The affectiveness of a standards-based, technology-connected staff development program

Lee Geary Grafton
THE AFFECTIVENESS OF A STANDARDS-BASED,
TECHNOLOGY-CONNECTED STAFF DEVELOPMENT PROGRAM

A Thesis
Presented to the
Faculty of
California State University,
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In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Educational Administration

by
Lee Geary Grafton, Ph.D.

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ABSTRACT

One role of an administrator is to provide and assess staff development programs. The purpose of this study was to measure the impact of a 120-hour standards-based, technology-connected staff development program on participating teachers' instruction.

Seventy-one K to 12th grade teachers from a moderate sized school district in southern California participated in the study. The teachers completed a survey aligned with the Technology Proficiencies for California Teachers developed by the California Technology Assistance Project (CTAP).

The results of the study indicated that there was a significant difference in the extent that teachers used technology applications instructionally after program participation. The study substantiated previous research that indicates that instructional technology staff development programs need to be standards-based, focused on curriculum and instruction, with a substantial follow-up component.
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CHAPTER ONE

INTRODUCTION AND PROBLEM STATEMENT

Introduction

In 1996, the U.S. Department of Education released its first national technology plan, "Getting America's Students Ready for the 21st Century: Meeting the Technology Literacy Challenge." A tremendous amount of money from federal, state, local agencies, business and schools has been invested in educational technology programs since the national plan was released with the goal being to improve student learning (U.S. Department of Education, 2001).

With today's focus on assessment and accountability in regards to student achievement, the question, "Are we getting our money's worth?" is being asked and must be addressed in regards to all instructional programs, including instructional technology (Branzburg, 2001).

The key to effective implementation of instructional technology programs is professional development (Wenglinsky, 1998, Greene, 2000). Administrators have a critical role to play to ensure that professional development is provided and effective.
These administrative leadership tasks have been defined by the Technology Standards for School Administrators Collaborative (TSSA, 2001). This team of national school leaders was assembled by the International Society for Technology in Education (ISTE) to define what administrators should know and be able to do to ensure technology applications are effectively implemented to achieve district and site learning goals.

Among those roles, TSSA defined specific leadership tasks for facilitating "learning and teaching" and "assessment and evaluation" of professional development:

- facilitate the use of technologies to support and enhance instructional methods that develop higher-level thinking, decision-making, and problem-solving skills;
- provide for and ensure that faculty and staff take advantage of quality professional learning opportunities for improved learning and teaching with technology;
- assess staff knowledge, skills, and performance in using technology and use results to facilitate
quality professional development and to inform personnel decisions (p.1)

Purpose

The purpose of this study was to assess the effectiveness of a standards-based, technology-connected staff development program in a school district in southern California. The study was designed to provide specific data about the success of that program. Implications from the study can guide the development of future programs.

Problem Statement and Background

The study was designed to determine if teachers that participated in a professional development program perceived they were proficient users of preliminary (basic) and professional (instructional) technology skills. A peer-modeling approach was used to teach the participants how to design and deliver standards-based, technology-connected lessons and units. The program consisted of two components. The first component was to provide teachers with 40 hours of "hands-on" instruction while completing a standards-based unit aligned to district curriculum. Participants assumed the role of their students when they learned or
applied new technology skills to accomplish learning goals. Generally the technology skills were taught on an "as-needed" basis because the focus of the instruction was on the application of technology for achieving standard-based learning, plus the impact of technology in the classroom on pedagogy and instructional management techniques.

The second component of the program was to require the participants to construct and deliver at least three standards-based, technology-connected lessons or one unit during the next school year. The participating teachers were provided with follow-up support from the two district instructors. The follow-up support consisted of site and class visitations, two district meetings with all participants, technology skill-based workshops and an end-of-the year celebration to showcase technology-connected student projects. The teachers also had to provide the instructors with a log of 120 hours of participation in the program, which included the 40-hour summer workshop at the end of the school year.

If the program was effective, it was assumed that the teachers would improve their instructional technology proficiencies as compared to prior practice. It was
further assumed that as teachers improved these skills, there would be a positive impact on student learning.

Hypothesis

H1: Participant teachers in an intensive 120-hour instructional technology professional development program will perceive that they have used Preliminary and Professional Technology Proficiency Skills to a greater extent after program involvement as compared to the year prior to program involvement.

Definitions

Preliminary and Professional Technology Proficiency Skills were defined by the California Technology Assistance Project (CTAP, 2000). The proficiency profiles have three basic constructs: 1) communication and collaboration; 2) planning, designing and implementing learning experiences; and 3) evaluation and assessment. The Preliminary Profile addresses what teachers need to know in order to use different types of computer and peripheral applications, and gain awareness of how to apply the tools. The Professional Profile assumes teachers know how to use different types computer and peripheral applications, but
need greater understanding of how to use the tools for classroom management, communications, lesson design and student performance.

Limitations of the Study

Ninety-five percent of the classrooms across the district being studied were connected to the Internet during the period of the study. However, not all of the teachers in the study had that access. Teachers in this situation responded to follow-up questions to determine if the lack of Internet access affected their responses. Generally, the response of those teachers was that they would have delivered more technology-connected lessons if they had access.

Another limitation of the study is that the teachers under investigation volunteered for the staff development program. While they also received a stipend and continuing educational units for compensation, it may also be true that these teachers are, by nature, more motivated, innovative and effective than the norm. This limitation was accepted as a possible factor that affected findings and deserves further investigation.
CHAPTER TWO

LITERATURE REVIEW

Introduction

One of the primary factors that affect the successful integration of technology to affect student learning is staff development (Wenglinsky, 1999; Greene, 2000). However, engaging in a staff development opportunity alone does not ensure that the implementation of that experience will be successful. According to the report from former U.S. Secretary of Education Riley (2000), research indicates that staff development programs are most likely to be successful if they are 1) sustained and 2) focused on affecting specific higher order skills of students.

Standards for Students

The National Educational Technology Standards for Students (NETS) Project (2001), is an ongoing initiative of the International Society for Technology in Education (ISTE) and a consortium of organizations representing major professional education groups, government entities, foundations and corporations. The primary goal of the NETS project is to establish national standards for educational
uses for technology that facilitate school improvement. This comprehensive project has established technology standards for students, plus guidelines for integrating technology into the curriculum and assessing technology use.

The NETS technology standards for students were developed to be used as guidelines for planning technology-based activities in which students could achieve success in "learning, communication and life skills" (NETS, 2001, p. 2). Specifically, the NETS Project advocates learning environments that prepare students to:

- communicate using a variety of media formats;
- access and exchange information in a variety of ways;
- compile, organize, analyze, and synthesize information gathered;
- know content and be able to locate additional information as needed;
- become self-directed learners;
- collaborate and cooperate in team efforts;
- interact in ethical and appropriate ways.
Technology-based instructional strategies fall into two sets of goals (Baker, 1999). The first set of goals focuses on teaching students basic technology skills needed to meet requirements, such as how to use e-mail and search engines for research, as well as databases, spreadsheets and word-processing programs.

