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ABSTRACT
              The Preparing Tomorrow's Teachers for Technology grant at
Morehead State University, Kentucky, was designed to have an immediate,
simultaneous impact on the education of teacher candidates, professional
development of university faculty, and curriculum reform. In the third year
of the grant (2002-2003), evaluation focused on the integration of technology
into teacher education courses. Data were collected through interviews with
92 teacher education faculty members and the content analysis of 240 syllabi
for the same courses. The unit of analysis was the course. Analysis of
interview and syllabus data shows that although 100% of the faculty
interviewed reported integration of technology into the courses, there were
differences among the technology standards incorporated. Analysis of course
syllabi shows 15 courses with no mention of technology integration.
Discrepancies in the data and the next steps toward curriculum integration
and alignment are discussed. An appendix contains state and National
Educational Technology standards for technology integration. (Author/SLD)

Running head: EVALUATING THE INTEGRATION OF TECHNOLOGY

Evaluating the Integration of Technology in a Teacher Preparation Program

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Abstract

The Preparing Tomorrow's Teachers for Technology (PT³) grant at Morehead State University was designed to have an immediate, simultaneous impact on the education of teacher candidates, professional development of university faculty, and curriculum reform. In the third year of the grant (2002-2003), evaluation focused on the integration of technology into teacher education courses. Data were collected through (1) interviews with teacher education faculty, and (2) content analysis of syllabi for the same courses (N=240). The unit of analysis was the course. Analysis of the interview and syllabi data found that although 100% of the faculty interviewed reported integration of technology into the courses, there were differences among the technology standards incorporated. Analysis of course syllabi found 15 of the courses with no mention of technology integration. Discrepancies between the data as well as the next steps toward curriculum integration and alignment are discussed.

Evaluating the Integration of Technology in a Teacher Preparation Program Purpose of the Study

The context for this study is the teacher education program at Morehead State University, a regional state university of approximately 9,000 students in northeastern Kentucky. The university's Preparing Tomorrow's Teachers for Technology (PT^3) grant, funded in 2000, was designed to have an immediate, simultaneous impact on the education of teacher candidates, professional development of university faculty, curriculum reform, and provision of technology rich field experiences.

Purpose of the Study

This evaluation study was undertaken during the third year (2002-2003) of the PT3 grant to examine the level of technology integration in courses in the teacher education program. The study was planned to yield information for both grant evaluation and National Council for Accreditation of Teacher Education (NCATE) program documentation. The evaluation goal measured by the study was one of five goals established at the time of the grant proposal: ***The number of the university's faculty who effectively model technology-based instructional strategies and practices will double within five years.***

This goal had been measured the first two years of the grant by paper-and-pencil surveys. The first year a faculty survey queried the use and integration of "technology" as a single entity. This lack of definition resulted in somewhat ambiguous results, yet provided some baseline data.

The second year a survey instrument designed around the sixteen performance criteria of Kentucky's New Teacher Technology Standard IX (Appendix) was used to delineate aspects of technology. This Kentucky's New Teacher Technology Standard is one of nine New Teacher Standards that frame Kentucky's teacher education programs. Further, these Standards are used as evaluative criteria for teacher interns. Passing the year long, standards-based evaluation during

the intern year is a requirement for teacher certification in Kentucky. Thus, the second-year survey instrument had better content validity than the instrument used the first year. Yet, a very low return (N=14) the second year inhibited generalizing the results across the teacher education faculty and courses. The first author of this study was employed as evaluator for the third and fourth years of the grant.

Theoretical Framework

In 1995, NCATE introduced technology expectations for schools of education and in 2000 issued updated accreditation standards that increased accountability for the integration of technology in teacher education programs. Paper-and-pencil and online surveys have frequently been used to evaluate technology integration in teacher education programs (e.g., Gershner, Snider, Huestis & Foster, 2000; Jacobsen, 1998; Vannatta, 2000).

The use of structured interviews (Patton, 1990), and content analysis (Airasian & Gay, 2002) of course syllabi using state (Education Professional Standards Board, 1999) and national (International Society for Technology in Education, 2003; NCATE, 2003) technology standards as guides is presented to offer new approaches to integration evaluation.

Method

Two data sources were used for the study: (1) face-to-face faculty interviews using a standards-based instrument, and (2) content analysis of teacher education program course syllabi. The unit of analysis for this study was the individual course. The measures obtained for the study were not independent as individual faculty members provided interview data for more than one course and designed more than one syllabus.

