based assignments. For example, there was a field-based assignment to demonstrate their ability to manage student records using Excel®, however, many student teachers elected to use third party attestation. By choosing third party attestation for this proficiency, student teachers were given the opportunity to enter grades for the students with whom they worked in the field, using the grade book software currently being used by their cooperating teacher (e.g., Easy Grade Pro®, Grade Book Plus®).

Portfolio

The TEP at the university uses a credential portfolio assessment to measure if student teachers meet the California Standards for the Teaching Profession. Preservice teachers include artifacts and reflections in these portfolios representing their teaching experiences. These artifacts include items such as lesson plans, videos of teaching episodes, and letters home to parents. It became apparent that while writing their descriptions of lessons and activities associated with field experiences, preservice teachers frequently mentioned ways in which technology was integrated into their teaching practices. Some of these descriptions pertained directly to specific CTAP technology proficiencies.

Since the student teachers were referring to their development of technology proficiencies in the credential portfolio, a convenient system was created for preservice teachers to demonstrate the technology proficiencies through their portfolio. An index page was inserted into the back of the credential portfolio, which included a list of technology proficiencies addressed and identified the location of proficiencies in the portfolio (i.e., artifact and page number).

The TEP encountered issues with some student teachers spending too much time on the form of the portfolio rather than on the content, and therefore, the student teachers became frustrated with the portfolio process. These preservice teachers were encouraged to focus on the content of the portfolio. This redirection encouraged student teachers to complete the portfolio, and use it to exhibit integration of technology proficiencies into their teaching practice.

ASSESSMENT OF CTAP LEVEL TWO, FIELD-BASED PROFICIENCIES

Due to the variation in technology proficiencies, the university instructor of the technology course determined which form of assessment (field-based assignments, third party attestation, credential portfolio), or combination of forms, could serve as evidence to support the completion of a particular proficiency. To facilitate the effectiveness of this process student teachers were given a list of the proficiencies and the form (or forms) of assessments that could be used to demonstrate each proficiency (Table 1).

Table 1

Sample of CTAP Technology Proficiencies and Choices Given for Assessment

Proficiency	Assign-ment	3rd Party	Port-folio
2.1 Communicate through a variety of electronic media	X	X	X
2.2 Interact and collaborate with others using computer-based collaborative tools	X	X	X
2.3 Collaborate with teachers, mentors, librarians, resource specialists, and other experts to support technology-enhanced curriculum	X	X	X
2.4 Contribute to site-based planning or local decision making regarding the use of technology and acquisition of technological resources	X	X	X
2.5 Examine a variety of current educational digital media and use established selection criteria to evaluate materials	X		
2.6 Design, adapt, and use lessons which address the students' needs to develop information literacy (plan, locate, evaluate, select, and use information), solve problems and draw conclusions for lifelong learning	X	X	X
2.7 Identify student learning styles and determine appropriate technological resources to improve learning	X	X	X
2.8 Consider the content to be taught and select the best technological resources to support, manage, and enhance learning	X	X	X
2.9 Demonstrate an ability to create and maintain effective learning environments using computer-based technology, including creating or making use of learning environments inside the classroom, as well as in library media centers or computer labs, that promote effective use of technology aligned with the curriculum		X	X
2.10 Optimizing lessons based upon the technological resources available in the classroom, school library media centers, computer labs, district and county facilities, and other locations	X	X	X
2.11 Use a computer application to manipulate and analyze data	X	X	X
2.12 Use technology as a tool for assessing student learning	X	X	X
2.13 Use technology as a tool for providing feedback to students and their parents	X	X	X
2.14 Analyze best practices and research findings on the use of technology and designs lessons accordingly while frequently monitoring and reflecting upon the results of using technology in instruction and adapting lessons accordingly		X	X