The second set of goals focuses on providing students with opportunities to use higher order thinking skills, such as problem-solving, analysis, critical thinking, synthesis and evaluation. Attainment of the goals from the first set is a prerequisite for students to be able to engage in higher order learning experiences. However, for students to be able to attain the second set of goals, teachers must have mastered the proficiencies outlined by the California Technology Assistance Project (CTAP).

Standards for Teachers

In October 2000, CTAP under the direction of the California Department of Education released the technology proficiencies that teachers need to provide students with learning opportunities that meet instructional goals. The Teacher Technology Proficiency Profiles include,
1) communication and collaboration; 2) planning, designing and implementing learning experiences; and 3) evaluation and assessment. With these proficiencies mastered, teachers can provide students with learning opportunities to reach the goals defined by the NETS project.

Instructional technology professional development programs need to provide teachers with the skills and understanding to use modern technologies to meet student's academic needs. Today's students need learning experiences that not only transfer basic knowledge, but also enables them to apply, synthesize and communicate that knowledge. Today's students need information literacy skills that will enable them to ask good questions and retrieve information to make informed decisions and solve problems.

Problem Statement

Teachers, therefore, need to be proficient users of modern technologies to provide students with opportunities to learn in new ways and enable students to critically select appropriate media to communicate their "understanding" as defined by McTighe and Wiggins (1999).
McCotnbs (2000) states that our instructional focus today needs to provide students with a higher level of instruction that focuses on "teaching students to communicate with others, find relevant and accurate information for the task at hand and be co-learners with teachers in diverse settings beyond school walls" (p.2). Students need to learn to research, communicate and collaborate, and experience learning opportunities that enable them to demonstrate their understanding using appropriate multimedia tools.

Penuel and Means (1999) have defined seven project-based learning components that are necessary to engage students' in higher-level cognitive activities:

- anchored in core curriculum, multidisciplinary;
- involve students in sustained efforts over time;
- involve students in decision making;
- have a clear, real-world connection;
- use systematic assessment;
- take advantage of multimedia as a tool (p. 1).

Penuel and Means make the point that the power of multimedia applications can only be assessed to the extent that its use is aligned with the goals and curriculum of
the class. However, multimedia applications by their nature, provide enriched opportunities for student’s to attain and communicate student understanding of higher order processes.

To enable teachers to design and deliver instruction to meet students’ academic needs, teachers need to be proficient at melding traditional approaches and new approaches to facilitate learning of relevant content. Teachers need to understand how new technologies enable them to effectively teach curricular content and assess student learning. Teachers need to master the communication and multimedia technologies that student’s need to demonstrate understanding of course content.

Instructional staff development programs, then, need to be designed to provide teachers with meaningful connections to how they enable students to master core curriculum standards. That was the intent of the staff development program being assessed by this study. If the staff development program enables teachers to improve their instruction in meaningful ways to meet the students’ learning needs, the teachers will be open to the learning. For teachers to master new instructional technology methods
and incorporate them effectively into the learning environment, teachers will need to be provided with follow-up support that will be available when needed. Finally, for teachers to adopt the new practices into their instructional practice, the teacher will need to see positive results.

Those principles served as the backbone for the design of the staff development program being investigated in this study. Based on the review of the research, participant teachers are expected to perceive they have improved their technology teaching proficiencies after involvement in this extensive curriculum-based professional development experience.
CHAPTER THREE

METHODOLOGY

Participants

One hundred twenty-five K-12 teachers from a moderate sized school district in southern California participated in the professional development program, TechConnect. Of those participants, seventy-one (56%) completed the survey and participated in this study.

Participants in the professional development program chose to participate and were given a stipend of $1,000 for the 120-hours of work they put into the program. They were also able to obtain twelve professional development continuing education units or four instructional technology master units from a state university.

The grade level distribution of the seventy-one participants in this study were: K-3 = 16, 4-5 = 27, 6-8 = 15, 9-12 = 13. The teaching experience distribution was: under 5 years = 29, 5-7 years = 15, 8-10 years = 9, 11-15 years = 6 and 15+ years = 12.
Instrumentation

In order to investigate the impact of the professional development program, the Instructional Technology Survey (ITS) was created. This assessment was constructed to align with the Technology Proficiencies for California Teachers developed by the California Technology Assistance Project (CTAP), in partnership with the California Department of Education and the California Commission on Teacher Credentialing. The purpose of creating the survey was that while CTAP has developed an on-line assessment, it did not appear to be a measure that would be a reliable measure of growth. Teachers from this sample population that have used the CTAP2 instrument reported that it was "cumbersome" and "hard to understand."

The ITS was designed to survey the teachers' perceptions of their application of the California technology proficiencies defined by CTAP. The instrument was designed to measure the percentage of perceived growth from the year prior to the professional development experience to the year in which the teachers were engaged in the program.
Items were constructed from the Preliminary and Professional Profiles of the Technology Proficiencies for California Teachers. The Preliminary Profiles address what teachers need to know in order to use different types of computer and peripheral applications, and gain awareness of how to apply the tools. The Professional Profiles assume teachers know how to use different types of computer and peripheral applications, but need greater understanding of how to use the tools for classroom management, communications, lesson design and student performance.

The instrument contained one hundred twenty-six assessment items. On a scale of 1 (none) to 5 (high), teachers were asked to rate the extent to which given activities were used in the 1999-2000 school year (prior to the professional development experience) and the extent the activities were used in the 2000-2001 school year (after involvement in the program). An example of an item included was "Extent you use computers to create newsletters, course descriptions and/or student reports." In addition to rating the extent to which activities were used, some items asked teachers to rate their own ability or students’ abilities to perform activities. An example
of such an item was "Rate your ability to select appropriate software to meet student needs." The complete instrument is in Appendix C.

Procedure

After completing the 120-hour professional development program, a closing meeting for participants was held. Teachers were given the survey to complete at the meeting after orienting them to its purpose. See Appendix A for the introduction and Appendix B for the informed consent form. After completing the survey, teachers shared anecdotal stories about the experience and received answers to questions they had about follow-up requirements.

Basic survey administration procedures were followed. Participants were read the introductory letter and asked to sign the consent form. The participants then were given the directions to complete the survey. Each participant completed the survey individually by completing a Scantron form to mark items that corresponded to their answers to the survey items. When the participants were finished they returned the forms and survey to the researcher and waited until all participants were finished. The researcher then
thanked them for their participation and continued the meeting.

