1-1-2015

E-Learning Authoring Software Selection: How Do Instructional Designers Gain Competency Using and Selecting Appropriate Digital Media Development Tools?

Lisa Giacumo
Boise State University

Quincy Conley
Boise State University

Publication Information

Giacumo, Lisa and Conley, Quincy. (2015). "E-Learning Authoring Software Selection: How Do Instructional Designers Gain Competency Using and Selecting Appropriate Digital Media Development Tools?". *38th Annual AECT Convention Proceedings - Indianapolis, IN: Selected Research and Development Papers, 1*, 87-95.

E-Learning Authoring Software Selection: How do Instructional Designers Gain Competency Using and Selecting Appropriate Digital Media Development Tools?

Lisa Giacumo, PhD
Assistant Professor
Organizational Performance & Workplace Learning (OPWL) Department
Boise State University
1910 University Dr.
Boise, ID, 83725-2090
LisaGiacumo@boisestate.edu

Quincy Conley, PhD
Assistant Professor
Organizational Performance & Workplace Learning (OPWL) Department
Boise State University
College of Engineering
1910 University Dr.
Boise, ID, 83725-2090
QuincyConley@boisestate.edu

Descriptors: e-learning, digital media

Introduction

Given the recent rapid innovation of e-learning authoring tools, academic programs responsible for preparing future training practitioners are faced with the difficult task of deciding how best to design curriculum for e-learning production skills for aspiring instructional designers and multimedia developers. To be able to appropriately design curriculum in academic programs, it would be valuable to know what tools experienced e-learning designers and developers frequently learn to use and how they select specific tools. This is important because, although many authoring tools advertise similar functionality, experienced instructional designers (IDs) and multimedia developers understand that there are subtle differences that need to be considered for novice and experienced users when thinking about the needs for a specific project. The motivation behind this pilot study is from students in a graduate e-learning certificate and master's degree programs consistently asking professors for support to learn how to use and select multimedia-authoring tools. We turned to the literature to gain insight on evidence-based practices to help meet this need; however, the research in this area is currently barren.

Selecting appropriate multimedia development software tools

It is posited that the consideration of the capabilities of different e-learning authoring tools available and appropriate selection criteria are typically based on practitioners' experience (Sweller, 1999; Tyler-Smith, 2006). This method of selection is typically problematic for novice instructional designers to choose the most appropriate development tool, especially when they have very little time or understanding of what each tool can do for them (Hardré, Ge, & Thomas, 2006). Students keep asking what software tools do employers most use and how should they become competent in their use.

Building instructional design competency and expertise

There is a small but growing body of scientific literature on strategies and models that can be leveraged to help build individuals' instructional design competency (Bannan-Ritland, 2001; Bichelmeyer, Boling, & Gibbons, 2006; Carr-Chellman, 1999; Clinton & Hokanson, 2012; Hoadley, & Cox, 2009; Klein & Fox, 2004; Quinn, 1994; Shambaugh & Magliaro, 2001). In addition, other researchers are focused on how novice or experienced instructional designers learn to develop their practice (Ertmer, York, & Gedik, 2009; Yanchar, & Hawkley, 2014). Much of the literature in these areas suggests real world, authentic, project-based experience as necessary for students to be able to translate theories and principles into practice in instructional design projects. The science behind designing effective, efficient, and engaging instruction is a primary focus of the curriculum, rather than software applications.

Building multimedia software tool competency

Outside of the instructional design research literature, there are principles identified to support students' software tool competency development. Bhavnani, Peck, and Reif (2012) have described scientific research conducted on strategy-based instructional principles for efficient and effective use of computer applications. Further, it is common for graduate-level students learning advanced statistics to encounter integrated instruction on how to use specific statistical software packages such as SPSS or R to work through problem sets when learning theoretical concepts (Mills, 2002). There are published statistical problem set resources and software tutorials readily available from major publishers to support these instructional needs. However, we were not able to identify any similar research or published resources for multimedia development tools.

Purpose of study

The purpose of this study in progress was to investigate how novice and experienced e-learning course designers and developers both learn to use, and then select the most appropriate widely available e-learning authoring software tool for individual project needs. It is an ongoing research project, for which we have collected preliminary data scientific data from a representative sample of the population who have to make instructional design decisions based on select tools.

As a long-term outcome, it is our goal to leverage the impending results from this study to create and disseminate a practical set of guidelines. These guidelines would serve as a foundation for those who need to train novice instructional designers and educational multimedia developers to develop competency in current software tool use and tool selection. In addition, they would provide novice instructional designers with an accessible frame of reference to use when selecting tools that would best align with the needs of a given instructional project.