Allowing for three forms of assessments, as shown in Table 1, provided student teachers with options regarding the form and content necessary to demonstrate their proficiencies. This choice appeared to motivate student teachers to develop the practice of implementing applicable technology into their curricular and instructional practices. The preservice teachers appeared to exhibit ownership of their education when they were given freedom to choose the subject area, and appropriate technology. For example, when completing the proficiency related to desktop publishing, preservice teachers used different applications to meet various educational objectives. Several preservice teachers used a word processor to design newsletters in an effort to foster communication with parents. Other preservice teachers used PageMaker® to create Venn diagrams and student handouts. Sometimes preservice teachers were limited in the methods with which they could demonstrate proficiency due to varying degrees of access to technological resources at their field placement sites. Overall, however, the freedom afforded by offering choice appeared to make the process of assessing technology proficiencies more student-centered and authentic.

RESULTS OF USING A STUDENT-CENTERED APPROACH TO ASSESSING TECHNOLOGY

Several positive outcomes resulted from allowing student teachers choice in representing evidence of technological proficiency. Preservice teachers began using a variety of methods to demonstrate their technology proficiencies and meaningfully integrate these skills into their field placements, teacher education faculty increasingly included examples of technology use in K-12 classrooms in their university coursework, and cooperating teachers and student teaching supervisors took the initiative to increase their technological knowledge through attending workshops and receiving individualized assistance.

Teacher Education Faculty

Teacher education faculty supported this student-centered assessment approach by providing examples of technology that could be used in K-12 schools. During the final year of the project, 12 of 16 faculty surveyed mentioned modeling K-12 technology use in the teacher education courses they taught. These examples provided preservice teachers with the models needed so that they would be capable of implementing technology successfully into their instruction. By the conclusion of the PT3 grant, all teacher education faculty (*n*=21), allowed student teachers the opportunity to practice technology skills within their university courses. This practice enabled preservice teachers to explore additional methods of incorporating technology into various content areas.

The PT3 grant offered teacher education faculty individual technological assistance by providing for the aid of technology associates. Technology associates assisted faculty individually with technology-based training or projects. Sixty percent (60%) of the faculty used the help of a technology associate, including 6 of 21 faculty that received PowerPoint® training. The assistance from technology associates supported teacher education faculty in creating projects such as edited digital videos, PowerPoint® presentations, web sites, and web-based assignments.

An instructor of Human Development created a web-based assignment in which preservice teachers watched and analyzed video clips of pupils solving math problems at three different age levels. This assignment required student teachers to provide feedback by way of a web site module in which they analyzed each of the video cases, applying the constructs of a particular developmental theory. It appears that access to a technology associate supported teacher education faculty, such as the Human Development instructor, in creating and modeling the use of technologically enhanced curricula.

Cooperating Teachers

Through modeling best practices and providing one-on-one-assistance to student teachers, cooperating teachers were directly involved in the process of supporting student teachers in meeting technology proficiencies. Cooperating teachers were also able to improve technological skills through attending numerous two-hour, after school workshops offered by the university. During the final year of the grant 272 teachers attended workshops, with each cooperating teacher participating in approximately 7.8 workshops.

Cooperating teachers (*n*=196) also received individual assistance with technology from technology associates. The primary role of the technology associate in the field was to help cooperating teachers identify appropriate technological resources and integrate them into their teaching. Through increasing their own technological proficiency, cooperating teachers were better able to model effective technology integration into their curriculum. They were also more qualified to assist the university in assessing student teachers' technology proficiencies (e.g., assessing student teachers using third party attestation forms).

In addition to receiving assistance from the university workshops and a technology associate, cooperating teachers were also able to use the expertise of technology-teaching colleagues (teachers at the school site who were already successful in using technology in their classrooms). These technology-teaching colleagues conducted various workshops in which a total of 328 teachers participated. Data was collected though sign-up sheets and monthly logs kept by the technology associates, specifying the types of assistance provided in the field.

Despite the fact that teachers seem to receive a great deal of value from working with technology-teaching colleagues, they did not take advantage of the opportunity to be released from their normal teaching responsibilities in order to observe exemplary technology-using teachers.