Data Analysis

All data was then coded and analyzed using the SPSS statistical package. An ANOVA was used to determine if there was a significant level of change from the year prior to involvement in the professional development program (1999-2000) to the year of involvement in the program (2000-2001). An alpha level of .01 was used for the statistical test.

Next, each data set item was analyzed to determine the percentage of teachers that were highly proficient in the given data set. The percentage of teachers with a 4 and 5 ratings on given items were added together to define the number of teachers that perceived they were highly proficient in that data set. So, all teachers that rated the extent they "used computers to create newsletters, course descriptions and/or student reports" a 4 or 5 on the scale were compiled together to get a percentage of the teachers that perceived they were highly proficient in that given data set.
Then, a percent increase measure was calculated by subtracting the extent that the teachers felt they were highly proficient, as rated by a 4 or 5, before involvement with the program from the extent the teachers felt they were highly proficient on a given data set after the program and dividing it by the highly proficient score from before their involvement.

Finally, to better define and understand the instrument, a principal components factor analysis using varimax rotation was executed. This data was to prove useful to understand the primary factors that accounted for most of the variance of the ITS measure (see Appendix F).
CHAPTER FOUR
FINDINGS AND RESULTS

Instrument Reliability

The internal consistency of the scale was determined to be highly reliable. Using Cronbach’s Alpha, the reliability coefficients score for the total scale was Alpha = .98. The reliability coefficient on the data sets was also very high with Alpha = .98 on 1999-2000 data set responses, Alpha = .96 on 2000-2001 data set responses and Alpha = .96 when assessing the reliability of the difference between the perceived change from year to year on the two data sets.

Program Assessment

The primary intent of the study was to determine if the teachers perceived instruction was changed in their classrooms as a result of the professional development program. The assumption behind the study was that if teacher and student behaviors did change and the teachers became more proficient at using technology instructionally, the program objectives would be met.
Hypothesis: Participant teachers in an intensive 120-hour instructional technology professional development program will perceive that they have used Preliminary and Professional Technology Proficiency Skills to a greater extent after program involvement as compared to the year prior to program involvement.

To test the hypothesis, the mean scores of the 1999-2000 school year data set responses were defined as the teachers perceptions of the extent they used technology applications in the classroom prior to the program. The mean scores of the 2000-2001 school year data set responses were defined as the teachers perceptions of the extent they used technology applications in their classrooms after involvement in the program.

The mean score for the 1999-2000 data sets was 2.51. The mean score for the 2000-2001 data sets was 3.29. A t-test was performed to identify if there was a significant difference between the two data set responses. Teachers perceptions of the extent they used technology applications in the classroom was significantly higher after their involvement in the professional development program (t = 12.51, p < .01).
Analysis of Perceived Change

To better describe the proficiencies in which teachers perceived they were most capable and least capable after the program, the data was analyzed to rank order the survey variables by the percentage of teachers that reported a high level of proficiency after program involvement. The three highest ranked variables were "extent you use a variety of instructional strategies to enhance learning (i.e. direct, cooperative, individual, small-group, and whole group instruction)" (80%); "extent you model behaviors adhering to the district acceptable use policy, electronic copyright and citation policies" (74%); and "extent you feel comfortable with basic operating and troubleshooting techniques (checking power connections, avoiding proximity to magnets, proper startup and shut down sequences, using storage devices)" (73%. See Appendix D for variables with perceived ability scores of 50% or above.

To better describe which teacher proficiencies were most affected by the program, the data was analyzed to determine which survey variables were perceived as increasing the most when comparing the pre-program to post-program scores. "Rate your students' ability to select
appropriate resources to complete assignments (i.e. periodical indexes, electronic encyclopedias, internet resources)" increased over 300%. "Extent students were engaged in locating information using electronic resources to complete tasks" increased over 275%. The teacher's indicated that twenty-five of the proficiencies measured by the ITS, increased over 150%. These survey variables are reported in Appendix E.

Principal Component Analysis

A principal components factor analysis using varimax rotation was used to identify the factors that best described instructional technology proficiency as defined by the survey. Three substantive factors emerged: "Student Impact," "Instructional Strategies" and "Instructional Management." Clustering the items provided a profile of the items that best described the broad indicators of instructional technology proficiency as measured by the ITS. The results of the analysis are shown in Appendix F. Scale alphas above .65 indicate a moderately high correlation to the factor and .75 and above indicate a high correlation.
CHAPTER FIVE
CONCLUSIONS AND RECOMMENDATIONS

Discussion

The goal of this study was to determine whether teachers perceived that the staff development program under investigation improved the instructional technology proficiencies of the teacher participants. Overall, the findings were that the staff development program did have a significant impact.

The findings corroborate previous research about instructional technology staff development programs. Specifically, the findings support previous findings that curriculum-based training with a focused follow-up program will result in improvement in teachers' technology proficiencies.

Teachers need to have basic technology skills to affect the technology skills of their students. However, once a basic level of proficiency is mastered, teachers need to understand how to apply those skills to the instructional context. The transference of personal basic technology skills to the application on student learning is
not intuitive. The impact that modern technologies can have on student learning is still largely unknown. Teachers need to be given an understanding of how these technologies can be managed and used most effectively.

Understanding has six facets (McTighe & Wiggins, 1999): explanation, interpretation, perspective, application, empathy, and self-knowledge. Basic proficiencies are needed to lay the foundation for understanding. But, understanding occurs at a higher level after the proficiencies are mastered.

The McTighe and Wiggins model was used to design the initial training workshop and subsequent follow-up. First, the "enduring understanding," or goal of the experience was defined: teachers will use technology effectively to facilitate student standards-based learning. Next, the basic skills and activities in which the teachers needed to engage to achieve the "enduring understanding" were defined.

Activities that were designed included the six facets of understanding. For example, in daily reflections, the teachers explained how pedagogical theory related to the application of technology to learning. Teachers regularly
discussed how modern technologies impacted teaching and learning as compared and contrasted with traditional methods to demonstrate perspective. Teachers empathized by taking on the role of the student and reflecting on how using modern technologies affected their own learning. Teachers applied what they learned to create new mediums to communicate new information literacy skills aligned to the academic standards. Teachers critiqued and interpreted how modern technologies affected learning through discussion and reflections in daily journals, small groups and whole groups. Teachers gained self-knowledge by maintaining a journal of personal reflections.

This emphasis on affecting the understanding of the teacher is crucial to the design of this staff development approach. It was felt by the designers of the program that for teachers to effectively transfer their learning to the classroom and positively affect the students’ attainment of information literacy skills and facilitate higher order thinking through the use of modern technologies, then the teachers needed to have a clear understanding of the role of technology in learning.
The teachers needed to also be engaged in the activities that they would expect of their students, such as collaboration and increased use of electronic information resources. The study findings showed that the teachers did increase their own application of these skills after involvement with the program.