In spring 2003, course syllabi for 240 separate courses were available electronically on the College of Education's NCATE Web site at Morehead State University. This list of syllabi

was printed and served as the target population of faculty members for the interviews. (By fall of 2003 an additional 20 course syllabi were placed on the College of Education's website, thus, the percentage of courses in the teacher education program evaluated for this study was 93.2%.)

Faculty interview data collection.

The graduate student working with the project contacted by phone and arranged face-to-face interviews with all faculty teaching the 240 courses (N=92). The graduate student used the Kentucky New Teacher Technology Standards-based instrument to collect data during the interview. Each interview was recorded on a separate data sheet.

The technology categories on the Kentucky New Teacher Technology Standards-based instrument were then coded using the National Educational Technology Standards (NETS) (International Society for Technology in Education, 2003) (Appendix). The six NET Standards allowed for additional comparisons of the interview data. The faculty interview data were analyzed using Statistical Analysis Software (SAS).

Syllabi content analysis.

The course syllabi all 240 courses were available in electronic format on Morehead State University's College of Education's website. The graduate student accessed each syllabus in Microsoft word format and used the word search function to identify technology requirements in the syllabus. These were copied and pasted as qualitative data into a database. The six NETS were used to code the qualitative data. Course labels and NETS codes were then entered into an Excel spread sheet and were analyzed using Excel.

Results

Structured interviews with faculty. Aggregate data from the structured faculty interview presented in Table 1 below.

Table 1. Faculty Interviews on Integration of Technology Standards (N=240 Courses)

Kentucky New Teacher Standard IX	Frequency and Percentage of Courses in Which Standard is Taught	National Educational Technology Standard (NETS)
1. Operates a multimedia computer and materials to install and use a variety of software.	163 (67.9%)	I
2. Uses terminology related to computers and technology appropriately in written and verbal communication.	190 (79.2%)	I
3. Demonstrates knowledge of the use of technology in business, industry, and society.	170 (70.8%)	I
4. Demonstrates basic knowledge of computer/peripheral parts and attends to simple connections and installations.	123 (51.2%)	I
5. Creates multimedia presentations using scanners, digital cameras, and video cameras.	145 (60.4%)	III
6. Uses the following to enhance professional productivity and support instruction: (a) computer to do word processing,	185 (77.1%)	V, II
(b) create databases and spreadsheets,	129 (53.8%)	V, II
(c) access electronic mail,	199 (82.9%)	V, II
(d) access and use the Internet,	219 (91.2%)	V, II
(e) make presentations,	167 (69.6%)	V, II
7. Uses the following to enhance professional productivity and support instruction: computer to do word processing,	152 (66.3%)	V, II
(a) audio/video conferencing,	47 (20.3%)	V, II
(b) other distance learning applications.	51 (21.2%)	V, II
8. Requests and uses appropriate assistive and adaptive devices for students with special needs.	77 (37.7%)	III, VI
9. Designs lessons that use technology to address diverse student needs and learning styles.	150 (62.5%)	III, VI
10. Practices equitable and legal se of computer and technology in professional activities.	146 (60.8%)	VI
11. Facilitates lifelong learning of self and others through the use of technology.	159 (66.3%)	V
12. Explores technology resources; software, applications, and related documentation;	157 (65.4%)	II
13. Applies researched-based instructional practices that use computers and other technology.	137 (57.1%)	II
14. Uses computers and other technology for individual, small group, and large group learning activities.	185 (77.1%)	II
15. Uses technology to support multiple assessments of student learning.	119 (49.6%)	IV
16. Instructs and supervises students in the ethical and legal use of technology.	123 (51.2%)	VI

Interviews were conducted with faculty teaching 240 of the 260 (92.3%) courses in the teacher education program at Morehead State University. All of the faculty members interviewed reported integration of technology in the courses they taught. The data in Table 1 indicate that the performance criteria integrated into the highest percentage of courses is criteria six "Uses the following to enhance professional productivity and support instruction...access and use of the Internet (91.2%)." The technology performance criterion with the lowest percentage of course integration was number seven, "Uses the following to enhance professional productivity and support instruction. . . audio/video conferencing (20.3%)."

The NET Standard most frequently integrated in the teacher education courses was Standard II, " PLANNING AND DESIGNING LEARNING ENVIRONMENTS AND EXPERIENCES..." (International Society for Technology in Education, 2003, p. 1). The NET Standard least frequently integrated was Standard IV, "IV.ASSESSMENT AND EVALUATION. *Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies...*" (International Society for Technology in Education, 2003, p. 2).