Preservice Teachers

The assessment measures (e.g., field-based assignments, third party attestation, portfolio) served as evidence that knowledge gained by preservice teachers from the technology course was transferred into their teaching practices. Student teachers were also able to think critically about how to best integrate technology into the curriculum. In addition, they were able to experience first hand the value K-12 students receive when learning with and through technology, which may encourage future technology use.

Field placement sites are equipped with varying availability and quality of technological resources. Planning and teaching lessons in the field, provides student teachers with the opportunity to evaluate which available resources are the most practical and effective in meeting lesson objectives. This process appears to support student teachers in thinking critically about the use of technology in the field.

By teaching with technology in their field experiences student teachers were also able to see the value of integrating technology into the curriculum. For example, one preservice teacher had her students use the Internet to research the meaning of their names in a multicultural lesson. She reported that, “although our class is only able to go to the computer lab once a week, they are able to make connections and explore the world of information at their fingertips.” Another preservice teacher used a CD-ROM to provide students with clues as they attempted to identify a certain species of tree and its distinguishing characteristics. The information made available by the CD-ROM led students to the identification of the native oak. She reported, “the students gained a greater understanding of where and why the oaks are rapidly diminishing throughout California and many of the students used the information from the CD-ROM software to support their arguments.” Another example came from a preservice teacher who found that the use of a WebQuest in a social studies lesson provided her students with, “immediate access to information, which could not have been done without computers.”

Finally, preservice teachers assisted K-12 students with whom they worked in meeting technology standards. The International Society for Technology in Education (ISTE) has developed technology standards for K-12 students referred to as National Educational Technology Standards (NETS). The methods by which student teachers gained technological expertise through the CTAP proficiencies supported them in helping their students meet the NETS standards. For example, using KidPix® in one of her lessons, a preservice teacher acknowledged the connection to the NETS by mentioning that “this program requires students to generate an image using the mouse and keyboard, as well as become familiar with the actions of saving, editing and copying.”

This multi-pronged support and assessment system appeared to provide many benefits to preservice teachers, cooperating teachers, university instructors, and K-12 students. To implement such a system into a TEP, many factors need to be taken into consideration.

CONSIDERATIONS FOR TEPS

Each TEP has varying priorities, resources, and access to funding that influence the creation of a plan to integrate technology across all areas of its program. In addition, there are at least five points; (a) communication, (b) modeling exceptional technology use, (c) instructor support, (d) peer assistance, and (e) logistics, which need to be considered while striving to integrate technology use into field work.

Communication

Communicating the assessment process to preservice teachers, teacher education faculty, and cooperating teachers, was essential to evaluating student teachers' use of technology in their field experience. Developing positive rapport and engaging in continuous communication with university faculty fostered cooperating teachers' technological growth, clarified university expectations related to their work with student teachers (e.g., third party attestation sheets, portfolio requirements, assignments, etc.) and, above all, contributed to their willingness to participate in the assessment process. Communication between the technology instructor and preservice teachers also facilitated the evaluation of student teachers' technology integration into the field.

Modeling Exceptional Technology Use

The modeling of exceptional use of technology by cooperating teachers and teacher education faculty is an important medium to support preservice teachers' development of technological proficiency (White, 1994). Through PT3 grant funding, the university fostered the technological development of cooperating teachers by providing a variety of workshops that covered topics ranging from basic computer skills to learning how to design Web Quests. The funds received by the PT3 grant also supported hiring technology associates to help cooperating teachers, teacher education faculty, and the TEP's student teaching supervisors, in increasing their technological knowledge and to assist them with technology projects.

Support from the Educational Technology Instructor

Not all cooperating teachers were able to assist with the myriad of issues that arose while the student teachers completed their field placement proficiencies. Likewise, many teacher education faculty members felt unprepared to integrate technology requirements into their own courses (Stetson & Bagwell, 1999). The instructor of the educational technology course, therefore, routinely visited methodology classes where technology proficiencies were being assigned for integration into field placements, and aided in clarifying requirements. The technology instructor was also an instructor in one of the methodology courses that emphasized having preservice teachers design an integrated curricular unit. As a result of the technology instructor's direct participation with the integrated unit course, and involvement in various methodology courses, the teaching assistant and instructor of stand-alone technology course had continual contact with the preservice teachers. The technology instructor (and in certain cases the teaching assistant) and technology associates, assisted student teachers and teacher education faculty in developing technology skills (e.g., creating electronic portfolios, multimedia presentations, web pages, etc.), through workshops, office hours, appointments, and e-mail communications.

