Which Way for Which Teacher? Comparing Two Graduate Courses that Teach Technology Integration to Teachers

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Abstract

This brief paper describes a comparison of two different courses, both of which have been approved by the state of Georgia's Professional Standards Commission (PSC). These courses fulfill the PSC requirement that all teachers be competent with technology and know how to integrate technology into teaching and learning by the year 2006. The method of comparison was document analysis. Each of these courses has been approved to by the state as meeting the "Special Technology Requirement," but there are many contrasting elements. A description is given of how each course addresses the common topics taught by the courses and then a rating is assigned for each course on how thoroughly it addresses each topic. After the content analysis of each class was conducted, data from another study reporting the amount of time spent by students in the courses studied was incorporated to add depth to the comparison of the courses.

Study Rationale

In 2000 the Georgia state legislature passed House Bill 1187 which became the A+ Education Reform Act of 2000. A part of that act requires that all certified teachers in the state meet a technology requirement in order to keep their teaching certificates current. There are currently at least three different ways that in-service teachers – teachers that have previous certification and are currently teaching in Georgia schools – can meet that requirement at the University of Georgia. One way is a professional development model called InTech offered by the University's Educational Technology Training Center (ETTC). Another way is a class offered by the Department of Instructional Technology called EDIT 6150 – Introduction to Computer-based Education. The third option is EDIT 6150 offered as an online class rather than through a more traditional face-to-face method. The expressed purpose of each of these courses is to prepare teachers to be able to better use modern technologies in their teaching practices.

In the literature there are various examples of individual programs for training teachers how to integrate technology into their curriculum. The reports about these describe attributes of each program and why those involved view these programs as successful. For example, Norton and Gonzales (1998) describe a regional educational technology agency's attempt to meet the needs of the teachers in their service area. They point out in their report that there are several components that teachers being trained feel are key to the success of the course and are key to helping them to reach the course objectives. Some of those are the fact that other teachers teach the course and that integration is emphasized rather than skills. In the same report, instructors give input as to what they feel are significant components of the course. Similar to the opinions of the teachers taking the course, the instructors feel that the philosophy of curriculum integration of the technology is important. They also agree that having a team of teachers teaching the course is a significant feature.

Another article discusses teachers' levels of concern for using technology (Gonzales, Pikett, and Ruppert, 2002). In this article, the authors suggest a relationship between a teacher's level of concern for using technology and their skills and support to do so. The more skills and support that teachers have with dealing with technology, the higher their level of concern for using technology in their teaching will be. Another program (Moersch, 2001) takes the opposite approach and connects a teacher's current use of technology to his or her need for further professional development in technology. In other words, rather than suggesting that teachers need certain professional development to be able to integrate technology, their current level of technology integration determines what kind of professional development they might need.

Is summary, there are examples of studies that describe individual programs or courses and then there are studies that describe levels of skills and experiences with technology of the people taking the classes. It is the researchers goal to take information from these studies and go further in an attempt to compare different programs in an attempt to discern which type of course is best for which type of teachers according to their nature, technical skills and past experiences.

Research Problem and Questions

There are many options for teachers who need to meet the technology requirement that the State of Georgia has mandated. A complete list of options can be found on the PSC's website at http://www.gapsc.com/ApprovedPrograms/EducationProgram.asp?technology=yes . There is a diversity of skills and previous experiences of teachers in those classes. Further, there are many people who are continuing to develop new courses to distribute and are modifying existing courses to meet this requirement.

This study seeks to compare two of the existing courses that teach technology integration to teachers in an attempt to inform instructors and potential course participants of which type of course is best for teachers of different skill levels and experiences. In doing so, the researchers must ask these questions: What key topics are covered by each individual course? How are different topics covered? Finally, what kinds of prerequisite skills are needed to be able to be successful with each topic?

Research Design

Site

The site for this study is the Department of Instructional Technology at the University of Georgia. The University of Georgia has one of the largest Colleges of Education in the country, and as such, serves not only a great many of the state's educators, but also educators that represent every demographic in the state. An impetus for this study is to become better informed of the variety of options teachers have for fulfilling the state technology recertification requirements.

In order to provide a richer context for the evaluation of student experience in each course, time-on-task data was also collected on the courses using a web-based log tool (Amiel, McClendon, & Orey, 2003). Students were asked to input the amount of time spend every week of class. The student log categories represent a comprehensive list of time consuming activities that are part of the course: class time, group time online, group time face-to-face, time spent working individually, technology problems, travel, message posting/boards, and other. Data from these logs were not collected for comparative purposes, but instead to provide another dimension for the analysis of in-class characteristics (for a discussion, see Clark, 1983, 1994; Ehrmann, 1995; Paulson, 2002).