Syllabi content analysis. Table 2 below presents the Frequencies and Percentages of the National Educational Technology Standards (NETS) by course. Thus, 213 of the 240 courses (88.8%) included NETS I, Technology Operations and Concepts. This was the most frequently mentioned NET Standard in course syllabi. The least frequently mentioned NET Standard in course syllabi was Standard VI, Social, Ethical, Legal, and Human Issues.

Table 2. Frequencies and Percentages of NETS Standards in Course Syllabi (N=240)

National Educational Technology Standard	Number of Courses Including Standard	Percentage of Courses Including Standard
I Technology Operations and Concepts	213	88.8%
II Planning and Designing Learning Environments and Experiences	55	22.9%
III Teaching, Learning, and the Curriculum.	63	26.3%
IV Assessment and Evaluation.	41	17.1%
V Productivity and Professional Practice.	49	20.4%
VI Social, Ethical, Legal, and Human Issues	20	8.3%

The frequencies and percentages in Table 2 do not sum to 240 or 100% because the course syllabi often included more than one standard. On the other hand, some course syllabi--surprisingly--included no mention of technology. This was surprising because faculty members have been strongly encouraged to include course objectives linked to Kentucky's New Teacher Standards. Further, this strong encouragement extended to the NCATE standards--and technology had been emphasized throughout the teacher education program via the PT3 grant. Nevertheless, the data in Table 3 below indicate that the syllabi for 15 of the courses did not mention technology.

Table 3. Frequencies and Percentages of NETS in Individual Course Syllabi

Number of Technology Standards in Syllabi	Number of Courses	Percentage
No technology use mentioned in syllabi	15	6.3%
One NET Standard included in syllabi	128	53.3%
Two NET Standards included in syllabi	47	19.6%
Three NET Standards included in syllabi	26	10.8%
Four NET Standards included in syllabi	8	3.3%
Five NET Standards included in syllabi	6	2.5%
Six NET Standards included in syllabi	10	4.1%
Total	240	99.9%

Discussion

Through the faculty interviews, the evaluation team learned that technology integration has increased at Morehead State University over the past three years. Learning that 100% faculty teaching 240 teacher education courses (92.3% of all courses in the program) had integrated technology into their course was a surprising finding.

Further, technology was better defined in this evaluation study by considering both the Kentucky New Teacher Technology Standard IX and the National Educational Technology Standards developed by the International Society for Technology in Education (ISTE). When compared, Kentucky's Technology Standard and the NETS have much in common, yet have differences. The NETS are more broadly defined and seem to be less prescriptive. For example the NETS use the inclusive term "technology" throughout. In contrast, the Kentucky New Teacher Technology Standard IX delineates specific technologies in some of the Performance Criteria, for example, "6. Uses the computer to do word processing, create databases and spreadsheets, access electronic mail and the Internet, make presentations, and uses other emerging technologies to enhance professional productivity and support instruction" (Education Professional Standards Board, 1999, p. 1).

The very surprising finding from this study was that 15 courses had no mention of technology in the course syllabi. Informal discussions of syllabus writing and style among teacher education faculty may explain some discrepancies between interview data and syllabi data. Unless faculty members were very familiar with the six NET Standards, we would not expect to find all six of these standards listed in the syllabus.

The next steps being discussed among teacher education faculty members is developing an integrated technology curriculum, that is, identifying the aspects of technology that the

candidates will need to be able to know and be able to use as they enter teaching then specifying the course or courses in which the knowledge and skills will be developed. Not every course needs to integrate all six NETS or all 16 performance criteria of the Kentucky's New Teacher Technology Standard IX; however, all should be integrated in a systematic way throughout the teacher education curriculum. The next steps in the process are to (1) have open discussions about writing course syllabi, and (2) take a "curricular view" for technology integration. The methodology used in this evaluation study resulted in very positive reactions from faculty members, good interviewing experience for the graduate student, and a deeper understanding of "technology" by all.

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APPENDIX

Kentucky New Teacher Technology Standard IX

National Educational Technology Standards (NETS)

NEW TEACHER STANDARD IX (Education Professional Standards Board, 1999).

DEMONSTRATES IMPLEMENTATION OF TECHNOLOGY

The teacher uses technology to support instruction; access and manipulate data; enhance professional growth and productivity; communicate and collaborate with colleagues, parents, and the community; and conduct research.

