Historical Evolution of Instructional Technology in Teacher Education Programs: A Ten-Year Update

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Abstract

The content and emphasis of the introductory technology courses for undergraduate pre-service teachers has historically been examined, with the earliest study conducted by Stracke in 1932. In an attempt to identify trends in the course DeKieffer conducted a series of studies over ten year intervals, in 1947, 1957, 1967, and 1977. In 2000 the first in a similar series of ten-year studies was conducted, and this 2010 study is the first update to that study. Results indicate that the introductory technology course has gone through a particularly dynamic era recently, with nearly half of all topics appearing as new in 2010. Of particular note among the new topics are SMART Boards and Web 2.0 technologies such as Blogs, Wikis, and Professional and Social Networking Sites.

Keywords: Content, Education, Preservice, Survey, Technology, Topics

There is a long history of documenting the content and emphasis of the introductory technology course for undergraduate pre-service teachers (Stracke, 1932; Starnes, 1937; DeKieffer, 1947; DeKieffer, 1957; DeKieffer, 1967; DeKieffer, 1977; McCutcheon, 1984). In 2000 I conducted the first in a series of ten-year surveys of the introductory technology course, similar to DeKieffer's (Betrus, 2000). A summary of these results was presented by Betrus and Molenda (2002), along with a more complete treatment of the early courses in visual instruction and early educational technology. The purpose of this article is to present the findings from a 2010 repetition study and identify trends in the introductory technology since the original study in 2000.

The 2010 study followed the same methodology and asked identical or similar questions to the 2000 study. Deans of Schools of Education were identified via a web search, and were then contacted with a request for contact information for the senior most person teaching the undergraduate pre-service technology course for teacher educators at their institution. The instructors were then contacted via e-mail to complete an online survey about their course. While both the 2000 and 2010 surveys were conducted electronically, and both involved solicitation via e-mail, increased spam filtering and/or e-mail fatigue in 2010 might partially explain the reduced number of responses. In the end the total number of returned surveys was100 in 2000, and 35 in 2010. Also partially contributing to the lower number of completed surveys was a reduction in the percentage of Deans who indicated that an introductory technology course for pre-service teachers was offered at their institution, from 80% in 2000 to 64% in 2010. There was corresponding increase in the percentage of schools that indicated that they integrated technology into other coursework (+8%) or included

technology integration courses only at the graduate level (+8%).

In regards to the content of the course, the most popular topic in 2000 was "Internet / World Wide Web." In this earlier study the assumption was that the Internet was a platform for accessing static instructional materials. In 2010 we would describe this as "Web 1.0." After conducting the pre-test for the 2010 survey, it was clear that if asked in the same way in 2010, it would be vague and difficult to interpret, especially with the proliferation of Web 2.0 technologies like Wikis or Blogs (Oliver, 2010, p. 50). As such, a series of web-based technologies were included in the 2010 survey. The most frequently taught topics in the introductory technology courses for undergraduate pre-service teachers can be seen in table 1, along with trends from the 2000 study.

Table 1 illustrates that the introductory technology course has undergone a period of dynamic change in the last ten years. In particular, the appearance in 2010 of Web 2.0 technologies such as Wikis, Blogs, Podcasts, Twitter, and Professional and Social Networking is a significant change from the 2000 study. Also remarkable was that 15 of the 31 topics taught in 2010 were not on the list in 2000. Even so, as much as things changed, some things remained the same. There remains a high emphasis on office suite applications, with Presentation Software and Spreadsheets still taught in a majority of courses. Word Processing, while down slightly, is taught in about three of every four courses, and although Databases dropped significantly, it remains in about half of all courses. There were also some big movers from 2000 to 2010 to go along with the Web 2.0 technologies, including especially Creating/Editing Web Pages and SMART Boards, which are now taught in a majority of courses. Video Production, File Management, and Instructional Games are now taught in half or more of all courses, none of which appeared in 2000. The biggest downward move was e-mail, which was taught in 84% of courses in 2000, and only 30% in 2010. This can likely be explained by an assumption by instructors that students already know how to use e-mail when they enter the course. Holding on near the bottom was the use of Overhead Projectors, although Document Cameras, which largely serve the same purpose, are now taught equally as often. While historically the content of the introductory technology course for pre-service teachers has proven to be dynamic, the results of the 2010 study indicate that we are in period of particularly rapid technology change.

Along with the content of the course, here are some other notable numbers from the study:

- 3 — The most frequent number of credit hours for the course, with the mean number of credit hours remaining at about 2.5.
- 23 — The average section size, unchanged from 2000.
- 10 — The median number of years of experience of the instructors of the course, up five from 2000.
- 53% — Instructors who self-identified as "Education — other," down 25% from 2000.
- 42% — Instructors who self-identified as "Instructional/Educational Technology," up 26% from 2000.
- 40% — Course that used textbooks, down 19% from 2000.
- 29% — Course that used locally compiled print materials, down 25% from 2000.
- 88% - Courses that used locally compiled electronic materials, up 24% from 2000.
- No Change — The predominant emphasis remained on teaching pre-service teachers to use computer-based technology (vs. non-computer-based technology).
- No Change — Teaching pre-service teachers to use technology themselves was most often emphasized, followed closely by teaching them to teach their future students to use technology.
- 100% — Courses that emphasize state technology standards, with the majority indicating a moderate or strong emphasis.