Research Questions

During this study, we sought to answer the following research questions:

1. What competencies do individuals, who are enrolled in degree programs, believe they need to develop?
2. What e-learning authoring tools are most often used to develop e-learning?
3. How do e-learning instructional designers and developers select different authoring tools?
4. What training resources do users leverage when learning how to use e-learning authoring tools?
   - 4.1. How does the amount of prior work experience relate to learning methods selection?
   - 4.2. How do competency levels relate to learning methods selection?

Method

Participants

Participants were recruited for this exploratory pilot study from an instructional design listserv managed by a small private mid-Atlantic university and from those enrolled in online e-learning design courses offered at a mid-sized public Northwestern university. These schools' programs were selected as pools to recruit our target sample participants due to the inclusion of e-learning development courses offered in their graduate program. IRB approval was granted for the study at both institutions.

According to CNN Money (2012) there are 217,700 people working as instructional designers. According to the Bureau of Labor Statistics (BLS) Occupational Handbook does not have a category for Instructional Designer.

The Bureau of Labor Statistics (BLS) Occupational Handbook does have a category for Training and Development Specialists listed under business and financial jobs. According to the BLS (2012) there were 228,800 Training and Development Specialists jobs in 2012. These positions require the functions widely known as part of instructional design; including the analysis, design, development, implementation, and evaluation, of training. This suggests a population may include up to 228,800 instructional designers and multimedia developers.

We were able to collect 83 complete data sets from a total of 400 invited participants, for a complete response rate of 20.75%. Visser, Krosnick, Marquette and Curtin (1996) showed that surveys with lower response rates (near 20%) yielded more accurate measurements than did surveys with higher response rates (near 60 or 70%). Further, a population of 288,000 individuals, a 95% confidence interval, and 10% margin of error, would require 80 sample respondents. Therefore, we believe our data to be an accurate representation of individuals who are associated with the position of an instructional designer with responsibilities associated with the design and development of multimedia products.

Procedures

A web-based survey software application was used to gather self-reported behavioral or skills responses for a range of items types, including: sixteen multiple choice, thirty-six rating scales, and fourteen open-ended questions. The survey was sent via email to individuals who were subscribed to both universities' listservs that serve instructional designers and instructional design students. Participants noted their informed consent prior to any data collection.

A mixed methods concurrent nested strategy was implemented for data analysis. The quantitative data was analyzed using frequencies and descriptive statistics, including measure of central tendency such as mean and mode. Correlation analyses were used to uncover relationships between variables such as experience, competency, and approaches to learn to use e-learning authoring tools. The qualitative data was then analyzed to further explain the quantitative findings and answer the research questions about how novice and experienced users select authoring tools.

Results and discussion

Research question 1: What competencies do individuals, who are enrolled in degree programs, believe they need to develop?

Over half (57.80%) of the survey respondents were enrolled in an instructional design or workplace learning degree program. The data revealed that participants' enrollment status has a small to moderate significant correlation between their enrollment and ID competencies. Those who were not enrolled in a masters' program reported more competency with evaluation, project management, and implementing the ADDIE process. Clearly individuals enrolled in master's degrees are working on developing competencies that are foundational to e-learning design and development projects such as storyboarding, working with SMEs, writing objectives, assessment items, and creating e-learning. These results are shown in Table 1.

Table 1
Correlations between enrollment status and ID competencies

	Evaluation	Project Mgmt	ADDIE	Storyboard	Work w/ SMEs	Write Objectives	Write assessment items	Create e-learning
Spearman's Correlation Coefficient	0.292	0.258	0.342	-0.318	-0.419	-0.164	-0.234	-0.327
Sig.	0.01*	0.021*	0.002**	0.005**	0.0**	0.138	0.035*	0.003*
N	77	80	83	76	83	83	81	81

Note. Enrollment status was coded as yes (1) or no (2). ID competencies were reported on a scale of 1 – 5, from not competent to very competent.
*Correlation is significant at the $p < 0.05$ level.
**Correlation is significant at the $p < 0.01$ level.

Research question 2: What e-learning authoring tools are most used in the field to develop e-learning?