Sample and Sample Selection

This study used as its sample one section of each of the two courses during the same semester. Time-on-task data was collected on both courses. Participants were self-selected and received extra credit for recording their time-on-task data using the web-based log tool once a week. The first course (online) had an enrollment of 21 and 11 participants; the second course (f2f) had an enrollment of 19 and 10 participants.

Data Analysis and Procedures

The course materials including syllabi, required texts, and assignment descriptions served as data and were analyzed according to the International Society for Technology in Education's National Educational Technology Standards (ISTE-NETS) categories. For a course to be approved by the PSC as meeting the special technology requirement, it must address the state's technology standards, which were adopted from the ISTE-NETS. In the ISTE-NETS there are twenty-three standards divided into six different topical areas. A complete, detailed list of these standards can be found on ISTE's website at http://cnets.iste.org/teachers/t_stands.html. After it was determined how each course addressed each topic, the primary researcher rated how well that topic was covered. She then consulted with the other researchers to confirm her findings. In order to rate how each course performed in addressing each topic, the researchers used a scale of one to five with descriptions of what would be seen as evidence of covering the topic at each level. The scale follows.

1 - Addressed only in an introductory nature such as by mentioning in lecture.

2 - Addressed mostly by discussion but with some practice or application.

3 - Addressed by an assignment that the student must complete. Often covered as a secondary objective to another assignment.

4 - Addressed by at least one assignment and one other method such as discussion, reading assignment, secondary objective of a lesson, etc.

5 - Directly and specifically addressed by multiple assignments on the topic.

Findings

Below is a description of each course including student demographics and information about the relationship of the researchers to the courses. The results of the analysis are then presented per ISTE-NETS topic for each course.

Descriptions of Each Course

EDIT 6150 Face-to-face

This course is offered as a traditional graduate level face-to-face class in 15 weekly meetings for 3-hours each over the span of a 15-week semester. Class discussions, technology skills, and software demonstrations are all a part of the course. A wide variety of students take this class including in-service and pre-service teachers, people who work in schools but not as teachers, and non-education majors.

EDIT 6150 Online

In this online course, the first class session has a face-to-face requirement. All 14 remaining sessions take place in a live online classroom. The online environment, HorizonLive, includes slides, live demonstrations and 2-way voice-over-IP audio. These live sessions last 2 hours each and take place over the course of the 15-week semester. In addition to the synchronous instruction, a variety of asynchronous requirements and supplements exist including required discussion threads, optional step-by-step software guides, professionally developed self-instructional software (from NetG), and other materials and activities. The student demographics of this course are similar to that of 6150 face-to-face.

Technology operations and concepts

Teachers demonstrate a sound understanding of technology operations and concepts. The face-to-face section of EDIT 6150 addresses technology operations and concepts through classroom activities and several of the course required activities such as a word processing assignment and a PowerPoint assignment. Time during class is devoted to technical assistance and certain individuals in the class are identified as technicians and tech tip teachers to help those that need personal assistance.
Rating: 5

EDIT 6150 Online uses several different web-based and print-based resources to help teachers with operations and concepts. Since the delivery of the course is online, there is no scheduled time that the students meet in person with others in the class or the instructor. However, the instructor does offer to be available to the students if they request a personal help session. The instructor also covers some of the concepts during class presentations delivered online.
Rating: 4

Planning and designing learning environments and experiences

Teachers plan and design effective learning environments and experiences supported by technology. Two of the six deliverable assignments for EDIT 6150 face-to-face are lessons that are to be designed for implementation with students. Those deliverables are a cognitive tool lesson and a final project that could be done in the form of a WebQuest, PowerPoint Game, or some other negotiated project. The course meetings provide a forum for discussion of these learning environments during the semester. Course readings that introduce ideas for technology supported learning environments and experiences are also included.
Rating: 5

EDIT 6150 online has students design three different learning environments. Those three assignments are a cognitive tool lesson, a WebQuest, and an open-ended project that is similar to the final project of the face-to-face class above. Each student's WebQuest and open-ended project idea is discussed via the discussion threads used as a part of the course.
Rating: 5

Teaching, learning, and the curriculum

Teachers implement curriculum plans that include methods and strategies for applying technology to

maximize student learning.