Peer Assistance

Since all preservice teachers were required to complete the technology proficiencies, peers served as empathetic and knowledgeable sources of support. One way collaborative support can be mediated is through a web-based message board (Thurston, Secaras, & Levin, 1997). The university established a threaded discussion board so that student teachers could receive feedback from each other, and share ideas about meeting proficiencies. To facilitate student teachers' success, the technology instructor and teaching assistant also took part in this threaded discussion.

Logistics

It is imperative to consider the logistics associated with ensuring that technology requirements are relevant to field practice, and that the methods by which technology proficiencies in the field are assessed are feasible. The technology instructor provided a worksheet with guidelines that clearly outlined how proficiencies could be demonstrated, what documentation is required, and criteria by which the end product is assessed. A web page displaying student progress regarding technology proficiencies was available through the TEP's web site to assist with record keeping and communicating progress to students.

CONCLUSION

Assessing preservice teachers' integration of technology into their field placements is a complex undertaking that can present many obstacles. To determine effective strategies for implementing technology integration into a TEP, the program must evaluate their goals, available funding, and the needs of faculty, preservice teachers, K-12 students, and cooperating teachers, particularly in relation to fieldwork.

Follow-up studies regarding this multi-pronged assessment and support model may be helpful to determine whether preservice teachers are better prepared to use technology in their teaching as compared to other programs, if technology is used with more frequency, to what degree technology use supports higher-level thinking, and whether preservice teachers become inservice teachers who are more apt to teach or assess with a student-centered approach. While this particular approach appeared to be successful, there were certain characteristics unique to the TEP described in this article that may necessitate further consideration before attempting to institute a similar approach.

Discretion over the content, form, and time period in which preservice teachers were able to complete proficiencies was essential to the effectiveness of this student-centered approach to field-based assessment. To this end, clear requirements in the form of technology proficiencies (based on California Commission on Teacher Credentialing proficiencies and CTAP requirements) were established to facilitate the development and utilization of technology skills in the field.

The success of this TEP's model can also be attributed to the multi-level support structure that included cooperating teachers, college instructors and teaching assistants, university-based supervisors, and peer support. The modeling of effective technology use by cooperating teachers and university instructors, and the support offered by the parties previously mentioned, provided student teachers with the support they needed to succeed in incorporating technology into their fieldwork.

In the past, having preservice teachers' learn technology through a stand-alone computer course, or by integrating technology into method courses was partially effective in contributing to student teachers' ability to use technology successfully with students. Infusing technology into preservice teachers' field practices, however, by providing choice regarding the content and form of assessment, appears to be a more effective method to support the meaningful integration of technology into student teachers' teaching practice.

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APPENDIX A
SAMPLE OF 3RD PARTY ATTESTATION FORM FOR PROFICIENCY 2.13

TEACHER EDUCATION PROGRAM — UNIVERSITY OF CALIFORNIA, SANTA BARBARA

Field-Based Technology Proficiency Verification

TO BE COMPLETED BY CANDIDATE:

Candidate's Name [redacted]

School site [redacted]

Proficiency Number 2.13
(see back of page)

Brief description of activity in which proficiency will be demonstrated:

After finishing my two-week takeover, I took my excel spreadsheet with grades and made a graph of how my students did overall. This graph was then used to give students final grades. This graph was also introduced to the class to inform them how they did as a class in all given assignments and homework.

TO BE COMPLETED BY ATTESTOR:

I attest to the candidate's demonstration of the named technology proficiency as described above.

[redacted] Print Name — [redacted] Signature — 6-7-2001 Date