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ABSTRACT

Modules to teach the appropriate integration of technology into social studies teaching were pilot-taught in a secondary social studies methods course. The seven modules emphasized the World Wide Web as a resource for teachers and students. Pre- and post-course surveys were conducted with the 24 students in the course. Both qualitative and quantitative evidence showed that most methods students valued, understood, and were able to use the Web in planning instruction. No conclusions can be drawn about the impact of the modules or instruction on the students in the course. The freestanding module approach does not appear to be an efficacious approach to integrating technology use in teacher education courses or programs. The revised modules are available on the Web for other methods instructors to adopt or adapt. (Author/BT)

Adding Instruction About Technology Infusion to the Secondary Social Studies Course With Web-Based Modules.

by

Lee H. Ehman
Indiana University

Paper delivered to the College and University Faculty Assembly of the National Council for the Social Studies in its annual meeting, November 19, 1999 in Orlando, Florida

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Abstract

Modules to teach appropriate integration of technology into social studies teaching were pilot-taught in a secondary social studies methods course. The modules emphasized the World Wide Web as a resource for teachers and students. Qualitative and quantitative evidence showed that most students valued, understood, and were able to use the Web in planning instruction. No conclusions can be drawn about the impact of the modules or instruction on the methods students, however, and the freestanding module approach does not appear to be an efficacious approach to integrating technology use in teacher education courses or programs. The revised modules are available on the Web for other methods instructors to adopt or adapt.

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Introduction

Teacher education programs tend to take one of two approaches for including technology preparation. The first is to require a "stand-alone" course, perhaps titled "Technology in Teaching," as part of the curriculum. The second is to incorporate technology integration as a topic across the entire teacher education curriculum (Willis & Mehlinger 1996, 995). Of course, there are blends of these two approaches. However, at Indiana University's School of Education, where I coordinate the "Technology in Teaching" course, as well as an 18-credit computer endorsement (minor) program, we have not moved far from the single, required course approach. Infusing technology preparation for our teacher candidates across the variety of education courses is mostly a hit-and-miss proposition. For example, some content methods instructors devote considerable attention to it, while others don't include it at all in their courses.

This is why I was very interested when approached by the North Central Regional Educational Laboratory (NCREL hereafter) staff to become part of a team of teacher education professors engaged in developing technology infusion modules, suitable for content methods classes for elementary and secondary education programs. (The others' modules can be accessed through the web site referenced in NCREL 1998). Modules aimed at particular methods courses might be adopted or adapted by instructors who otherwise haven't the time or inclination to create them on their own. Therefore, I accepted NCREL's development task, created what I thought to be appropriate modules for the secondary social studies methods class, and taught them as a co-instructor.

Stand-alone educational technology courses, as opposed to an approach of infusion across the teacher education curriculum, is laid out ably by Willis & Mehlinger (1996) in their research review of information technology and teacher education. Stand-alone courses have the twin

disadvantages of marginalizing this aspect of teacher preparation, and the tendency to be taught by non-teacher educators, although the latter difficulty might be diminishing with increases in faculty competence and experience with computers. An integrated approach has been shown to be more effective by Handler & Pigott (1994) who compared teachers one year after graduation on their responses to questions about level of preparation to use technology in their classrooms. Of the teachers who felt prepared, 58% (compared to only 27% who felt unprepared) had a methods course in which technology use was modeled and emphasized. Therefore, regular, mainstream teacher education courses in which instructors actively include perspectives on technology use, rather than isolated stand-alone technology courses taught by specialists, might be a key to impacting teachers' confidence to employ computers in their classrooms.

The purpose of this paper is to describe my efforts at integrating web-based modules into a secondary social studies methods course, the signs of impact on student thinking and work in that course, and implications for creating modules as an infusion strategy.

Methods

The primary emphasis of the study was descriptive, using qualitative and quantitative evidence. Evidence of students' work in the methods class was assessed by examining written micro-teaching and unit plans, plus observing micro-teaching and other in-class discussion. Drawing connections between this student work and the modules was one goal of the data analysis.