Table 2 shows the percentage of the respondents who reported having used of each tools mentioned above, the mode response for each tools' users' total years of experience, ability level ranging from novice, to intermediate to expert, and a mean rating number based on a scale of one to five. Participants rated each tool according to ease of use, meeting needs, and access to help, with one being the least satisfactory rating and five being the greatest satisfactory rating. We allowed three additional opportunities for participants to enter other tools used, which were not identified on the list below. Flash was reported as being used by a few respondents. However there were not enough people using it, to signal an importance to categorize it and study its use as an e-learning authoring tool.

Table 2
Summary of tool use, years of experience, ability level, and rating

Tool	Use	Experience	Ability	Rating (1-5)
Articulate	70.37%	1-7 Years	Intermediate	4.2
Camtasia	60.24%	1-7 Years	Intermediate	3.8
Captivate	73.17%	1-7 Years	Intermediate	4.4
Lectora	28.91%	< 1 Year	Novice	3.9
PowerPoint	98.80%	10+ Years	Expert	4.6

Articulate was a tool that 70.37% participants reported having used to develop e-learning software. While 31.57% of the respondents had less than one year of experience, 59.65% had one to seven years of experience. Most people who use Articulate are not experts. Camtasia was a tool that 60.24% participants reported having used this tool. While 38.00% of the respondents had less than one year of experience, 48.00% had one to seven years of experience. Most people who use Camtasia are not experts. Captivate was a tool that 73.17% of the survey participants reported having used to develop e-learning materials. While 25.00% of the respondents had less than one year of experience, 55.0% had one to seven years of experience. Most people who use Captivate are not experts. Lectora was a tool that 28.91% participants reported having used this tool. While 41.67% of the respondents had less than one year of experience, 50.00% had one to seven years of experience. Most people who use Lectora are not experts.

Nearly all (98.80%) survey respondents reported having used PowerPoint to develop e-learning materials. While 2.43% of the respondents have less than one year of experience using this tool to create instructional multimedia, 14.63% had one to years of experience using this tool to create instructional multimedia, 69.51% had more than ten years of experience using this tool to create instructional multimedia. Most people who use PPT to develop e-learning are expert users, where expert is someone with ten years of experience.

We used Spearman's correlation coefficient to further investigate relationships between tools use because we did not have a normal distribution for participants' experience in their current role and experience with each of the tools. We found that those who tend to use Captivate also tended to have experience using Articulate in their work, as evidenced by the moderate positive correlation between use of Captivate and Articulate, $r_s(82) = .475$, p = < .001. Those who tend to use Lectora also tended to have experience using Camtasia in their work, as evidenced by the moderate positive correlation between use of Lectora and Camtasia, $r_s(82) = .451$, p = < .001. This relationship suggests that it may be helpful to guide students towards developing skill sets for more than one tool. Also, Articulate and Captivate are the two most often used tools and may increase an individual's employability.

Research question 3: How do e-learning instructional designers and developers select different authoring tools?

Qualitative coding revealed three overarching themes and ten corresponding categories, each with multiple entries. The reasons that e-learning authoring tools are selected center on the comfort level of the individuals who need to use the tool, the tool's availability, and compatibility with the project. Each of these themes along with their corresponding categories, frequencies, and examples are shown in Table 3.

Table 3
Summary of themes, categories, frequency, and examples, found in open ended responses to reasons for e-learning authoring tool selection

Theme	Category (occurrences)	Frequency	Examples
Designer or developer comfort level with tools	Easy to use	17	"Ease of use...," "Because it was easy to use..."
	Prior experience with tool	4	"Because it was the only one I knew." "It's the one I know."
	Developer community support	3	"The online community is awesome. Have a problem or need a template? Check out the community. Plus the tool now comes with templated objects such as characters." "Seemed to have a great community of support..."
Tool availability	Client request	33	"Company requirement...," "Selected by customer."
	Own license	12	"Company owns license." "Earlier version licenses had been purchased."
	Cost	7	"Grant-funded." "...cost of the package."
Tool compatible with project scope	Product matched training need	16	"I selected PowerPoint because I didn't need the screen capture abilities of Captivate as the online module is simply informative and used to socialize something new." "It was the best fit for what the instructor was trying to achieve."
	Compatible with system	11	"...Works well on our learning management system." "...integration with our LMS."
	Fit with content requirements	10	"The type of content could be best delivered after published in this tool." "Because of audio ability and screen recording ability."
	Time	4	"Required less time..." "Time to develop"

Research question 4: What training resources do users leverage to learn how to use e-learning authoring tools?

