Educational Media and Technology Yearbook 38

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Preface

The audience for the *Yearbook* consists of media and technology professionals in schools, higher education, and business contexts. Topics of interest to professionals practicing in these areas are broad, as the Table of Contents demonstrates. The theme unifying each of the following chapters is the use of technology to enable or enhance education. Forms of technology represented in this volume vary from traditional tools such as the book to the latest advancements in digital technology, while areas of education encompass widely ranging situations involving learning and teaching which are idea technologies.

As in prior volumes, the assumptions underlying the chapters presented here are as follows:

1. Technology represents tools that act as extensions of the educator.
2. Media serve as delivery systems for educational communications.
3. Technology is *not* restricted to machines and hardware, but includes techniques and procedures derived from scientific research about ways to promote change in human performance.
4. The fundamental tenet is that educational media and technology should be used to:

   (a) Achieve authentic learning objectives.
   (b) Situate learning tasks.
   (c) Negotiate the complexities of guided learning.
   (d) Facilitate the construction of knowledge.
   (e) Aid in the assessment/documenting of learning.
   (f) Support skill acquisition.
   (g) Manage diversity.

The *Educational Media and Technology Yearbook* has become a standard reference in many libraries and professional collections. Examined in relation to its companion volumes of the past, it provides a valuable historical record of current ideas and developments in the field. Part I, "Trends and Issues in Learning, Design, and Technology," presents an array of chapters that develop some of the current themes listed above, in addition to others. Part II, "Trends and Issues in Library and Information Science," concentrates upon chapters of special relevance to K-12 education, library science education, school learning resources, and various types of library and media centers—school, public, and academic among others. In Part III, "Leadership Profiles," authors provide biographical sketches of the careers of instructional technology leaders. Part IV, "Organizations and Associations in North America," and Part V, "Worldwide List of Graduate Programs in Learning, Design, Technology, Information or Libraries," are, respectively, directories of instructional technology-related organizations and institutions of higher learning offering degrees in related fields. Finally, Part VI, the "Mediagraphy," presents an annotated listing of selected current publications related to the field.

The Editors of the *Yearbook* invite media and technology professionals to submit manuscripts for consideration for publication. Contact Michael Orey (mikeorey@uga.edu) for submission guidelines.

For a number of years we have worked together as editors and the tenth with Dr. Michael Orey as the senior editor. Within each volume of the Educational Media and Technology Yearbook (EMTY) we try to list all the graduate programs, journals, and organizations that are related to both Learning, Design, and Technology (LDT) and Library and Information Science (LIS). We also include a section on trends in LDT, trends in LIS, and we have a section profiling some of the leaders in the field. Beginning with the 2007 volume, we have attempted to generate a list of leading programs in the combined areas of LDT and LIS. One year, we were able to compose an alphabetical list of 30 of the programs that people told us were among the best. However, each year we have worked on being more systematic. Instead of following the *US News and World Report* model and have one top program list, we decided to use some of the same numbers that they use and generate a collection of top 20 lists, rather than attempt to generate a statistical model to generate the rankings list. One thought was to rank programs according to the number of publications that were produced; however, deciding which journals to include was an issue. We have decided to use a 5-year span, in this case 2007 through 2011, as the years to count (since at the time of writing, it is still 2012 and so we do not have a complete year). Furthermore, we decided to only count actual research reports that appeared in one of two journals, *Educational Technology Research and Development* and the *Journal of the Learning Sciences*. These two journals were primarily selected based on the general sense that they are the leading journals in the area of LDT. Noticeably absent is the area of information and library science. So, while these numbers are pretty absolute, choosing to only count these journals is somewhat arbitrary.