EDIT 6150 face-to-face requires that students develop their cognitive tool lesson and final project to be used with learners but does not require that they actually be implemented with the target audience. Again, class discussion and readings support the ideas needed to generate these products.
Rating: 3

EDIT 6150 online has its participants implement the WebQuest and the open-ended project with at least three learners from the target audience. Evidence of implementation is shown by photo documentation of the learners participating in the lesson. The cognitive tool lesson is planned so that it could be implemented, but evidence of implementation is not required.
Rating: 5

Assessment and evaluation

Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies. EDIT 6150 face-to-face uses rubrics for each required assignment. By having students in the class be assessed by a rubric, they can see the value of having a rubric for assessment. Also, they complete a software evaluation activity using a rubric, which further illustrates the value of a rubric. Additionally, the cognitive tools lesson focuses on how students can use technology to assess and evaluate information.
Rating: 4

EDIT 6150 online addresses this topic similarly to the face-to-face version of the course. Each assignment has a rubric to which the students in the class are held accountable. Also, the cognitive tools lesson has the students applying their knowledge of how different technologies can be used for assessing and evaluating information.
Rating: 4

Productivity and professional practice

Teachers use technology to enhance their productivity and professional practice. For both of the courses, the act of enrolling in the course to learn more about technology in education demonstrates their willingness to enhance their professional practice through the use of technology. However, each class also adds other components to this topic.

EDIT 6150 face-to-face has a journal requirement that students must keep and include in their web-based portfolio. Additionally, they include a description of how each activity that they complete as a student in class could be used by their own students in the classes that they teach.
Rating: 5

EDIT 6150 online makes use of the discussion thread in the online class room in order to facilitate a dialogue about how the course topics relate to their own practice. Also, participants are required to create a web-based portfolio for the course and in there must have a reflection on each activity that they have completed as a result of the course.
Rating: 5

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. Both sections of EDIT 6150 have a component to the cognitive tools lesson and the final/open-ended projects that asks students to reflect on affordances that are offered by technology to the learning activity. Both classes also cover the topics of social, ethical, legal and human issues in assigned readings and discussions.
Rating: 4

Time on task

Students were asked to log the amount of time spent on a comprehensive list of activities. Data entered by the students was saved into a database and exported into a spreadsheet program for analysis (Table 1). Each log entry was examined for consistency. The semester was composed of 15 weeks, so students who entered less than 12 logs were not considered for analysis. Since each class met once a week, it is reasonable to expect that students could miss a number of classes, or simply do no measurable work for class during a specific week.

Table 1. *Average times on task per student per week by category*

Category	6150 online (N=11)		6150 f2f (N=10)	
	Average Minutes	Average Hours	Average Minutes	Average Hours
Class time	93.73	1.56	132.43	2.21
Groupwork online	3.36	0.06	3.23	0.05
Groupwork f2f	0	0	10.97	0.18
Individual work	125.70	2.09	85.27	1.42
Message posting	28.11	0.47	16.15	0.27
Technology problems	18.38	0.47	8.50	0.14
Travel	13.88	0.31	42.62	0.71
Other	6.45	0.11	3.80	0.06
Total	289.61	4.83	302.97	5.05

Participants in this study were self-selected, and as such, a generalization to the whole class would seem difficult. Still the variance of data is so substantial (online, N=11, M = 4344.09, S = 2378.85; f2f, N=10, M = 4544.50, S = 1724.09) that a reasonable degree of confidence can be exercised when discussing the results as representative of the whole class. Were this a time comparison study, it would be easy to note that no significance differences exist between the courses in terms of total time-on-task per student (Table 2). Examining the specific categories provides a better context for the examination.

Table 2. *Total time-on-task per student*

6150 online		6150 f2f	
Total Minutes	Total Hours	Total Minutes	Total Hours
1787	29.78	2110	35.17
2445	40.75	2542	42.37
2458	40.97	3313	55.22
2480	41.33	3665	61.08
3440	57.33	3980	66.33
3745	62.42	4755	79.25
3980	66.33	5465	91.08
4660	77.67	5970	99.50
5585	93.08	6150	102.50
8290	138.17	7495	124.92
8915	148.58		

Data confirm some of the traditional assumptions regarding online courses. Students in the online classroom traveled less than those in the face-to-face class. It is not possible to ascertain whether travel time was a defining factor in choosing the course either of these courses. Still, since these courses were offered simultaneously, the data suggest that travel time might have been an important factor in choosing the session of 6150 a student would take. It is often assumed that more technology-related mishaps will occur in an online classroom, because the computer and an internet connection are needed for class time. Both classes made extensive use of computer-related technologies, but there were more technology-related problems reported by students in the online class. Though the time spent per week it is not in itself sizeable, it represents a little over 5-percent of the time students spent in the online class. Comments indicated some frustration with the audio connection, a common initial problem in the online classroom. Students are required to download a java-based plug-in in order to use the two-way audio, which often must be tweaked to work behind a firewall. As one student in the online classroom declared: “I find now that "problems with technology" are just part of the

work!"