Administrators need to take note of four major implications of this study to guide the development of future instructional technology staff development. First, the McTighe & Wiggins model was useful in identifying the performance behaviors that demonstrate understanding of how the use of new practices affect teaching and learning. Second, the staff development program was contextual. Third, curricular goals drove the implementation of all new practices. Fourth, follow-up was necessary to facilitate success. With these components in place, the end goal - to positively affect student application of advanced information literacy skills and higher order learning - is possible.
Limitations of Study Design

One limitation of the study design was the participants were not randomly selected and cannot be assumed to represent the general population. This limits the extent to which the results can be generalized. Teachers volunteered to attend the training. It can be assumed this population was more motivated and willing to try new technology skills in the classroom. The techniques used in this staff development program may not work for teachers that are more reticent about using modern technologies for instruction.

Another limitation of the study was that the actual performances of the teachers and students were not reported. Only self-reported surveys were used. To validate the findings, additional data would be needed that would include actual confirmation of improved instruction affecting student learning. However, the instructors did attend classrooms and observed student and teacher work. The visitations substantiated findings that positive progress was made toward improving teachers' proficiencies and students' access to technology-connected learning opportunities.
In addition to the above limitations, there was an inequity of access to hardware in teachers’ classrooms. The number of computers and peripheral equipment varied between classrooms. To offset this problem, only teachers with access to at least one computer, plus software used in the training, participated.

Future Research and Recommendations

Future research should use other methods to collect and validate the data. A triangulated method of data collection with observation, interviews, and survey data of both teachers and students, would yield valuable insights.

Future research also needs to focus on how this training method works for a variety of other populations, such as the reluctant technology-adopting teacher. It is expected that the reluctant user would benefit from this approach because of the ability to feel comfortable with the contextual component of the staff development design and the extensive follow-up.

Research on the effects of planning time for the successful implementation of an instructional technology staff development program could yield interesting results.
Given that technology-connected lessons are time intensive to plan, whether teachers are given the time and incentives to construct those lessons should play a role in the ability of teachers to apply the new skills learned.

After controlling for equitable access for hardware and software, a study to compare a randomly selected group of teachers that were not trained with a randomly selected group of teachers that were trained would be valuable. This type of control is difficult in school district environments. However, without the control, findings can only be seen as descriptive of a tendency that indicates what a successful program entails.

Recommendations for follow-up are to continue specialized workshops, create a library of easily accessible curricular supporting materials and provide mentors that can provide timely responses to requests for teacher support. Successful integration of technology into the classroom requires a high degree of concerted time and effort. For the program to have lasting affects, support from both district and site administration is necessary.
LETTER OF INTRODUCTION

Dear Educators,

Think back to the beginning of the 1999-2000 school year.

With this visual picture in mind, think back to what your personal technology skills were in the school year of 1999-2000. What were the technology skills of your students? Was technology just a box that collected dust in a corner, or was it a tool for you and your students to utilize in communicating learning and creating products.

Please take a minute or two to reflect on your personal technology skills during the 1999-2000 school year and now. Have your technology skills increased, remained the same or decreased? Has your classroom pedagogy and planning changed with the influence of technology? Have students’ technology application skills changed? Has technology been used as a tool for learning and communicating?

We appreciate your time and honest answers on this survey. Your responses will help the Department of Instructional Technology better meet your professional development needs.

Thank you for your participation.

Sincerely,

Lee Grafton, Ph.D.
Director of Instructional Technology

Important Note: While your participation in this study is appreciated, it is not required. You will be in no way penalized for not participating. Be assured, that individual responses will be kept confidential. Only cumulative responses will be reported.
APPENDIX B:

INFORMED CONSENT
INFORMED CONSENT

The study in which you are about to participate is designed to investigate decision-making processes. Dr. Lee Grafton is conducting this study under the supervision of Dr. Kenneth Lane, Dean of Educational Administration. The Institutional review Board, California State University, San Bernardino have approved this study. The university requires you give your consent before participating in this study.

In this study, you will be asked to respond to a survey. It should take you about 15 minutes to complete. All of your responses will be held in the strictest confidence by the researcher. Your name will not be reported with your responses. Only cumulative findings will be reported. You may receive the final report upon completion in December of 2001.

Your participation in this study is totally voluntary. You are free to withdraw at any time during the study without penalty. When you complete the task, you will receive a debriefing statement describing the study in more detail. In order to ensure the validity of the study, please do not discuss the study with others until the study results are released.

If you have questions about the study, please feel free to contact Lee Grafton at (760) 416-6063.

By placing a check mark in the box below, I acknowledge that I have been informed of, and that I understand, the nature and purpose of this study, and I freely consent to participate. I also acknowledge that I am at least 18 years of age.

Place a check mark here □

Signature ________________________ Date ________________________
APPENDIX C:

SURVEY
SURVEY

Instructional Technology Survey Items
Spring 2001

Rating Scale:

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>Moderate</td>
<td>High</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Extent you use computers to create newsletters, course descriptions and/or student reports:
1. Extent of activity in the 1999-2000 school year
2. Extent of activity now

Extent you use of e-mail to communicate professionally:
3. Extent of activity in the 1999-2000 school year
4. Extent of activity now

Extent you use electronic tools to communicate professionally (i.e. listservs, web pages, e-boards):
5. Extent of activity in the 1999-2000 school year
6. Extent of activity now

Extent you collaborate with other experts/colleagues to design lessons/units of study:
7. Extent of activity in the 1999-2000 school year
8. Extent of activity now

Extent you use a variety of input devices appropriately to design instructional materials (i.e. digital cameras, scanners, clips from the internet, CDs, and or other software programs):
10. Extent of activity now

Extent you use web tools to construct lessons (includes designing webquests, web-based communications (i.e. e-Board, Geocities, iTeach, Trackstar, Filimentality, etc):
11. Extent of use in the 1999-2000 school year
12. Extent of use now
Extent you facilitate student projects that use electronic tools to communicate with subject matter experts and/or students in other classes:
14. Extent of activity now

Extent you collaborate with other experts/colleagues to deliver lessons/units of study:
15. Extent of activity in the 1999-2000 school year
16. Extent of activity now

Extent you use technology-based lessons in a variety of settings (i.e. whole group, small group, individual, computer lab):
17. Extent of use in the 1999-2000 school year
18. Extent of use now

Extent you model behaviors adhering to the district acceptable use policy, electronic copyright and citation policies:
20. Extent of activity now