PERFORMANCE CRITERIA:

The extent to which the teacher:

1. Operates a multimedia computer and peripherals to install and use a variety of software.
2. Uses terminology related to computers and technology appropriately in written and verbal communication.
3. Demonstrates knowledge of the use of technology in business, industry, and society.
4. Demonstrates basic knowledge of computer/peripheral parts and attends to simple connections and installations.
5. Creates multimedia presentations using scanners, digital cameras, and video cameras.
6. Uses the computer to do word processing, create databases and spreadsheets, access electronic mail and the Internet, make presentations, and uses other emerging technologies to enhance professional productivity and support instruction.
7. Uses computers and other technologies such as interactive instruction, audio/video conferencing, and other distance learning applications to enhance professional productivity and support instruction.
8. Requests and uses appropriate assistive and adaptive devices for students with special needs.
9. Designs lessons that use technology to address diverse student needs and learning styles.
10. Practices equitable and legal use of computers and technology in professional activities.
11. Facilitates the lifelong learning of self and others through the use of technology.
12. Explores, uses, and evaluates technology resources: software, applications, and related documentation.
13. Applies research-based instructional practices that use computers and other technology.
14. Uses computers and other technology for individual, small group, and large group learning activities.
15. Uses technology to support multiple assessments of student learning.
16. Instructs and supervises students in the ethical and legal use of technology.

National Educational Technology Standards (NETS)
     Educational Technology Standards and Performance Indicators for All Teachers
     (International Society for Technology in Education, 2003, pp. 1-3)

I.   TECHNOLOGY OPERATIONS AND CONCEPTS.
Teachers demonstrate a sound understanding of technology operations and concepts. Teachers:
    A.   demonstrate introductory knowledge, skills, and understanding of concepts related to technology (as described in the ISTE National Education Technology Standards for Students)
    B.   demonstrate continual growth in technology knowledge and skills to stay abreast of current and emerging technologies.

II.   PLANNING AND DESIGNING LEARNING ENVIRONMENTS AND EXPERIENCES.
Teachers plan and design effective learning environments and experiences supported by technology. Teachers:
    A.   design developmentally appropriate learning opportunities that apply technology-enhanced instructional strategies to support the diverse needs of learners.
    B.   apply current research on teaching and learning with technology when planning learning environments and experiences.
    C.   identify and locate technology resources and evaluate them for accuracy and suitability.
    D.   plan for the management of technology resources within the context of learning activities.
    E.   plan strategies to manage student learning in a technology-enhanced environment.

III.   TEACHING, LEARNING, AND THE CURRICULUM.
Teachers implement curriculum plans, that include methods and strategies for applying technology to maximize student learning. Teachers:
    A.   facilitate technology-enhanced experiences that address content standards and student technology standards.
    B.   use technology to support learner-centered strategies that address the diverse needs of students.
    C.   apply technology to develop students' higher order skills and creativity.
    D.   manage student learning activities in a technology-enhanced environment.

IV.   ASSESSMENT AND EVALUATION.
Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies. Teachers:
    A.   apply technology in assessing student learning of subject

  matter using a variety of assessment techniques.
B. use technology resources to collect and analyze data,
  interpret results, and communicate findings to improve
  instructional practice and maximize student learning.
C. apply multiple methods of evaluation to determine students'
  appropriate use of technology resources for learning, communication, and
  productivity.

V. PRODUCTIVITY AND PROFESSIONAL PRACTICE.
Teachers use technology to enhance their productivity and
professional practice. Teachers:
A. use technology resources to engage in ongoing professional
  development and lifelong learning.
B. continually evaluate and reflect on professional practice to
  make informed decisions regarding the use of technology in
  support of student learning.
C. apply technology to increase productivity.
D. use technology to communicate and collaborate with peers,
  parents, and the larger community in order to nurture
  student learning.

VI. SOCIAL, ETHICAL, LEGAL, AND HUMAN ISSUES.
Teachers understand the social, ethical, legal, and human
issues surrounding the use of technology in PK-12 schools and apply
those principles in practice. Teachers:
A. model and teach legal and ethical practice related to
  technology use.
B. apply technology resources to enable and empower learners with diverse
  backgrounds, characteristics, and abilities.
C. identify and use technology resources that affirm diversity.
D. promote safe and healthy use of technology resources.
E. facilitate equitable access to technology resources for all students.

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