Conclusions and Future Directions

While technology use in K-12 settings typically lags behind the use of technology use in the wider culture, this is often for good reason. Technologies need to tested and proven to be stable, effective, and elegant if they are to be used in a classroom setting. Historically, the topics taught in the introductory technology course have largely been proven technologies that have been adopted in prior years at a societal level. The results of this most recent study seem to be consistent with this, as most Web 2.0 technologies are widely used and have been around for 10 years or more. The content of the introductory course will likely never be "cutting-edge," but nonetheless it is often the first place where future teachers are exposed to methods for integrating these technologies into classroom settings. As such, perhaps the most

Table 1. Trends in the topics taught in the introductory technology course for undergraduate preservice teachers, 2000 to 2010.

Rank	Topic	Percentage in 2010	Change from 2000
1	Presentation software	93	+3
2/3	Technology Integration	90	+18
	Trends/Ethics/Issues	90	+16
4/5	Creating/Editing Web Pages	83	+74
	Spreadsheets	83	no change
6	Instructional Design	80	+20
7/8	Word Processing/Desktop Publishing	77	-10
	SMART Boards/technologies	77	*
9	Multimedia Authoring	73	+6
	Wikis	73	*
11	Blogs	70	*
12/13/14	Video Production	67	*
	Software Review or Evaluation	67	-13
	Professional Networking Sites	67	*
15	Psychology/Learning Theory	60	+26
16	Social Networking Sites	57	*
17/18	File Management	53	*
	Creating Podcasts	53	*
19	Instructional Games	50	*
20	Databases	47	-29
21/22	Hardware installation and troubleshooting	40	-6
	Video Conferencing	40	+20
23	E-mail	30	-54
24	Video and/or Film (VHS/DVD/Blu-ray)	30	+9
25	Twitter	27	*
26	Overhead Projectors	13	-3
27	Mobile Devices (iPods, cell phones, tablets)	13	*
28	Document Camera	13	*
29/30/31	Course Management Systems	7	*
	Copyright	7	*
	Collaborative Authoring	7	*

** = new in 2010*

important quality of the introductory technology course is to provide future teachers with the skills needed to evaluate new technologies, and to identify sources for future professional development. Ironically, often these sources are Web 2.0 environments, where teachers and professionals get together to share best practices.

And while it is not the purpose of this study to outline how to use these technologies to most effectively, or how meet specific curriculum standards, there are number of recently published studies that provide both advice and best practices in these areas. Barbour et al (2009) give advice for using PowerPoint to create instructional games. Blue and Tirotta (2010) give advice for integrating SMART Boards and into teacher preparation generally. Teclehaimanot and Hickman (2011) give advice on appropriate uses of social networking sites such as Facebook. Valance and Towndrow (2010) outline methods for successful collaborative document authoring, a topic that just surfaced in 2010 at 7%, and will likely increase in the near future with free and easy access to tools such as Google Docs. And in regards to Web 2.0, which was the biggest change from 2000, Oliver (2010) does a nice job of outlining a number of online websites and tools that emphasize collaborative learning and student inquiry, a hallmark of Web 2.0 technologies. He goes into good detail about how Web 2.0 technologies can be integrated into Science, English-Language Arts, Mathematics, Social Studies, Physical Education and Health, Music, Art, and Foreign Language, and Business curricula. I personally have noted increased motivation by my students to perform well when working with Web 2.0 technologies. It is one thing to turn in work that only the teacher will see, and something quite different when it is to be viewed and judged by friends and peers. I have even noticed that I tend to be a bit more critical when accepting students work if it is to be viewed online, as my reputation as an instructor with my own peers is partially at stake.

In terms of specific technologies to look for, some may be gleaned from the Horizon Report, a publication produced by the New Media Consortium and the EDUCAUSE Learning Initiative. Of particular note from their most recent 2011 publication is the predicted increase in the use of: e-books and mobile devices in the next year; augmented reality and game-based learning in the next two to three years; and gesture-based computing and learning analytics in the next four to five years (Johnson et al, 2011, pp. 5-6). While the 2010 introductory course study did not differentiate e-textbooks from traditional textbooks, the 2020 will need to do so. Of the remaining five trends, Instructional Games has already gained prominence in 2010, taught in 50% of all courses, while mobile devices appears near the bottom of the table at 13%. While I hesitate to make any strong predictions, especially given the changes that occurred from 2000 to 2010, I will make one: mobile technologies such as iPods, iPads, and other tablet and touchscreen hand-held devices will be much more prominent the next time this study is completed. As for the rest, the future is in our hands.

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