As we know, novice learners often learn more efficiently when experts provide guidance and structure to problem or task centered learning needs. However, most respondents who need to learn to use e-learning authoring tools do so without the help of what one might think of as formally structured training and expert guidance. It appears as though most people are learning the software through trial and error (91.60%) as well as freely available open educational resources (79.50%). Results are shown in Table 4. While trial and error along with accessing open educational resources (OERs) may lead to developing competencies associated with the design and development of e-learning products, more information is needed this approach to determine appropriate guidelines.

Table 4
Resources leveraged to learn e-learning authoring tools

	Yes	No
1. Trial and error	91.60% (76)	8.40% (7)
2. Open Educational Resources* (OERs)	79.5% (66)	29.50% (17)
3. Friend	47.00% (39)	53.00% (44)
4. Purchased resources**	4.80% (4)	95.20% (79)

*OERs included videos, tutorials, and job aids.
**Purchased Resources included videos, tutorials, job aids, and courses.

Research question 4.1: How does the amount of prior work experience relate to learning methods selection?

No significant correlations were found between the amount of prior work experience and the learning methods selection. This adds perspective to our findings, and shows that there may not be enough widely known resources to support individuals who are developing competencies associated with the design and development of e-learning. Furthermore, it might be worthwhile for the respective software companies to consider extending their marketing efforts to create a larger learning community around their e-learning authoring tools. It could add to their positive branding by doing so for novice users.

Table 5
Correlation between experience and learning method selection

	Purchased	OER	Friend	Trial and error
Spearman's Correlation Coefficient	.117	.136	-.056	.152
Sig.	.293	.220	.617	.169
N	83	83	83	83

Note. Years of experience were reported on a scale of 1 – 5: 0-11 months (1), 1-3 years (2), 4-7 years (3), 8-10 years (4), 10+ years (5). Purchase, OER, friend, and trial and error, resource selection was reported as no (0) or yes (1) by participants.

Research question 4.2: How do competency levels relate to learning methods selection?

Only two significant correlations were found between competency levels and learning methods selection. Developing competencies and OERs were significantly correlated for Captivate, $r_s(82) = .293$, $p = .007$. Also, developing competencies and purchased formal training materials were significantly correlated for Lectora, $r_s(82) = .295$, $p = .007$. Results are presented in Table 5. Again, this finding would suggest that desirable, quality-training materials are not widely available for those who are trying to develop tool competency.

Table 5
Correlation between tool competency and resource selection

Tool competencies	Purchased	OER	Friend	Trial and error
Articulate				
Spearman's Correlation Coefficient	.014	.16	.069	.072
Sig.	.897	.148	.534	.516
N	83	83	83	83
Camtasia				
Spearman's Correlation Coefficient	0.009	.09	.074	-0.013
Sig.	.939	.42	.508	0.906
N	83	83	83	83
Captivate				
Spearman's Correlation Coefficient	0.001	.293	0.026	.172
Sig.	.991	.007*	.817	.12
N	83	83	83	83
Lectora				
Spearman's Correlation Coefficient	.295	0.063	.086	.185
Sig.	.007*	.57	.441	.094
N	83	83	83	83
PPT				
Spearman's Correlation Coefficient	0.167	0.161	.073	-0.105
Sig.	.132	.147	.51	.346
N	83	83	83	83

Note. Participants rated their tool competency on a scale of 1 – 5, from not competent to very competent. Purchased, OER, friend, and trial and error, resource selection was reported as no (0) or yes (1) by participants.

Conclusion

Several other technical fields (e.g., math, engineering, medicine, architecture) provide learners enrolled in degree programs the opportunity to gain formal instruction on project design as well as the tools needed to complete the project. There may be a growing need to package the traditional instruction provided on good ID practices with efficient and effective training on e-learning tool selection and use, for degree programs that are preparing instructional design professionals to gain entrance to positions and advance their careers. Additional research into the desired skills and competencies associated with available instructional design or training professional positions, hiring managers' current selection practices for identifying successful candidates from applicant pools, and placement statistics of recent program graduates, would help clarify the actual demand and need for individuals with competencies associated with e-learning authoring tools.

Three themes emerged from the reported selection methods for authoring tools: tool availability, tool compatibility with project scope, and designer or developer comfort level with tools. Additional research should be considered to explore potential relationships between experience or competency and approaches to selecting e-learning tools. Also, we should find out if formal training on tool use and selection guidelines helps instructional designers and developers successfully advocate for more relevant tool selection based on the project needs with their clients.