The other top 20 lists are based on self-report data collected as part of the program information in the Educational Media and Technology Yearbook. Every year, we collect general information about programs in LDT and LIS and publish this information in the *Yearbook*. Each year we also collect some additional data. We asked the representatives of each of the institutions to enter the US dollar amount of grants and contracts, the number of Ph.D. graduates, the number of Masters graduates, and the number of other graduates from their programs. We also asked them for the number of full-time and part-time faculty. We then generated a top 20 list for some of these categories. The limitation in this case is that it is self-report data and

Table 1 Top 20 Graduate Programs in the area of Learning, Design, and Technology as measured by the number of publications in *Educational Technology Research and Development* and the *Journal of the Learning Sciences*

Rank	Institution	Total points
1	University of Georgia	11.572
2	Indiana University	7.66
3	Arizona State University	7.32
4	Stanford University	5.59
5	Nanyang Technological University	4.83
6	Brigham Young University	4.53
7	University of Wisconsin	4.52
8	Purdue University	4.46
9	Utrecht University	3.94
10	University of Toronto	3.9
11	University of Maryland	3.86
12	SRI International	3.69
13	Open University of the Netherlands	3.66
14	Utah State University	3.33
15	University of Northern Colorado	3.25
16	Aristotle University of Thessaloniki	3
17	University of Missouri	3
18	San Diego State University	2.85
19	University of Colorado at Boulder	2.83
20	Michigan State University	2.73

there is no real way of verifying that the data is accurate. So, while the list of the 30 top programs from the first year lacked hard data, and the lists this year are based on numbers, those numbers may be just as unreliable. In the end, we have a collection of lists that we hope will be of use to our readers. Many of the universities that appeared in the list last year are here again, in addition to many others. More information about many of these universities can be found in Part V of this edition.

There are five top-20 lists in this preface. The first of these top-20 lists is based on a count of publications. We used every issue from the 2007 through 2011 volume years of the *Educational Technology Research and Development* journal and the *Journal of the Learning Sciences*. We eliminated all book reviews and letters-to-the-editor and such. We only used the primary academic articles of these journals. Each publication counted 1 point. If the article had two authors, then each author's institution received 0.5 points. If there were three authors, then 0.33 was spread across the institutions. Also, as an additional example, if there were three authors and two of them were from the same institution, then that institution received 0.66 points and the institution of the remaining author received 0.33. Finally, the unit receiving the points was the University. So, in some cases, you might have publications from two completely different departments in the same journal. Table 1 shows our results. The University of Georgia came out as the top LDT program in the world, in fact the top 3 are the same as last year. The two biggest moves on the list are Utrecht that jumped from 17th last year to 9th this year and Purdue that jumped from 16th to 8th. Michigan State made it in this year and Florida State just barely fell short off the list.

The two primary measures of research achievement are publications and grants. While choosing ETRD and IJLS was somewhat arbitrary, the numbers are verifiable. In Table 2, we present the top-20 programs according to the dollar amount of

Table 2 Top 20 LDT and LIS programs by the amount of grant and contract monies

1	Old Dominion University	Instructional Design & Technology	25,000,000
2	University of Calgary	Office of Graduate Programs, Faculty of Education	20,000,000
3	University of Louisville	Organizational Leadership & Learning	4,500,000
4	University of Massachusetts, Amherst	Learning, Media and Technology Masters Program/Math Science and Learning Technology Doctoral Program	4,300,000
5	Virginia Tech	Instructional Design and Technology	4,100,000
6	George Mason University	Learning Technologies	2,500,000
7	Arizona State University; Educational Technology programs	Division of Educational Leadership and Innovation; Mary Lou Fulton Teachers College	2,000,000
8	New York University	Educational Technology Programs	1,500,000
9	The University of Texas at Austin	Curriculum & Instruction	1,306,456
10	Indiana University	Instructional Systems Technology, School of Education	1,235,000
11	The Ohio State University	Cultural Foundations, Technology, & Qualitative Inquiry	1,200,000
12	University of North Carolina, Wilmington	Master of Science in Instructional Technology—Department of Instructional Technology, Foundations & Secondary Education	1,199,546
13	University of Houston	Curriculum & Instruction	1,000,000
14	Utah State University	Department of Instructional Technology & Learning Sciences, Emma Eccles Jones College of Education and Human Services	850,000
14	Georgia State University	Middle-Secondary Education and Instructional Technology	850,000
16	University of Memphis	Instructional Design and Technology	600,000
16	University of Georgia	Department of Educational Psychology and Instructional Technology, College of Education	600,000
18	Rutgers-The State University of New Jersey	School of Communication and Information	500,000
18	Lehigh University	Teaching, Learning, and Technology	500,000
18	Ohio University	Instructional Technology	500,000

grants and contracts for that program over the academic year of 2010–2011. While Table 1 was constrained to LDT, Table 2 has both LDT programs and LIS programs which resulted in the University of Calgary being number 2 in the grants and contracts list, but not appearing at all in the publication list. In fact, the only institutions that are both on the list for publications and grants are the University of Georgia (1 for publications and 16 for grants), Indiana University (2 for publications and 10 for grants), Arizona State University (3 for publications and 7 for grants), and Utah State University (14 for publications and 14 for grants).