There was also analysis of a 19-item pre- and post-course survey containing questions regarding the value and awareness of technology in the curriculum, as well as knowledge and ability to incorporate it into teaching. The items were constructed by the NCREL staff for administration in all eight pilot test classes, and addressed students' understanding of engaged

learning (Tinzmann, Rasmussen & Foertsch 1997), use of technology in teaching their subjects, and the importance they give to its use. The complete instrument is reproduced in Table 1, found at the end of the paper, and includes percentage responses to the pre- and post-test questions. There were no missing data except for one student not responding to the last four post-test items.

Given the convenience sampling, low level of measurement, and the weak, pre-experimental, design implied by the quantitative data (one group, pre- and post-test), no measures of central tendency or inferential statistics were applied to the analysis of responses to the survey instrument.

The Web Modules

During 1998 the North Central Regional Educational Laboratory (NCREL) conducted a project in which eight professors in various subjects and grade levels created methods course modules about technology integration for pilot testing and eventual dissemination nationally (NCREL 1998). I authored seven such modules (Ehman 1998) and used six of them while co-teaching the secondary social studies methods course described below. The team of eight module developers agreed on a common format for the modules. For example, each module is referenced to national standards. In the case of my seven modules, three sets of standards are used: the ISTE basic standards for technology proficiencies in teacher education, the INTASC core standards for teacher education, and the NCSS pedagogical standards. References to specific standards can be found in the individual modules on the web (Ehman 1998).

In creating the modules I relied on the framework of the existing methods course -- its progression of topics, assignments, and related activities. I attempted to make the modules fit the course in ways that would permit their full integration, while keeping them flexible enough that they could be adapted by teachers to be used partially, or in different courses, such as for

elementary social studies methods. I attempted to tie the use of technology in social studies teaching to national standards, both the social studies content standards, and teacher education standards as noted above. The modules emphasize heavily the use of the World Wide Web and an approach of fostering students' use of technology as learning tools, rather than an older view of technology as purveyor of tutorial and drill and practice instruction.

The seven modules are web-based and can be accessed through an overview web page at http://www.indiana.edu/~leeehman/ncrel/overview.html. The titles, context, and brief descriptions of the modules follow:

Module 1: Engaged Learning

Context: This module can be completed in one 75-minute class period. It provides conceptual material, principally "engaged learning," for subsequent modules and assignments such as lesson/unit planning and curriculum standards.
Description: This module introduces the concept of "engaged learning" through readings and discussion, and engages students in applying the concept by analyzing a NCREL Captured Wisdom Scenario, a video/CD-based depiction of a social studies unit, called "Historical Fiction."

Module 2: Planning a Social Studies Lesson

Context: This module can be completed in one 75-minute class period. It introduces lesson planning concepts and categories through analysis of a teacher's unit, rather than requiring students to create their own lesson ideas while simultaneously learning the lesson planning framework. It should be completed before modules and assignments on microteaching and lesson/unit planning.
Description: This module builds upon the first module's development of the engaged learning concept, and focuses on lesson planning by involving students in analyzing a NCREL Captured Wisdom Scenario, a video/CD-based depiction of a social studies unit called "Trash Talk," with the categories of NCREL's "Lesson Planning Framework."

Module 3: Social Studies Curriculum Standards

Context: This module can be completed in one 75-minute period. It assumes that some attention has already been devoted to alternative social studies curriculum goals and perspectives. It should be completed before lesson and unit plan assignments.
Description: This module introduces students to national curriculum standards and state proficiencies used in lesson/unit/course planning. The standards and proficiencies are used as interpretive concepts while analyzing two NCREL Captured Wisdom Scenarios,

"Historical Fiction" and "Trash Talk." A short reading on implementing social studies standards through internet-based lessons and units is also used.

Module 4: Print and Computer-Based Tools for Social Studies Research and Lesson/Unit Planning

Context: Two 75-minute class sessions are needed for this module, one of which requires use of a web-capable computer lab/classroom. It is one necessary prerequisite for the lesson and unit planning assignments.
Description: This module introduces students to a range of print and computer-based resources useful in curriculum planning and their future pupils' research in social studies subjects. Activities include a tour and demonstration of library resources, as well as small group work in planning use of computer-based materials for instruction.

Module 5 Title: Planning Social Studies Lessons, Units, and Courses

Context: This module can be completed in two 75-minute class periods. It is assumed that the group-based unit planning activity will be done in the latter part of one 75-minute period and the first part of the subsequent 75-minute period. This activity requires use of a web-capable computer lab/classroom.
Description: This module reinforces, through student application, NCREL's lesson planning framework. It uses a NCREL Captured Wisdom Scenario, a video/CD-based depiction of a social studies unit called "The Jane Goodall Story," and involves students working in small groups to adapt the model unit to outline a history unit based in part on web-based information.