Extent you use a variety of instructional strategies to enhance learning (i.e. direct, cooperative, individual, small-group, and whole group instruction):
22. Extent of use now

Extent you teach and monitor student’s adherence to the district’s acceptable use policy, electronic copyright and citation policies:
23. Extent of activity in the 1999-2000 school year
24. Extent of activity now

Extent you post and/or articulate classroom rules related to issues of appropriate use of technology (i.e. privacy, security, appropriate access and implementation of the acceptable use policy):
25. Extent of use in the 1999-2000 school year
26. Extent of use now
Extent you deliver technology-integrated lessons that were clearly aligned with state academic standards:

27. Extent of activity in the 1999-2000 school year
28. Extent of activity now

Given your resources, extent you provide students with the skills needed to create electronic presentations appropriate to tasks (i.e. newsletters, web-authoring, written reports, graphs, multimedia, video):

29. Extent of activity in the 1999-2000 school year
30. Extent of activity now

Extent you use a variety of electronic resources to meet specific student needs (i.e. drill and practice, simulation, video-based instruction):

31. Extent of activity in the 1999-2000 school year
32. Extent of activity now

Extent you use an electronic gradebook or spreadsheet to record and report student progress:

33. Extent of activity in the 1999-2000 school year
34. Extent of activity now

Extent you have used electronic reports of student achievement to modify instruction for a specific students:

35. Extent of activity in the 1999-2000 school year
36. Extent of activity now

Extent you model and use technology with students to solve a problem or draw conclusions:

37. Extent of activity in the 1999-2000 school year
38. Extent of activity now

Extent you use standards-based rubrics and/or student reflection to evaluate student projects:

40. Extent of activity now

Extent you use standards-based quizzes, tests to evaluate student work:

41. Extent of activity in the 1999-2000 school year
42. Extent of activity now
Extent that student reports include appropriate bibliographic citations:
43. Extent of activity in the 1999-2000 school year
44. Extent of activity now

Extent students use a variety of input devices appropriately to complete tasks (i.e. digital cameras, scanners, clips from the internet, CDs, and or other software programs):
45. Extent of activity in the 1999-2000 school year
46. Extent of activity now

Extent students were engaged in planning how they would gather information to complete tasks:
47. Extent of activity in the 1999-2000 school year
48. Extent of activity now

Extent students were engaged in planning how they would gather information to complete tasks using electronic resources:
49. Extent of activity in the 1999-2000 school year
50. Extent of activity now

Extent students were engaged in locating information using electronic resources to complete tasks:
51. Extent of activity in the 1999-2000 school year
52. Extent of activity now

Extent students were engaged in locating information to complete tasks:
53. Extent of activity in the 1999-2000 school year
54. Extent of activity now

Extent students were engaged in problem-solving activities:
55. Extent of activity in the 1999-2000 school year
56. Extent of activity now

Extent students were engaged in activities to evaluate and draw conclusions from information gathered or experiences:
57. Extent of activity in the 1999-2000 school year
58. Extent of activity now
Extent that students select appropriate information to complete tasks:
59. Extent of activity in the 1999-2000 school year
60. Extent of activity now

Extent that students report information clearly and accurately:
61. Extent of activity in the 1999-2000 school year
62. Extent of activity now

Extent that students communicate information persuasively:
63. Extent of activity in the 1999-2000 school year
64. Extent of activity now

Extent that student research projects incorporate multiple references from a variety of credible electronic and traditional sources:
65. Extent of activity in the 1999-2000 school year
66. Extent of activity now

Given resources available, extent you use a variety of learning locations to facilitate instruction (i.e. one computer, computer lab, multiple workstations):
67. Extent of activity in the 1999-2000 school year
68. Extent of activity now

Extent that students demonstrate an understanding of the authenticity, reliability and bias of data gathered from electronic resources:
69. Extent of activity in the 1999-2000 school year
70. Extent of activity now

Extent you use accurate vocabulary to describe technology procedures and problems:
71. Extent of use in the 1999-2000 school year
72. Extent of use now

Extent you feel comfortable with basic operating and troubleshooting techniques (checking power connections, avoiding proximity to magnets, proper startup and shut down sequences, using storage devices):
73. Extent of use in the 1999-2000 school year
74. Extent of use now
Extent you use ready-made technology productivity tools (i.e. gradebooks, attendance, assessment records):
75. Extent of use in the 1999-2000 school year
76. Extent of use now

Extent you create simple databases in word-processing programs to produce student lists for field trips, labels, certificates):
77. Extent of use in the 1999-2000 school year
78. Extent of use now

Extent you use online resources to guide instructional decisions:
79. Extent of use in the 1999-2000 school year
80. Extent of use now

Extent you have created reports/presentations summarizing student instructional progress/needs with tables or charts for an audience, such as parents or a school committee, using technology applications:
81. Extent of activity in the 1999-2000 school year
82. Extent of activity now

Extent you have used technology to create individual learning reports about students:
83. Extent of activity in the 1999-2000 school year
84. Extent of activity now

Extent you have used technology to create individual learning reports for parents:
85. Extent of activity in the 1999-2000 school year
86. Extent of activity now

Extent you participate in grade level, department or site activities to develop a school site technology plan:
87. Extent of activity in the 1999-2000 school year
88. Extent of activity now
Extent you participate in grade level, department or site decision-making processes regarding the use and acquisition of technology:
89. Extent of activity in the 1999-2000 school year
90. Extent of activity now

Rate your ability to select appropriate software to meet student needs:
91. Ability level in the 1999-2000 school year
92. Ability level now

Rate your ability to provide students with appropriate Internet resources to complete tasks:
93. Ability level in the 1999-2000 school year
94. Ability level now

Rate your ability to guide students to find appropriate electronic resources to complete research assignments:
95. Ability level in the 1999-2000 school year
96. Ability level now

Rate your ability to guide students to find appropriate electronic resources to complete research assignments:
95. Ability level in the 1999-2000 school year
96. Ability level now

Rate your ability to guide students to find appropriate electronic resources to complete research assignments:
95. Ability level in the 1999-2000 school year
96. Ability level now

Rate your ability to provide students with the skills needed to create electronic presentations appropriate to meet standards-based assignments (i.e. newsletters, web-authoring, reports, graphs, multimedia, video):
97. Ability level in the 1999-2000 school year
98. Ability level now

Rate your ability to design a lesson using technology to meet standards-based learning goals:
99. Ability level in the 1999-2000 school year
100. Ability level now

Rate your ability level in delivering lessons that use technology to facilitate standards-based learning:
101. Ability level in the 1999-2000 school year
102. Ability level now

Rate your ability level at managing technology use by students in a lab/classroom:
103. Ability level in the 1999-2000 school year
104. Ability level now
Rate your ability to select appropriate technology resources to meet specific student needs (i.e. drill and practice, simulation, video-based instruction):
105. Ability level in the 1999-2000 school year
106. Ability level now