Tables 1 and 2 are measures of research productivity. The remaining three tables are more related to teaching than research. The first, Table 3, shows the top-20 programs in terms of the number of full-time faculty. You will notice that the list is

Table 3 Top 20 LDT and LIS programs by the number of full-time faculty (also shown is the total faculty which includes both full and part time faculty)

Rank	University	Department	Full time	Total
1	Rutgers-The State University of New Jersey	School of Communication and Information	22	37
2	The University of Hong Kong	Faculty of Education	20	110
3	Middle East Technical University	Computer Education & Instructional Technology	20	60
4	Towson University	College of Education	17	22
5	Regis University	School of Education and Counseling	15	165
6	Valley City State University	School of Education and Graduate Studies	15	23
7	University of Bridgeport	Instructional Technology	14	35
8	Utrecht University	Educational Sciences	12	19
9	Fordham University	MA Program in Public Communications in the Department of Communication and Media Studies	12	16
10	Universiti Sains Malaysia	Centre for Instructional Technology and Multimedia	12	12
11	Lesley University	Educational Technology	11	81
12	University of Louisville	Organizational Leadership & Learning	11	25
13	The University of Oklahoma	Instructional Psychology and Technology, Department of Educational Psychology	11	11
14	Taganrog State Pedagogical Institute	Media Education (Social Pedagogic Faculty)	10	30
15	Athabasca University	Centre for Distance Education	10	29
16	Anadolu University	Computer Education and Instructional Technology	10	26
17	Hacettepe University	Computer Education and Instructional Technology	10	24
18	Indiana University	Instructional Systems Technology, School of Education	10	22
19	Utah State University	Department of Instructional Technology & Learning Sciences, Emma Eccles Jones College of Education and Human Services	10	11
20	University of British Columbia	Master of Educational Technology degree program	9	17

ordered by the number of full-time faculty (FT), but number 2, The University of Hong Kong has 110 total faculty members. We decided that full-time faculty was more important than part time as a measure and so only generated one list for number of faculty. We just thought it would be interesting to see the total number of faculty as well. For example, it is interesting to see The University of Hong Kong and the Regis University with very large numbers (110 and 165, respectively) while the Universiti Sains Malaysia and the University of Oklahoma have 12 and 11 full-time faculty and no part time faculty.

Table 4 Top 20 LDT and LIS programs by the number of Ph.D. graduates

Rank	University	Department	Total
1	University of Bridgeport	Instructional Technology	15
1	University of Calgary	Office of Graduate Programs, Faculty of Education	15
3	Lesley University	Educational Technology	11
3	Wayne State University	Instructional Technology	11
3	University of Georgia	Department of Educational Psychology and Instructional Technology, College of Education	11
6	Rutgers-The State University of New Jersey	School of Communication and Information	10
6	Ohio University	Instructional Technology	10
6	University of Houston	Curriculum & Instruction	10
6	Middle East Technical University	Computer Education & Instructional Technology	10
6	George Mason University	Learning Technologies	10
11	Georgia State University	Middle-Secondary Education and Instructional Technology	8
11	Florida State University	Educational Psychology and Learning Systems	8
13	Indiana University	Instructional Systems Technology, School of Education	7
13	Utah State University	Department of Instructional Technology & Learning Sciences, Emma Eccles Jones College of Education and Human Services	7
15	The University of Oklahoma	Instructional Psychology and Technology, Department of Educational Psychology	6
16	Texas Tech University	Instructional Technology	5
16	Arizona State University; Educational Technology programs	Division of Educational Leadership and Innovation; Mary Lou Fulton Teachers College	5
16	Virginia Tech	Instructional Design and Technology	5
16	Towson University	College of Education	5
16	University of Louisville	Organizational Leadership & Learning	5
16	The Ohio State University	Cultural Foundations, Technology, & Qualitative Inquiry	5
16	Iowa State University	School of Education	5
16	Utrecht University	Educational Sciences	5