Module 6: Accessing and Evaluating Web-Based Information

Context: This module can be completed in one 75-minute class period. A computer classroom with web access is necessary.
Description: This module introduces students to concepts and approaches related to accessing and evaluating the authenticity and validity of web-based information of use in social studies teaching and learning. It uses the existing Widener Library sites as references for criteria and processes for evaluating web information, and incorporates lecture, demonstration, and discussion of three articles about web information issues in social studies teaching.

Module 7 Title: Creating WebQuests for Social Studies Instruction

Context: Two 75-minute class sessions plus one or more open computer laboratory sessions with individual assistance are needed for this module, and should be taught after all six other modules. It requires a computer classroom with web connectivity. This module can be seen as an "elective" by the instructor if webquest site construction appears beyond the needed computer infrastructure and support levels. If so, the introductory part of the module, with the introduction and evaluation/comparison of existing webquests, can be retained.

Description: This module teaches students required knowledge and skills for constructing social studies webquests as a form of lesson or unit planning. Webquests are structured units of activities, accessed by students on the web, and incorporate print and web materials within a framework of engaged learning.

The Methods Course and Teaching the Technology Infusion Modules

The methods course for which the modules were developed has been taught and modified over a period of years by several instructors at Indiana University. It is a one-semester, 3-credit course taught concurrently with an additional 1-credit required 20-hour pre-student teaching field experience involving observing and teaching in a secondary social studies classroom. The class met twice a week for 15 weeks, on Mondays for two and one-half hours, and on Wednesday's for two hours. Assignments included two position papers, two 10-minute microteaching lessons, a mid-term examination, an annotated bibliography of Web resources, a textbook and electronic materials review, and a culminating curriculum unit.

The technology modules were integrated into the course and taught in sequence except that module #4, Print and Computer-Based Tools, was taught first, together with the introduction of the class web site and use of listserves. Module #6, Assessing and Evaluating Web-Based Information, was taught before #5, Planning Social Studies Lessons, Units, and Courses. Module #7, Creating WebQuests, was not attempted because of time limitations.

Nineteen undergraduate and five graduate students were enrolled in the course during the fall 1998 semester, and all but a handful would student teach during the semester following this course. The instructor of record, Aaron, was an ABD doctoral student who had previously taught high school social studies and had taught several semesters in the Indiana University's School of Education teacher education laboratory, a micro-teaching component in the secondary teacher education program. He was a beginner with computers, not using e-mail on a regular basis. While he welcomed my co-teaching the course, and the emphasis on integrating

technology into the course and into social studies teaching in general, he did not initiate such activities himself with the exception of using video recording equipment during the two rounds of microteaching.

The course met in a classroom equipped with a video projector, permitting display of computer and videotape output. The class met several times in a separate computer lab with sufficient computers for all to do Internet work on their own. Teaching some of the technology modules occurred in this computer lab.

The course schedule is sketched out below, and shows the sequencing of the topics, written assignments, and technology infusion modules:

Social Studies Methods Class Schedule of Topics,
Written Assignments (in ALL CAPS), and Modules (in Bold)
Fall 1998

Week 1, days 1 & 2	Defining the social studies
Week 2, day 1	Defining ss con't; introduction to class web site; sign up for social studies Listserv; **Module #4**, print & computer based tools for social studies research and lesson/unit planning
Week 2, day 2	**Module #1**, engaged learning and technology
Week 3, day 1	**Module #2**, lesson planning and technology
POSITION PAPER	
Week 3, day 2	Effective teaching in social studies
Weeks 4-5	Microteaching
Week 6, day 1	**Module #3**, social studies curriculum standards
Week 6, day 2	In class mid term examination
Week 7, days 1 & 2	Issues in the social studies: multiculturalism; feminism

Week 8, day 1 **Module #6**, accessing and evaluating web-based information

Week 8, day 2 Social studies textbooks

Week 9, day 1 Research and planning social studies units and courses

Week 9, day 2 Practical classroom teaching strategies

TEXTBOOK & WEB SITE EVALUATIONS

Week 10, day 1 **Module #5**, planning social studies lessons, units, and courses.