Other observable differences in workload between the students in each course can be attributed to pedagogical decisions. Students reported spending less time in class because the online class rarely convened for more than two hours every week. Related to this observation is the finding that students spent more time on individual work in the online class. Time was incorporated into the classroom instruction in the face-to-face section of the class for completion of assignments whereas students' only time to complete individual assignments in the online course was on their own time. Group work was not written into the curriculum of the online class and the time-on-task data confirmed that students spent little time cooperating in their projects. This finding suggests that students will likely not engage in group work unless encouraged by their instructor or demanded by the assignment (Hill, 2002).

Instructor reflection

Examining the workload of each student in the classroom provided for an interesting observation: some students dedicated as little as 30 hours to the course, while others set aside 150 hours, a five-fold difference! The low-end numbers are especially shocking when considering that class time alone (as reported by the students) would consume approximately 1.56 hours per week, for a total of 23.4 hours for class time alone during the full 15 weeks.

In order to examine some of the issues associated with such disparities, a follow up e-mail was sent to four students: the two who reported the lowest and highest time-on-task for each class.

Each student was asked to confirm that they had completed the logs correctly, and to provide an explanation for the higher/lower than average workload. The two students with the highest reported workload (online = 148.58 hours, and f2f = 124.92 hours) attributed the amount of workload to their general inexperience with computing and software used in his course ("It consumed my time because I am not computer savvy"). Both students with the lowest workload also confirmed the estimates. The responses indicate that both students were knowledgeable about the course content. One student added that she/he: "tried to budget my time very wisely". The other responded indicated that she/he "basically knew everything covered in the class".

Once the log data was compiled, it was taken to the course instructors. A semi-structured interview was used requesting that each instructor reflect on the time-on-task data. The most interesting aspect of the interview surrounded the large variance of reported workload. One instructor could not believe that anyone could have dedicated less than 30 hours to his whole course, while jotting down estimates of the number of hours a student would minimally have to dedicate to complete each project. The instructor estimated that a student would need at least *double* the time (60 hours) to complete the assignments in this course. Even though the log confirmed that the student devoted only 30 hours to the course, the instructor continued to affirm it to be impossible. The instructor was then told that the student had confirmed, via email, that indeed the 30 hours were approximately correct – moreover, the student had received an "A" (full grade") in course. Even though substantial evidence was presented to confirm the validity of the data, the instructor did not shift his opinion regarding the minimum workload required for the course.

Conclusion

It is clear from the analysis above as would be expected that both of the courses address each topic area of the ISTE-NETS and therefore Georgia's PSC standards. But the differences lie in the manner in which each is addressed described in the findings above. Additional distinguishing features of each individual course are based on the nature of its delivery and the structure of its curriculum.

EDIT 6150 face-to-face has the support of the instructors and classmates for students as they run into technical difficulties, which could be helpful for those who need personal attention when learning new skills and concepts. Not all of the skills that they learn in this course are directly tied to classroom application, and can be used more for teacher productivity, or even personal use. Since this course is not only offered to in-service teachers, this course allows for the opportunity of input from people who are new to the profession or in non-teaching roles.

While EDIT 6150 face-to-face could meet the needs of learners of all skill levels, the online version of EDIT 6150 does require some prerequisite technical ability. At the minimum, a student in this course should be comfortable with basic web navigation, sending and receiving of emails with attachments, and a functional knowledge of Windows (ability to change screen settings, etc.) Also, a student taking EDIT 6150 should have the ability to work independently and yet still contribute to the class as a whole.

In conclusion, we offer brief descriptions of the types of students who might be best served by each

class based on our findings. A student in EDIT 6150 face-to-face may come from various settings, but is usually best served by having some connection to education so that the examples and suggestions given in class have some significance. But since none of the lessons are required to be implemented with students, it is not essential that students in this course have a classroom connection. His or her level of skill will be irrelevant since plenty of in class support is given for those lacking skills. EDIT 6150 online requires more prerequisite skills than either of the other courses. Students who prefer a more self-directed environment would be best served by this course and should have an available classroom for implementing the required assignments.

The time-on-task analysis provided for valuable confirmation of pedagogical decisions by each instructor. It further supports some of the "truisms" of distance education as discussed above (travel preferences, technology problems). The results presented here further our belief that time-on-task data can be far more useful if it is not used for comparison purposes. The use of student reported data can fruitfully be used as a reflection tool for instructors, in analyzing the actual student-response (measure by workload) to pedagogical choices.

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