Please note that the list only goes to 17, but since there was a 7-way tie for 17th, the next university would be 24th place

The next top-20 list is the number of Ph.D. graduates. This list might be a good measure of research productivity as well as teaching productivity. The number of graduates is self-reported. The number of publications is verifiable, so it is interesting to compare who is on both lists. None of the three number ones are on top 20 publications list, but there are five institutions on both lists. University of Georgia, Indiana University, Utah State University, Arizona State University, and Ultrecht University are on both of these lists. University of Calgary is number 2 on both the Ph.D. and the amount of grant monies (Table 4).

Table 5 Top 20 LDT and LIS programs by the number of masters graduates

Rank	University	Department	Total
1	University of Bridgeport	Instructional Technology	294
2	University of Calgary	Office of Graduate Programs, Faculty of Education	250
3	Lesley University	Educational Technology	225
4	Regis University	School of Education and Counseling	200
5	Towson University	College of Education	180
6	Rutgers-The State University of New Jersey	School of Communication and Information	143
7	New York Institute of Technology	Department of Instructional Technology and Educational Leadership	130
8	Utrecht University	Educational Sciences	100
9	Georgia Southern University	College of Education	75
9	University of Central Florida	College of Education—ERTL	75
11	University of British Columbia	Master of Educational Technology degree program	74
12	California State University, East Bay	M.S. Ed., option Online Teaching & Learning	60
12	Michigan State University	College of Education	60
14	Emporia State University	Instructional Design and Technology	52
15	George Mason University	Learning Technologies	50
16	Wayne State University	Instructional Technology	48
17	University of Nebraska Kearney	Teacher Education	46
18	Valley City State University	School of Education and Graduate Studies	45
19	University of Texas at Brownsville	Educational Technology	42
20	University of Missouri—Columbia	School of Information Science & Learning Technologies	40
20	University of Georgia	Department of Educational Psychology and Instructional Technology, College of Education	40
20	University of Central Arkansas	Leadership Studies	40

Our last top-20 list is based on the number of masters graduates. In our mind, we might consider this an indication of whether the program is more practitioner-oriented than say the number of Ph.D. graduates. Interestingly, University of Calgary is second here, and is second in both grants and Ph.Ds. So, this differentiation may be meaningless. It is interesting to note that last year we had seven schools that produced more than 100 graduates last year and this year we have eight. The University of Bridgeport graduated 294 masters students! While the economy has not done so well, several schools have attracted fairly large numbers of masters students to their programs and successfully graduating some pretty large numbers of graduates. Some people seek degrees during these economic down turns (Table 5).

We acknowledge that any kind of rankings of programs is problematic. We hope you find our lists useful. If you have suggestions, please let us know and we will try to accommodate those changes in future publications of the *Yearbook*. If your program is not represented, please contact one of us and we can add you to the database so that you can be included in future issues.

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Part I
Trends and Issues in Learning, Design, and Technology

Chapter 1
Introduction

Daisyane Barreto and Michael Orey

Learning, Design, and Technology

The use of computer technologies and Internet has increased in the past decades. The number of individuals buying computer machines for professional and personal use is growing. For instance, according to a past report from the US Census Bureau, the number of households who acquired computer machines increased approximately from 8 to 62 % within the years of 1984–2003. Moreover, the number of households who had Internet access increased approximately from 18 to 55 % within the years of 1997–2003 (Day, Janus, & Davis, 2005). Even though this information indicates the adoption of computer and web-based technologies is increasing among households in the USA, there are still individuals who do not have means to acquire or to access these technologies on a daily basis. In this case, the role of educational environments is crucial to provide access to computer and Internet as well as to overcome the digital divide in the country (DeBell & Chapman, 2006). Indeed, school environments can be sites where students can develop academically and technologically if equal access to both kinds of information is guaranteed.