Week 10, day 2 Guest speaker on social studies curriculum and instruction

Week 11, day 1 Guest speaker on Law-Related Education and We The People projects

ANNOTATED WEB BIBLIOGRAPHY

Week 11, day 2 through

Week 13, day 1 Microteaching

Week 14, day 1 Unit planning

Week 14, day 2 Assessment of student learning

Week 15, day 1 Classroom management

UNIT PLANS

In planning the schedule, Aaron and I integrated the modules into the schedule so that students would encounter knowledge, skills, and resources prior to the relevant assignments and experiences in the course. The general course schedule had been established by previous instructors, and Aaron adapted that for his use, and we let his schedule determine the points at which the modules would be most useful. Therefore, the original order of the modules was changed as noted above, and the 7th module, on creating webquests, a kind of electronic unit plan, was dropped because of lack of time and redundancy with the final unit plan assignment.

Throughout the semester Aaron and I acted as co-teachers; in some classes we alternated as the lead instructor, with the other chiming in as appropriate. We team-taught Module #5 on unit planning, and the class session on textbook evaluation and use. We worked together in planning several of the class sessions, but in cases where discussion of assigned readings was the focus, Aaron planned and taught the classes with me acting mainly as observer. Aaron also led in all the microteaching sessions, although I participated in most of the debriefing sessions. Aaron did all the grading for the course in his role as instructor of record.

Module #5, on unit planning, was largely replaced by an activity in which Aaron and I used the presentation in the prior class by a person demonstrating Zero Population Growth materials, as the basis for a class session on unit planning. While some of the ideas from the module about technology integration were included in this session, the module itself seemed not to fit the needs of the students at that particular point in the class, so we basically scrapped it.

I made some adaptations in the other modules as I taught them. For instance, when I taught module #2 on lesson planning, I invented a plan on teaching the impeachment process, a very relevant topic at that time. I used the NCREL "engaged learning" lesson planning framework categories, and handed out the example to the students. They also created frameworks for their own lesson plans and shared them with a classmate, who gave a critical analysis and suggestions. A further adaptation came during the class session after this. I invented an example in which I incorporated a legal case on school censorship, Boring vs. Buncombe County Board of Education, that had been denied a writ of certiorari by the Supreme Court on the previous day. I showed how the Internet could be used to locate relevant newspaper articles as well as the original case in preparing a lesson. I then taught the short lesson as a model for them to use in creating microteaching plans, which they were to begin teaching during

the following week. While not originally in the module, the idea of creating and teaching a timely lesson to the class as a model worked out well, and is an example of an adaptation that could be made easily by an instructor.

Evidence of Module Impact in Student Work

Two assignments and activities provided an opportunity to see whether there was any use by students of ideas or skills taught in the modules. Each student created a written microteaching plan and then taught the lesson. Also, they wrote semester end unit plans. Students were generally encouraged in class, but not required specifically in the assignments, to incorporate technology in their preparation.

Microteaching

One minor piece of evidence about module impact was that most (but not all) of the students used NCREL's lesson planning categories as the basis for their micro-teaching plans, even though they had not been required to do so. They were probably influenced by the NCREL format, included in a print source provided as a module support resource (NCREL 1997), and by the model lessons on the impeachment process and writs of certiorari, both of which used the NCREL format.

Another sign that the modules might have been at work is that in about one-third of the micro-teaching lessons, students made explicit reference either to having used the web as a resource in developing the lesson, or presented information while teaching the lesson that came from or referred explicitly to the web. Some of the specific resources they used in microteaching planing were taught in the first and second module.

Unit Plan Content

The culminating assignment of the course was a written unit plan. Here is the short version of the assignment; the longer, one-page, version elaborated expectations but did not add any general expectations or specific requirements relating to including Internet or other computer-related use:

> You will design a ten-lesson unit. The unit should represent the ideas, skills, and values you believe are important in the secondary social studies. Your unit should emphasize rationale, goals, and linkages to national and state curriculum standards/proficiencies.

The unit plan was worth 20% of the course grade, and was evaluated only by Aaron.