Rate your ability to use appropriate technology resources to meet individual student needs (i.e. drill and practice, simulation, video-based instruction):
107. Ability level in the 1999-2000 school year
108. Ability level now

Rate your ability to articulate a rationale for selection and use of electronic search tools (i.e. periodical indexes, electronic encyclopedias, internet resources):
109. Ability level in the 1999-2000 school year
110. Ability level now

Rate your ability to select appropriate resources for student tasks (i.e. periodical indexes, electronic encyclopedias, internet resources):
111. Ability level in the 1999-2000 school year
112. Ability level now

Rate your students' ability to select appropriate resources to complete assignments (i.e. periodical indexes, electronic encyclopedias, internet resources):
113. Ability level in the 1999-2000 school year
114. Ability level now

Rate your ability to use search delimiters and Boolean logic to retrieve information:
115. Ability level in the 1999-2000 school year
116. Ability level now

Rate your students' ability to use search delimiters and Boolean logic to retrieve information:
117. Ability level in the 1999-2000 school year
118. Ability level now
Rate your understanding of the District’s Acceptable Use Policy:
119. Level of understanding in the 1999-2000 school year
120. Level of understanding now

Rate your understanding of electronic copyright laws:
121. Level of understanding in the 1999-2000 school year
122. Level of understanding now

Rate your understanding of electronic source citation policies:
123. Level of understanding in the 1999-2000 school year
124. Level of understanding now

Rate your ability to select appropriate electronic communication tools to meet various communication needs with parents, students and colleagues:
125. Ability level in the 1999-2000 school year
126. Ability level now

2000-2001 grade level assignment:
127. A: Kindergarten - 1st grade   B: 2nd - 3rd grade
    C: 4th - 5th grade   E: Middle School
    F: High School

Total years experience as a classroom teacher:
128. A: 5 years   B: 5-7 years   C: 8-10 years
    D: 11-15 years   E: 15+ years experience

Were you a participant in any of the following technology professional development opportunities?
129. TechConnect   A: Yes   B: No
130. Technology Literacy Grant   A: Yes   B: No
131. After School Personal Proficiency Workshops   A: Yes   B: No
132. Classroom Connect’s Connected University   A: Yes   B: No
133. University Master’s or Doctoral Program   A: Yes   B: No
134. CTAP Professional Development   A: Yes   B: No
135. Other   A: Yes   B: No
Did you have Internet access and/or computer access in your classroom during the 1999-2000 school year?
136. A: Internet access  B: Computer access only  C: No access

Do you have Internet access and/or computer access in your classroom now?
137. A: Internet access  B: Computer access only  C: No access

Do you have Internet connectivity at your residence?
138. A: Yes  B: No

Rate the degree to which you take risks in trying new instructional strategies:
139. A: Do not take risks  B: Low risk taker  C: Moderate risk taker  D: Moderately-high risk  E: High risk taker
APPENDIX D:

VARIABLES WITH THE HIGHEST LEVEL

OF PERCEIVED ABILITY IN 2000-2001
VARIABLES WITH THE HIGHEST LEVEL
OF PERCEIVED ABILITY IN 2000-2001

Variables with Percentage of Perceived Ability at 50% or Above in 2000-2001

<table>
<thead>
<tr>
<th>Survey Item</th>
<th>Ability level in the 2000-2001 school year (%)</th>
<th>Ability level in the 1999-2000 school year (%)</th>
<th>Percent Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent you use a variety of instructional strategies to enhance learning (i.e. direct, cooperative, individual, small-group, and whole group instruction)</td>
<td>80</td>
<td>61</td>
<td>31.1</td>
</tr>
<tr>
<td>Extent you model behaviors adhering to the district acceptable use policy, electronic copyright and citation policies</td>
<td>74</td>
<td>45</td>
<td>64.4</td>
</tr>
<tr>
<td>Extent you feel comfortable with basic operating and troubleshooting techniques (checking power connections, avoiding proximity to magnets, proper startup and shut down sequences, using storage devices)</td>
<td>73</td>
<td>38</td>
<td>92.1</td>
</tr>
<tr>
<td>Extent you teach and monitor student’s adherence to the district’s acceptable use policy, electronic copyright and citation policies</td>
<td>72</td>
<td>44</td>
<td>63.6</td>
</tr>
<tr>
<td>Extent students were engaged in problem-solving activities</td>
<td>69</td>
<td>41</td>
<td>68.3</td>
</tr>
<tr>
<td>Extent you use computers to create newsletters, course descriptions and/or student reports</td>
<td>69</td>
<td>21</td>
<td>228.6</td>
</tr>
<tr>
<td>Rate your understanding of the District’s Acceptable Use Policy</td>
<td>67</td>
<td>44</td>
<td>52.3</td>
</tr>
<tr>
<td>Rate your understanding of electronic copyright laws</td>
<td>65</td>
<td>40</td>
<td>62.5</td>
</tr>
<tr>
<td>Rate your ability to design a lesson using technology to meet standards-based learning goals</td>
<td>64</td>
<td>24</td>
<td>166.7</td>
</tr>
<tr>
<td>Rate your ability to guide students to find appropriate electronic resources to complete research assignments</td>
<td>64</td>
<td>21</td>
<td>204.8</td>
</tr>
<tr>
<td>Rate your ability to provide students with appropriate Internet resources to complete tasks</td>
<td>63</td>
<td>21</td>
<td>200.0</td>
</tr>
<tr>
<td>Survey Item</td>
<td>Ability level in the 2000-2001 school year (%)</td>
<td>Ability level in the 1999-2000 school year (%)</td>
<td>Percent Increase (%)</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Rate your ability to articulate a rationale for selection and use of electronic search tools (i.e. periodical indexes, electronic encyclopedias, internet resources)</td>
<td>61</td>
<td>21</td>
<td>190.5</td>
</tr>
<tr>
<td>Extent you use standards-based quizzes, tests to evaluate student work</td>
<td>60</td>
<td>38</td>
<td>57.9</td>
</tr>
<tr>
<td>Rate your ability level at managing technology use by students in a lab/classroom</td>
<td>57</td>
<td>23</td>
<td>147.8</td>
</tr>
<tr>
<td>Extent students were engaged in locating information to complete tasks</td>
<td>56</td>
<td>26</td>
<td>115.4</td>
</tr>
<tr>
<td>Extent you use standards-based rubrics and/or student reflection to evaluate student projects</td>
<td>56</td>
<td>25</td>
<td>124.0</td>
</tr>
<tr>
<td>Extent that student research projects incorporate multiple references from a variety of credible electronic and traditional sources</td>
<td>56</td>
<td>21</td>
<td>166.7</td>
</tr>
<tr>
<td>Extent students were engaged in activities to evaluate and draw conclusions from information gathered or experiences</td>
<td>55</td>
<td>31</td>
<td>77.4</td>
</tr>
<tr>
<td>Extent you use accurate vocabulary to describe technology procedures and problems</td>
<td>55</td>
<td>29</td>
<td>89.7</td>
</tr>
<tr>
<td>Rate your ability to select appropriate software to meet student needs</td>
<td>55</td>
<td>19</td>
<td>189.5</td>
</tr>
<tr>
<td>Rate your understanding of electronic source citation policies</td>
<td>54</td>
<td>29</td>
<td>86.2</td>
</tr>
<tr>
<td>Rate your ability to select appropriate resources for student tasks (i.e. periodical indexes, electronic encyclopedias, internet resources)</td>
<td>54</td>
<td>21</td>
<td>157.1</td>
</tr>
<tr>
<td>Extent you deliver technology-integrated lessons that were clearly aligned with state academic standards</td>
<td>53</td>
<td>19</td>
<td>178.9</td>
</tr>
<tr>
<td>Extent students were engaged in locating information using electronic resources to complete tasks</td>
<td>53</td>
<td>14</td>
<td>278.6</td>
</tr>
<tr>
<td>Survey Item</td>
<td>Ability level in the 2000-2001 school year (%)</td>
<td>Ability level in the 1999-2000 school year (%)</td>
<td>Percent Increase (%)</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Rate your ability level in delivering lessons that use technology to facilitate standards-based learning</td>
<td>52</td>
<td>21</td>
<td>147.6</td>
</tr>
<tr>
<td>Extent you use a variety of input devices appropriately to design instructional materials (i.e. digital cameras, scanners, clips from the internet, CDs, and or other software programs)</td>
<td>52</td>
<td>16</td>
<td>225.0</td>
</tr>
<tr>
<td>Rate your ability to select appropriate technology resources to meet specific student needs (i.e. drill and practice, simulation, video-based instruction):</td>
<td>51</td>
<td>19</td>
<td>168.4</td>
</tr>
<tr>
<td>Rate your ability to use appropriate technology resources to meet individual student needs (i.e. drill and practice, simulation, video-based instruction):</td>
<td>50</td>
<td>18</td>
<td>177.8</td>
</tr>
<tr>
<td>Extent you use technology-based lessons in a variety of settings (i.e. whole group, small group, individual, computer lab)</td>
<td>50</td>
<td>16</td>
<td>212.5</td>
</tr>
</tbody>
</table>
APPENDIX E:

VARIABLES WITH THE HIGHEST

PERCENTAGE OF INCREASE IN PERCEIVED ABILITY
## VARIABLES WITH THE HIGHEST PERCENTAGE OF INCREASE IN PERCEIVED ABILITY

Variables with Highest Percentage of Increase of Ability in 2000-2001 as Compared to 1999-2000

<table>
<thead>
<tr>
<th>Survey Item</th>
<th>Ability level in the 2000-2001 school year (%)</th>
<th>Ability level in the 1999-2000 school year (%)</th>
<th>Percent Increase (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate your students' ability to select appropriate resources to complete assignments (i.e. periodical indexes, electronic encyclopedias, internet resources):</td>
<td>34</td>
<td>8</td>
<td>325.0</td>
</tr>
<tr>
<td>Extent students were engaged in locating information using electronic resources to complete tasks</td>
<td>53</td>
<td>14</td>
<td>278.6</td>
</tr>
<tr>
<td>Extent you use of e-mail to communicate professionally</td>
<td>45</td>
<td>12</td>
<td>275.0</td>
</tr>
<tr>
<td>Extent you use web tools to construct lessons (includes designing webquests, web-based communications (i.e. e-Board, Geocities, iTeach, Trackstar, Filimentality, etc)</td>
<td>25</td>
<td>7</td>
<td>257.1</td>
</tr>
<tr>
<td>Extent you use computers to create newsletters, course descriptions and/or student reports</td>
<td>69</td>
<td>21</td>
<td>228.6</td>
</tr>
<tr>
<td>Extent you use a variety of input devices appropriately to design instructional materials (i.e. digital cameras, scanners, clips from the internet, CDs, and or other software programs)</td>
<td>52</td>
<td>16</td>
<td>225.0</td>
</tr>
<tr>
<td>Extent you use technology-based lessons in a variety of settings (i.e. whole group, small group, individual, computer lab)</td>
<td>50</td>
<td>16</td>
<td>212.5</td>
</tr>
<tr>
<td>Rate your ability to guide students to find appropriate electronic resources to complete research assignments</td>
<td>64</td>
<td>21</td>
<td>204.8</td>
</tr>
<tr>
<td>Extent you use electronic tools to communicate professionally (i.e. listservs, web pages, e-boards)</td>
<td>27</td>
<td>9</td>
<td>200.0</td>
</tr>
<tr>
<td>Survey Item</td>
<td>Ability level in the 2000-2001 school year (%)</td>
<td>Ability level in the 1999-2000 school year (%)</td>
<td>Percent Increase (%)</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Given resources available, extent you use a variety of learning locations to facilitate instruction (i.e. one computer, computer lab, multiple workstations)</td>
<td>45</td>
<td>15</td>
<td>200.0</td>
</tr>
<tr>
<td>Rate your ability to provide students with appropriate Internet resources to complete tasks</td>
<td>63</td>
<td>21</td>
<td>200.0</td>
</tr>
<tr>
<td>Rate your ability to articulate a rationale for selection and use of electronic search tools (i.e. periodical indexes, electronic encyclopedias, internet resources)</td>
<td>61</td>
<td>21</td>
<td>190.5</td>
</tr>
<tr>
<td>Extent you participate in grade level, department or site decision-making processes regarding the use and acquisition of technology</td>
<td>29</td>
<td>10</td>
<td>190.0</td>
</tr>
<tr>
<td>Rate your ability to select appropriate software to meet student needs</td>
<td>55</td>
<td>19</td>
<td>189.5</td>
</tr>
<tr>
<td>Extent you collaborate with other experts/colleagues to design lessons/units of study</td>
<td>48</td>
<td>17</td>
<td>182.4</td>
</tr>
<tr>
<td>Rate your ability to provide students with the skills needed to create electronic presentations appropriate to meet standards-based assignments (i.e. newsletters, web-authoring, reports, graphs, multimedia, video)</td>
<td>45</td>
<td>16</td>
<td>181.3</td>
</tr>
<tr>
<td>Extent you deliver technology-integrated lessons that were clearly aligned with state academic standards</td>
<td>53</td>
<td>19</td>
<td>178.9</td>
</tr>
<tr>
<td>Rate your ability to use appropriate technology resources to meet individual student needs (i.e. drill and practice, simulation, video-based instruction)</td>
<td>50</td>
<td>18</td>
<td>177.8</td>
</tr>
<tr>
<td>Extent you facilitate student projects that use electronic tools to communicate with subject matter experts and/or students in other classes</td>
<td>22</td>
<td>8</td>
<td>175.0</td>
</tr>
<tr>
<td>Survey Item</td>
<td>Ability level in the 2000-2001 school year (%)</td>
<td>Ability level in the 1999-2000 school year (%)</td>
<td>Percent Increase (%)</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Rate your ability to select appropriate technology resources to meet specific student needs (i.e. drill and practice, simulation, video-based instruction):</td>
<td>51</td>
<td>19</td>
<td>168.4</td>
</tr>
<tr>
<td>Extent that student research projects incorporate multiple references from a variety of credible electronic and traditional sources</td>
<td>56</td>
<td>21</td>
<td>166.7</td>
</tr>
<tr>
<td>Rate your ability to design a lesson using technology to meet standards-based learning goals</td>
<td>64</td>
<td>24</td>
<td>166.7</td>
</tr>
<tr>
<td>Extent you use a variety of electronic resources to meet specific student needs (i.e. drill and practice, simulation, video-based instruction)</td>
<td>36</td>
<td>14</td>
<td>157.1</td>
</tr>
<tr>
<td>Rate your ability to select appropriate resources for student tasks (i.e. periodical indexes, electronic encyclopedias, internet resources)</td>
<td>54</td>
<td>21</td>
<td>157.1</td>
</tr>
<tr>
<td>Extent you collaborate with other experts/colleagues to deliver lessons/units of study</td>
<td>33</td>
<td>13</td>
<td>153.8</td>
</tr>
</tbody>
</table>
APPENDIX F:

PRINCIPAL COMPONENTS ANALYSIS
## Three Primary Factors from Principal Component Analysis

<table>
<thead>
<tr>
<th>Factor 1: Student Impact</th>
<th>Factor Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extent students were engaged in locating information using electronic resources to complete tasks</td>
<td>0.822</td>
</tr>
<tr>
<td>Extent that student research projects incorporate multiple references from a variety of credible electronic and traditional sources</td>
<td>0.795</td>
</tr>
<tr>
<td>Extent students were engaged in locating information to complete tasks</td>
<td>0.725</td>
</tr>
<tr>
<td>Extent students were engaged in planning how they would gather information to complete tasks</td>
<td>0.69</td>
</tr>
<tr>
<td>Extent students were engaged in planning how they would gather information to complete tasks using electronic resources</td>
<td>0.682</td>
</tr>
<tr>
<td>Extent students were engaged in activities to evaluate and draw conclusions from information gathered or experiences</td>
<td>0.57</td>
</tr>
<tr>
<td>Extent that students demonstrate an understanding of the authenticity, reliability and bias of data gathered from electronic resources</td>
<td>0.55</td>
</tr>
<tr>
<td>Extent you model and use technology with students to solve a problem or draw conclusions</td>
<td>0.524</td>
</tr>
<tr>
<td>Extent that students select appropriate information to complete tasks</td>
<td>0.503</td>
</tr>
<tr>
<td>Extent students were engaged in problem-solving activities</td>
<td>0.483</td>
</tr>
<tr>
<td>Given resources available, extent you use a variety of learning locations to facilitate instruction (i.e. one computer, computer lab, multiple workstations)</td>
<td>0.473</td>
</tr>
<tr>
<td>Extent students use a variety of input devices appropriately to complete tasks (i.e. digital cameras, scanners, clips from the internet, CDs, and or other software programs)</td>
<td>0.43</td>
</tr>
<tr>
<td>Factor 2: Instructional Strategies</td>
<td>Factor Loading</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Rate your ability to select appropriate resources&lt;br&gt;for student tasks (i.e. periodical indexes, electronic encyclopedias, internet resources)</td>
<td>0.764</td>
</tr>
<tr>
<td>Rate your ability to select appropriate software to meet student needs</td>
<td>0.742</td>
</tr>
<tr>
<td>Rate your ability to articulate a rationale for&lt;br&gt;selection and use of electronic search tools&lt;br&gt;(i.e. periodical indexes, electronic encyclopedias, internet resources)</td>
<td>0.734</td>
</tr>
<tr>
<td>Rate your ability level at managing technology use by students in a lab/classroom</td>
<td>0.678</td>
</tr>
<tr>
<td>Rate your ability level in delivering lessons that use technology to facilitate standards-based learning</td>
<td>0.659</td>
</tr>
<tr>
<td>Rate your students' ability to select appropriate resources to complete assignments (i.e. periodical indexes, electronic encyclopedias, internet resources)</td>
<td>0.625</td>
</tr>
<tr>
<td>Rate your ability to use appropriate technology resources to meet individual student needs (i.e. drill and practice, simulation, video-based instruction)</td>
<td>0.622</td>
</tr>
<tr>
<td>Rate your ability to select appropriate technology resources to meet specific student needs (i.e. drill and practice, simulation, video-based instruction):</td>
<td>0.534</td>
</tr>
<tr>
<td>Extent you use standards-based rubrics and/or student reflection to evaluate student projects</td>
<td>0.486</td>
</tr>
<tr>
<td>Factor 3: Instructional Technology Management</td>
<td>Factor Loading</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Extent you have used electronic reports of student achievement to modify instruction for a specific student</td>
<td>0.787</td>
</tr>
<tr>
<td>Extent you use a variety of electronic resources to meet specific student needs (i.e. drill and practice, simulation, video-based instruction)</td>
<td>0.678</td>
</tr>
<tr>
<td>Extent you use technology-based lessons in a variety of settings (i.e. whole group, small group, individual, computer lab)</td>
<td>0.588</td>
</tr>
<tr>
<td>Extent you feel comfortable with basic operating and troubleshooting techniques (checking power connections, avoiding proximity to magnets, proper startup and shut down sequences, using storage devices)</td>
<td>0.588</td>
</tr>
<tr>
<td>Given your resources, extent you provide students with the skills needed to create electronic presentations appropriate to tasks (i.e. newsletters, web-authoring, written reports, graphs, multimedia, video)</td>
<td>0.492</td>
</tr>
<tr>
<td>Extent you use online resources to guide instructional decisions</td>
<td>0.468</td>
</tr>
<tr>
<td>Extent you deliver technology-integrated lessons that were clearly aligned with state academic standards</td>
<td>0.44</td>
</tr>
</tbody>
</table>
BIBLIOGRAPHY