Besides the potential digital divide, the increase in advance of technology and the instant access to information via computer or mobile technologies have challenged the education to reconsider its current school system. As some learners interact with these technologies out of the school context, educators and policy makers may need to question how to embrace and leverage skills and knowledge that learners are developing in informal contexts. For example, educators could create opportunities in which learners' technical skills could be encouraged and strengthened. Learners could be advised to reconsider new ways to present and represent their school work (e.g., video presentation, web pages, podcast, animation), which could enhance their creativity and promote innovative production. In addition, teachers

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and instructors could use these technologies to support collaboration among students. For instance, students could work in projects, papers, and presentations remotely and at their own time. Therefore, it is important to investigate best practices to integrate new technologies (e.g., cloud-based applications, smartphones, and tablets) into the school curriculum program as well as to adopt innovative pedagogical approaches that enable and nourish learners' skills and experiences from informal to formal contexts.

Furthermore, the adoption of new technologies should be planned carefully. Generally, the high priority given to technology in education can lead to the acquisition of new tools without a clear road map for their integration into the school. That is, just acquiring new technologies for the school will not improve students' learning experiences; however, developing a curriculum program that incorporates appropriate technologies strategically will. Thus, it is essential that educators and stakeholders envision how teachers and students can use these technologies to enhance, create, and share learning content. Delineating a plan for training teachers and faculty as well as a plan for the technology use (i.e., when, how, and what kind of technologies) is needed to support an effective technology-based learning environment.

Given the aforementioned reasons, combining knowledge domains associated with learning theories, instructional design principles, and technology practices might be a key feature to design and develop innovative and well-suited initiatives that implement cut-edge technologies for educational purpose. For instance, fundamental premises of learning theories can be applied to create and use educational resources and instructional programs based on the ways people learn. Meanwhile, instructional design principles can be applied to create a plan for the adoption of technology grounded on theories and principles of learning. And by implementing technology in educational contexts, educators can develop technology practices such as identifying appropriate tools for specific learning contexts or designing learning materials grounded on theories and principles of learning.

Thus, this section of the book will introduce a series of chapters written by scholars in the field of instructional technology. These chapters will refer to previously mentioned and other relevant issues in the field. These chapters have been organized into three themes: (a) *overview of the trends and issues in field*, in which Abbie Brown and Tim Green present the current challenges and tendencies in instructional technology; (b) *benefits and challenges of current pedagogical approaches in educational settings*, in which Beaumie Kim, Lynde Tan and Seng Chee Tan propose a pedagogical approach that harnesses students' previous experiences playing games and with learning, within formal and informal contexts, to develop games for learning; while Angela van Barneveld and Peggy Ertmer examine the challenges and motivations to implement problem-based pedagogies in engineering schools; (c) *current studies examining the principles of multimedia learning*, in which Tonia Dousay explored how multimedia principles could be implemented in design of instructional materials to leverage (to have an influence on) learner interest; while Michael Cottam and Wilhelmina Savenye investigated how the use of multimedia features such as text and pictures could reduce learners' cognitive load and improve learners' listening comprehension in a foreign language learning course.

Overview of the Trends and Issues in the Field

With new trends in instructional technology, it is important to examine the conditions of the field regarding the challenges and opportunities for education brought by contemporary technologies. In fact, Abbie Brown and Tim Green have addressed these issues effectively in the first chapter of this section. According to the authors, the funding availability is still scarce for K-12 and higher education settings. Even with this deficit in funding, education sectors were still able to succeed integrating instructional technology with novel approaches. The authors provided an overview of the current status of instructional technology in three education sectors: corporate training, higher education, and K-12 education.

In terms of corporate training, the authors: (a) reported the cutbacks (or decline) on investments for learning; (b) presented the top content topics in corporate instruction; (c) indicated the most popular methods to deliver instructional content; (d) pointed out current trends that should be taken into consideration such as *big data* and the cloud computing technologies.

Regarding the higher education sector, Abbie Brown and Tim Green reported a list of prevalent technologies being used to support instruction in universities and colleges, such as course management systems and document management tools. In addition, the authors identified current trends for higher education. Massive Online Open Courses (MOOCs) is mentioned as the newest movement in the field that attends both the demand for online learning and open education resources. Other innovative approaches to consider in the future are strategies such as "gamification," which uses game elements to create engaging learning experiences.

As for K-12 education, Abbie Brown and Tim Green reported the ways in which some states and districts have used technology to "minimize costs" in schools such as adopting open textbooks and using digital content/resources in their curriculum. Moreover, the authors indicated Personalized Learning Environments (PLEs) as an "emergent theme" in K-12 settings. Indeed, PLEs might enable learning opportunities for students, but it might present challenges to teachers and administrators, who might need to reconsider their views of teaching and learning when adopting this approach. Other trending technologies being used by students, such as social media, might also bring similar opportunities and challenges for K-12 education.