Aaron and I read the units independently to determine the extent to which students integrated Internet and other computer use into their planning and specific lesson activities. We did not conduct rigorous reliability checks, but for the two most general categories we agreed exactly on which plans included what kinds of technology integration. We agreed on the 12 students that had students use the Internet as a research tool one or more times in specific lesson activities, and we agreed on the four students who used the Internet solely as a teacher resource in planning their units. For purposes of this paper I analyzed the technology integration in the units more closely than Aaron did.

I grouped the uses of the Internet and other technology in the units into several categories. Here are the categories, with numbers of unit plans in which the category appeared:

- 5 incorporated Internet use specifically into the overview or objectives of the unit, or into objectives of one or more lessons
- 12 incorporated Internet use specifically as a student research tool in one or more lessons
- 17 listed specific Web sites in the unit's list of resources
- 8 incorporated Internet use specifically as a teacher tool in planning or teaching one or more lessons
- 1 incorporated other computer tool use (PowerPoint presentations) by students into one or more lessons
- 2 incorporated other computer tool use (PowerPoint presentations) by the teacher into one or more lessons

Those that discussed Internet use in their unit's overview or objectives treated it as a student research tool. It is interesting that only five included this specifically as part of their overall thinking about their unit and lesson objectives, while half -- 12 of the 24 -- used the Internet in specific lesson activities. I interpret this to mean that most prospective social studies teachers in this group see Internet use as only one of several tools students can use to locate and extract information on a topic or question. To them, "teaching the Internet" is not an objective in its own right.

Some of the specific uses of the Internet in student research activities are noteworthy. One unit devoted a lesson to students using the Internet to test hypotheses about the short-term effects of the Industrial Revolution. Another, on minorities and the law in the U.S., had the students study four legal cases on the Web in preparing to present and debate them. A third unit included a lesson in which students gathered information about mass media influence on the course of the Vietnam War, and followed that by an extended lesson to create a newspaper about the war, in which pictures and other information from the Web were located. A final example, in a unit on Irish immigration to the U.S., concerned several different lessons involving student Internet research activities, and concluded with a critical discussion of the worth of information found on the Web, including how to evaluate its credibility and worth.

These examples indicate a thoughtful and creative approach toward integrating Internet use in social studies teaching. It goes beyond a "tacking on" attitude, in which the unit writers might be trying to please the instructor who grades their plans.

What I don't know is the extent to which the inclusion of the modules and my teaching in the course influenced the students in their planning. They knew their grades on the units did not depend on including Internet or other technology use into the plans. However, I had taught and

modeled ways to use the Internet in planning and teaching, and presented written examples of lesson plans that did that. But their unit planning could also have been influenced by other courses or experiences in their teacher education program. All I can conclude is that the modules and my efforts didn't seem to inhibit this kind of action. Seventeen of the 24 listed Web sites as planning and teaching resources. Half invented specific and meaningful lesson activities featuring Internet use within their units. The one other piece of evidence that suggests that the modules and my teaching might have had an impact is the shift over the semester in the students' responses to a survey, the analysis of which I now turn.

Pre- and Post-Course Survey Results

All 24 students in the class responded to the pre- and post-course survey questions (see Table 1 at the end of the paper) for all questions and percentages responding in each of four possible categories.) The survey was administered during the first day of class, before the syllabus was discussed, and again on the next to last day of classes. One student failed to respond to the last four questions on the post-course survey; otherwise, there are complete data for all items in both administrations.

For all 19 items, there was a positive shift in response percentages from before to after the course, and for many items the changes were quite large. In one item, directly at the core of the modules' purpose, students were asked to respond to: "I know how to apply technology to increase the quality and effectiveness of learning in my content area." They responded as follows:

	Pre	Post
a. ❒ No understanding	0%	0%
b. ❒ Some understanding	75	0
c. ❒ Good understanding	21	58
d. ❒ Very good understanding	4	42

The course-end response distribution included all answering either "good understanding" or "very good understanding," while at the beginning of the course three-quarters answered only "some understanding" of how to apply technology to increase learning in social studies. This is a dramatic shift in students' self-reports.

Another item asked if students "know how to design lessons that integrate technology into instruction and learning." The response percentages were:

	Pre	Post
a. ❒ No understanding	4%	0%
b. ❒ Some understanding	75	13
c. ❒ Good understanding	21	75
d. ❒ Very good understanding	0	13

Again, it can be seen that a pronounced shift occurred, so that the modal response became "good understanding" by the end of the course from "some understanding" at its beginning.