Those enrolled in degree programs tend to lack strong competencies in e-learning design and the use of authoring tools to create e-learning. Trial and error is most often leveraged to learn how to use e-learning authoring

tools, while purchased resources are least used. Most people also use open educational resources. Further investigation is needed to determine which OERs are most often used and whether or not a structured, formal training experience would support more efficient and effective development of e-learning design and authoring tool development competencies.

Additional participant samples drawn from a large research university, different areas in the US, organizations that employ or support instructional designers, developers, or performance improvement professionals, and similar sampling pools from outside of the US would add value to this research project. The implications of this continued research may result in an ability to advocate for the funding to build and for the inclusion of formal training materials in degree programs for those who want to build e-learning tool competency.

References

Bannan-Ritland, B. (2001). Teaching instructional design: an action learning approach. *Performance Improvement Quarterly, 14*(2), 37–52.

Bureau of Labor Statistics, US Department of Labor. (2012). Instructional Coordinators. In *Occupational Outlook Handbook. 2014-15 online edition.* Retrieved September 30, 2015 from http://www.bls.gov/ooh/education-training-and-library/instructional-coordinators.htm.

Bureau of Labor Statistics, US Department of Labor. (2012). Training and Development Specialists. In *Occupational Outlook Handbook. 2014-15 online edition.* Retrieved September 30, 2015 from http://www.bls.gov/ooh/business-and-financial/training-and-development-specialists.htm.

Bhavnani, S., Peck, F. and Reif, F. (2008). Strategy-Based Instruction: Lessons Learned in Teaching the Effective and Efficient Use of Computer Applications. *ACM Transactions on Computer-Human Interaction, 15*(1) 2:1 – 43.

Bichelmeyer, B., Boling, E., & Gibbons, A. S. (2006). Instructional design and technology models: Their impact on research and teaching in instructional design and technology. In M. Orey, V. J. McClendon, & R. M. Branch (Eds.), *Educational media and technology yearbook* 31, 33–73. Littleton, CO: Libraries Unlimited, Inc.

Carr-Chellman, A. (1999). I have a problem! *TechTrends, 43*(6), 15–19.

Clinton, G. & Hokanson, B. (2012). Creativity in the training and practice of instructional designers: the Design/Creativity Loops model. *Educational Technology Research and Development, 60*(1), 111-130.

CNN Money Staff. (2012, July 26). Top 100 jobs in America: 38 Instructional designer. CNN.com *CNN.* Retrieved October 5, 2015, from http://money.cnn.com/pf/best-jobs/2012/snapshots/38.html.

Ertmer, P. A., York, C. S., & Gedik, N. (2009). Learning from the pros: How experienced designers translate instructional design models into practice. *Educational Technology, 49*(1), 19–27.

Fox, J., & Andersen, R. (2005). Using the R statistical computing environment to teach social statistics courses. Department of Sociology, McMaster University. Retrieved January 31, 2015 from http://socserv.socsci.mcmaster.ca/jfox/Teaching-with-R.pdf.

Hardré, P. L., Ge, X., & Thomas, M. K. (2006). An investigation of development toward instructional design expertise. *Performance Improvement Quarterly, 19*(4), 63–90.

Hoadley, C., & Cox, C. (2009). What is design knowledge and how do we teach it. *Educating learning technology designers: Guiding and inspiring creators of innovative educational tools*, 19-35.

Mills, J. D. (2002). Using Computer Simulation Methods to Teach Statistics: A Review of the Literature. *Journal of Statistics Education, 10*(1), 1-20.

Quinn, J. (1994). Connecting education and practice in an instructional design graduate program. *Educational Technology Research and Development, 42*(3), 71–82.

Shambaugh, N. & Magliaro, S. (2001). A reflexive model for teaching instructional design. *Educational Technology Research and Development, 49*(2), 69-92.

Sweller, J. (1999). *Instructional Design in Technical Areas.* New York, NY: Australian Education Review.

Tyler-Smith, K. (2006). Early attrition among first time eLearners: A review of factors that contribute to drop-out, withdrawal and non-completion rates of adult learners undertaking eLearning programmes. *Journal of Online Learning and Teaching, 2*(2), 73–85.

Visser, P. S., Krosnick, J. A., Marquette, J., & Curtin, M. (1996). Mail surveys for election forecasting? An evaluation of the Columbus Dispatch poll. *Public Opinion Quarterly, 60*(2), 181-227.

Yanchar, S. & Hawkley, M. (2014). "There's got to be a better way to do this": a qualitative investigation of informal learning among instructional designers. *Educational Technology Research and Development, 62*(3), 271-291.