Benefits and Challenges of Current Pedagogical Approaches in Educational Settings

The integration of technology in education entails not only the adoption of tools, but also the embracement of novel pedagogical approaches to enhance teaching and learning. Implementing new pedagogical approaches in the classroom might involve a change in how teaching and learning is perceived. That is, the role of the instructor/teacher might need to shift from being the formal authority to the facilitator of the learning experience, in which learners are empowered with the information needed to take ownership of their own learning. This section introduces the potential benefits and challenges of implementing new pedagogical approaches in education with Beaumie Kim, Lynde Tan and Seng Chee Tan's chapter ""Perhaps This Can Be For Education": Learners' Cultural Models for Educational Game Design" and Angela van Barneveld and Peggy Ertmer's chapter "Implementing problem-oriented pedagogies in engineering education: examination of tensions and drivers."

First, Beaumie Kim and colleagues argued in their chapter that equipping schools with new tools and devices is not an optimal solution to generate positive learning outcomes for students. Instead, the authors proposed a pedagogical approach that embraces students' previous knowledge and experiences to design games for learning. Grounding on Brian Street and other scholars' work, Beaumie Kim and colleagues framed their pedagogical approach as a process that builds on students' literacy practices. These literacy practices involve individuals constructing meanings through social practices and experiences. In addition, these practices are not bounded to formal contexts, and in fact, these practices can be understood as "assets" that individuals gain from informal experiences and contribute to development of literacy practices in formal contexts. In their chapter, Beaumie Kim and colleagues focused on learners' literacy practices developed in and out of school context and how these practices could be used to understand learners' *cultural models*, which can be understood as "stories and images" that characterize learners' understanding of what "typical" cases or situations are. The authors examined learners' cultural models of games and learning in five game design workshops offered to students between ages 13 and 15. From this study, Beaumie Kim and colleagues were able to identify three major themes related with students' cultural models: (a) *learning*, in which students' views of learning (e.g., teacher-centered, knowledge measurement) were challenged and transformed throughout the workshops; (b) *technology*, in which students revisited the concepts of using technology (i.e., entertainment purpose) to address their educational goals; and (c) *aesthetic*, in which students expressed through images and game design, their emotions. Overall, Beaumie Kim and colleagues argued for playful experiences, such as the one proposed in their study as means to foster and expand students' knowledge and concepts.

Similarly, Angela van Barneveld and Peggy Ertmer advocated for novel pedagogical approaches in their chapter. The authors argued for an integration of theory and practice within the engineering curriculum program. That is, the curriculum should not be limited to the development of technical skills, and instead, it should encourage the development of a set of skills needed to be a successful engineer in the job market. Therefore, the authors argued for problem-based pedagogies in engineering schools in order to bridge the gap between skills taught and skills needed. Problem-based pedagogies involve the design of learner-centered environments in which learners are presented with ill-structured problems as means to develop knowledge and skills needed to function on the job. Nevertheless, like any new approach in education, potential challenges can be faced by educators when introducing problem-based pedagogies in the classroom. These challenges may vary within the different levels in the educational system (e.g., administrators, colleagues, students). In their chapter, Angela van Barneveld and Peggy Ertmer examined the challenges of implementing problem-based pedagogies, and at the same time, present the reasons to adopt such approaches in engineering school as means to improve teaching and learning practices. First, the authors highlighted how problem-based pedagogies meet criteria "needed for engineering education." Moreover, the authors listed benefits of such approaches for engineering programs, including authentic situations, acquiring knowledge and skills directly related with the problem presented, overcoming the gap between theory and practice, and transferring skills. Still, the authors also addressed some of the tensions implementing problem-based pedagogies, such as structural and cultural barriers in the educational system. Besides the identified tensions, the authors have identified drivers for implementing problem-based pedagogies in engineering schools, including connecting foundational and practical knowledge, increasing learners' motivation, supporting learning and transfer, and integrating and applying process skills. Overall, the tensions should not been seen as constraints that will stop the implementation of problem-based pedagogies. In fact, educators and stakeholders should seek to overcome these tensions in order to promote and foster learning environments that can lead to innovative production. Moreover, faculty's experiences with problem-based pedagogies can be used as means to overcome tensions and leverage strategies to adopt and fit problem-based pedagogies in engineering schools.