The modules were web-based and emphasized web use as a resource in teaching social studies, so it is important to examine the items that focused on that aspect. One item asked, "I know how the World Wide Web can support teaching and learning in my content area." Responses were:

	Pre	Post
a. ❒ No knowledge	8%	0%
b. ❒ Some knowledge	21	4
c. ❒ Good knowledge	46	29
d. ❒ Very good knowledge	25	67

Whereas before the class started the students spread their responses over all four categories, with "good knowledge" the modal response, at the end of the class two-thirds of them responded "very good knowledge." Further, more students at the end of the class than at the beginning believed they could "find Web-based resources that are relevant to teaching and learning -- this was a main goal of module #4. Their pre- and post-response percentages to this item were:

	Pre	Post
a. ❒ No understanding	0%	0%
b. ❒ Some understanding	44	4
c. ❒ Good understanding	44	38
d. ❒ Very good understanding	13	58

The intent of module #5 was to provide a framework for evaluating web-based information, asserted by Risinger to be a paramount goal of social studies teaching as it relates to use of the Internet (1998). Students responded much more confidently on their post-course surveys than at the beginning of the course that they "...know how to evaluate the quality of Web-based resources that are relevant to teaching and learning," with nearly all claiming either "good" or "very good" understanding at course end:

	Pre	Post
a. ❒ No understanding	22%	0%
b. ❒ Some understanding	57	8
c. ❒ Good understanding	22	50
d. ❒ Very good understanding	0	42

Causal claims cannot be made about the impact of the social studies course modules on self-reported students' knowledge, confidence, and valuing of technology use in teaching, but the pre-post data indicate that there were very positive changes during the semester. The strength and consistency of percentage distribution differences is noteworthy, and, together with evidence from the content of their semester-end unit plans described above, give some reason for hope about the efficacy of the modules.

Conclusion and Implications

Notwithstanding my hopefulness, the reality is that these methods students might have written the same units without my instruction, or the module's content, added to the course. My discussion with Aaron about subsequent methods classes he's taught suggest that his students increasingly use the web as a research tool in planning lessons and units without me or my

modules. Aaron himself has not used the modules in any way in teaching the course during the two semesters following our team teaching, nor has he attempted any explicit teaching of how to incorporate the web into planning or teaching social studies instruction. Aaron indicates that he has used some of the ideas and approaches about textbook evaluation and use, as well as lesson and unit planning, that we created together, and in that way I might have influenced him.

Based on my experience in teaching with these modules, I conclude that it is the teacher, not freestanding modules that will make a difference in the extent to which methods class students integrate technology into their thinking and actions regarding social studies instruction. My teaching of the modules in his course was not enough to seduce Aaron into adopting or adapting them when he taught alone. His only concession to the idea of technology infusion is to say that as a result of working with me he is more tolerant and less resistant to using the web as a tool in social studies teaching, and now points out to his students that it is a rich source of information, if evaluated and used wisely.

The modules are on the web, and I might use parts of them in my own teaching. Whether others decide to adopt or adapt them remains to be seen. But I'm doubtful that this approach is an effective way to change the teacher education curriculum.

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Table 1
Learning With Technology Pre- and Post-Course Survey Questions and Percentage Responses (N=24)
(Percents might not total 100 due to rounding errors)

Read the following statements and check the box next to the response that most closely matches your knowledge, skills, and beliefs.

1. I understand the principles of engaged learning.

	Pre	Post
a. ❒ No understanding	8%	0%
b. ❒ Some understanding	67	4
c. ❒ Good understanding	21	58
d. ❒ Very good understanding	4	38

2. I know how to apply technology to increase the quality and effectiveness of learning in my content area.

	Pre	Post
e. ❒ No understanding	0	0
f. ❒ Some understanding	75	0
g. ❒ Good understanding	21	58
h. ❒ Very good understanding	4	42

3. I value using technology in my content area.

	Pre	Post
a. ❒ Not valuable	0	0
b. ❒ Somewhat valuable	29	0
c. ❒ Moderately valuable	25	42
d. ❒ Very valuable	46	58