Current Studies Examining the Principles of Multimedia Learning

To generate educational resources that can facilitate learning, sound instructional design principles should be applied. In fact, the purpose of instructional design is to improve the quality of instruction (Reigeluth, Bunderson, & Merill, 1994), which can be accomplished if instructional designers consider these principles to guide their work. Instructional designers could organize complex information through graphs or images in a way that could be easier for learners to comprehend. And an approach that follows these guidelines is *multimedia learning*. Multimedia learning can be simplified as the learning resulted from the combination of pictures and words (Mayer, 2009). In this case, instructional designers apply research-derived principles to design textual and visual information effectively, consequently enhancing learning. This section introduces two studies examining Richard Mayer's principles of multimedia learning: Tonia Dousay's chapter on "Multimedia design and situational interest: A look at juxtaposition and measurement" and Michael Cottam and Wilhelmina Savenye's chapter on "The Effects of Visual and Textual Annotations on Spanish Listening Comprehension, Incidental Vocabulary Acquisition and Cognitive Load."

First, Tonia Dousay highlighted in her chapter that online learning is probably an area that might benefit of well-designed learning materials based on principles and theories. Grounding on cognitive and motivation theories, Tonia Dousay argued online materials could be designed to not only enhance learning, but also to motivate and sustain learners' interest in the topic or content presented. In addition, the author introduced key principles of multimedia design and how instructional designers could apply these principles to design more comprehensive information. A series of studies were also presented in the chapter indicating the benefits of using images to represent complex information, especially in the medical field. These benefits included improvements in patients recalling and communicating health information with practitioners. Besides improvements in comprehension, Tonia Dousay pointed out the importance of studying motivation and multimedia principles together, especially when there is a lack of multimedia design studies focusing on learner interest. Tonia Dousay described in her chapter the different types of interest, how learner interest could be applied and measured in educational contexts. Overall, using visual representations for instructional purpose can go beyond facilitating learning, as the aesthetic appeal of images and graphics can potentially stimulate learner interest on the topic being studied.

With the increase in numbers of online learning in higher education and the demand for online foreign language course, Michael Cottam and Wilhelmina Savenye examined college students' listening comprehension of Spanish language. According to the authors, completely asynchronous foreign language courses usually rely on auditory inputs and using only these types of inputs may limit students' comprehension due to the lack of nonverbal cues. Thus, drawing on cognitive load theory and multimedia learning principles, Michael Cottam and Wilhelmina Savenye argued that using multimedia features along with words could enhance students' comprehensibility of foreign language and reduce students' cognitive load. Several studies were presented in the chapter indicating the positive outcomes in second language comprehension when textual and visual information is applied instead of text only. In their study, the authors examined 35 college students enrolled in elementary-level Spanish courses to investigate the effects of visual and textual features on students' vocabulary acquisition and listening comprehension. Overall, Michael Cottam and Wilhelmina Savenye's study presented a positive experience when developing online materials for second language acquisition. For instance, the use of images and text definitions helped students with their listening comprehension and even increased their vocabulary since most key words were new to students. The study also supported previous studies in the multimedia learning principles and cognitive load theory.

Implications of These Studies to the Field

Given the chapters presented in this section of the book, the current trends for educational technology in 2013 include: (a) analyzing the trends and issues in the use of technology to improve teaching and learning, (b) investigating and implementing new pedagogical approaches that can benefit educational contexts, and (c) using multimedia learning principles to stimulate learner interest and foreign language comprehension. In summary, knowing that one of the main purposes of instructional design is to improve instruction, and consequently learning, it might be important that educators and administrators attend to students' prior experiences from informal contexts. Learning activities could be designed in order to harness and leverage learners' informal experiences, which could potentially motivate and increase learner interest in academic content. Moreover, learning in schools should not be limited to academic content. School programs should include the development of life-long skills and competencies, which learners might need to succeed in the work place. Finally, with the increase in growth of online learning, instructional designers and researchers should not only investigate and implement multimedia learning principles to facilitate learning, but should also consider how these principles could be used to motivate and sustain learner interest over academic content, especially if learners may have a negative attitude toward that content.