4. I know how to design lessons that promote engaged learning.

	Pre	Post
a. ❒ No understanding	13	0
b. ❒ Some understanding	71	13
c. ❒ Good understanding	13	75
d. ❒ Very good understanding	4	13

5. I know how to design lessons that integrate technology into instruction and learning.

	Pre	Post
e. ❒ No understanding	4	0
f. ❒ Some understanding	75	13
g. ❒ Good understanding	21	75
h. ❒ Very good understanding	0	13

6. **I have had access to sample lessons that demonstrate the effective use of technology in my content area.**

	Pre	Post
a. ❒ No access	38	0
b. ❒ Some access	50	29
c. ❒ Good access	0	46
d. ❒ Very good access	13	25

7. **It is valuable to have access to sample lessons that demonstrate the effective use of technology in my content area.**

	Pre	Post
a. ❒ Not valuable	0	0
b. ❒ Somewhat valuable	17	0
c. ❒ Moderately valuable	17	29
d. ❒ Very valuable	67	71

8. **I have had the opportunity to observe and learn from other teacher education students who are using technology in their teaching (e.g. through videotapes, CD-ROMs, live classrooms, etc.).**

	Pre	Post
a. ❒ No opportunity	33	8
b. ❒ Some opportunity	38	50
c. ❒ Good opportunity	21	29
d. ❒ Very good opportunity	8	13

9. **I have had the opportunity to observe and learn from university instructors how to effectively use technology in instruction (e.g. through videotapes, CD-ROMs, live classrooms, etc.).**

	Pre	Post
a. ❒ No opportunity	25	0
b. ❒ Some opportunity	50	46
c. ❒ Good opportunity	25	38
d. ❒ Very good opportunity	0	17

10. **I have had the opportunity to observe and learn from classroom teachers how to effectively use technology in instruction (e.g. through videotapes, CD-ROMs, live classrooms, etc,).**

	Pre	Post
a. ❒ No opportunity	29	8
b. ❒ Some opportunity	58	46
c. ❒ Good opportunity	8	33
d. ❒ Very good opportunity	4	13

11. I have had the opportunity to practice using technology in my teaching.

	Pre	Post
a. ❒ No opportunity	46	21
b. ❒ Some opportunity	46	38
c. ❒ Good opportunity	4	33
d. ❒ Very good opportunity	4	8

12. I am familiar with Listservs, E-mail, and other forms of electronic communication.

	Pre	Post
a. ❒ No familiarity	0	0
b. ❒ Some familiarity	38	0
c. ❒ Good familiarity	29	42
d. ❒ Very good familiarity	33	58

13. Listservs, E-mail, and other forms of electronic communication are valuable ways of corresponding with educators in order to improve my teaching.

	Pre	Post
a. ❒ Not valuable	4	0
b. ❒ Somewhat valuable	13	4
c. ❒ Moderately valuable	29	42
d. ❒ Very valuable	54	54

14. I know how the World Wide Web can support teaching and learning in my content area.

	Pre	Post
e. ❒ No knowledge	8	0
f. ❒ Some knowledge	21	4
g. ❒ Good knowledge	46	29
h. ❒ Very good knowledge	25	67

15. It is important to integrate the World Wide Web into my content area.

	Pre	Post
a. ❒ Not important	0	0
b. ❒ Somewhat important	17	4
c. ❒ Moderately important	25	38
d. ❒ Very important	58	58

16. I know how to find Web-based resources that are relevant to teaching and learning.

	Pre	Post
e. ❒ No understanding	0	0
f. ❒ Some understanding	44	4
g. ❒ Good understanding	44	38
h. ❒ Very good understanding	13	58

17. I know how to evaluate the quality of Web-based resources that are relevant to teaching and learning.

	Pre	Post
e. ❒ No understanding	22	0
f. ❒ Some understanding	57	8
g. ❒ Good understanding	22	50
h. ❒ Very good understanding	0	42

18. I understand how to integrate other types of technology (non Web-based) into my content area.

	Pre	Post
a. ❒ No understanding	13	0
b. ❒ Some understanding	83	21
c. ❒ Good understanding	4	54
d. ❒ Very good understanding	0	25

19. It is important to integrate other types of technology (non Web-based) into my content area.

	Pre	Post
a. ❒ Not important	4	0
b. ❒ Somewhat important	26	21
c. ❒ Moderately important	35	54
d. ❒ Very important	35	25

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