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Chapter 2
Issues and Trends in Instructional Technology: Maximizing Budgets and Minimizing Costs in Order to Provide Personalized Learning Opportunities

Abbie Brown and Tim Green

Introduction

We continue the tradition of reporting the past year's issues and trends that shape attitudes and approaches to instructional technology. This chapter comprises four sections: Overall Developments; Corporate Training and Development; Higher Education; and K-12 Settings.

Overall Developments

As with the previous year, the nation's economy continued on a slow growth pattern. Funding for K-12 and higher education took a sizeable hit throughout the nation. Federal funding for technology—although less than robust—was available for K-12 and higher education through Federal stimulus programs. Private sector funding for technology increased slightly in comparison to the previous year. Although funding remained an issue, all sectors continued to provide robust and innovative approaches to integrating instructional technology. The K-12 and higher education sectors continued to maximize cost savings by sharing resources through the use of cloud computing, collaborative online environments, e-books, and other digital online content and resources.

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Corporate Training and Development

As we have done in previous issues and trends, chapters of the yearbook (e.g., Brown & Green, 2011, 2013), we continue to track corporate application of instructional technologies primarily by referring to the American Society for Training and Development's (ASTD's), *State of the Industry* report, (Miller, 2012). The current ASTD annual report is based on data collected from consolidated sources (organizations regularly submitting annual data), BEST award winners (organizations recognized by ASTD for their exceptional efforts in support of learning within the enterprise); and Fortune Global 500 companies (the top 500 revenue-producing corporations worldwide). This represents data collected from over 500 different business organizations. Secondary sources used to track corporate trends include the, *Gartner Hype Cycle Special Report for 2012* (Fenn & Raskino, 2012) and reports sponsored by the Pew Research Center.

Learning Expenditures

ASTD reports organizational expenditures for learning decreased slightly (around 4 %, adjusting for inflation) since its last report (Miller, 2012). Small organizations report spending more per employee than larger ones: companies with fewer than 500 employees spent an average of $1,605, while companies with 10,000 or more employees spent an average of $825. Direct spending on learning and development compared to payroll increased as it has in previous, recent reports, up 16 % from the previous year.

The ASTD reports that employees are continuing to make use of the learning and development opportunities offered by their employers; according to the most recent report, individuals spent an average of 31 h in training during 2011 (Miller, 2012). The ratio of learning staff to employees decreased in the most recent ASTD report, which is consistent with the trend reported in previous years (with the exception of the penultimate, 2010 report in which the ratio indicated an increase in learning staff (Patel, 2010)). Miller's interpretation that this is probably due to the increase in outsourcing and investments made in external services (Miller, 2012) is no doubt correct.

Instructional Content

ASTD's latest industry report indicates that, as in recent years past, the top three content topics for corporate instruction are: managerial and supervisory, profession and/or industry specific, and business processes, procedures, and practices (Miller, 2012). These three topic areas account for 36 % of the instructional content available within the responding organizations (Miller). The content areas that account for the least amount of instructional content (17 %) are executive development, customer service, and basic skills (Miller).

Methods of Instructional Delivery

The majority of organizations included in the ASTD state-of-the-industry report make use of a combination of instructional delivery methods, most commonly: face-to-face, instructor led; self-paced; and e-learning. E-learning is defined in the report as "…*the use of electronic technologies to deliver information and facilitate the development of skills and knowledge*" (Miller, 2012, p. 10). E-learning technologies are increasing in popularity as a delivery method. Technology-based instructional delivery methods account for 37.3 % of the formal learning hours offered by the business organizations reporting. Delivery of instruction using mobile devices is becoming increasingly popular, up significantly from the previous year's report; the 2011 report shows 1.4 % use; the 2010 report shows a 0.4 % use.

The increased popularity of mobile devices for instructional delivery is unsurprising when one takes into consideration the increased use of mobile devices among younger, educated individuals (e.g., the increased use of tablets and smartphones to read about news, as reported by Pew Research Center's Project for Excellence in Journalism, 2012). The ASTD report confirms this increased use while pointing out by virtue of the small percentage of use how far the industry is from ubiquitous use of mobile technologies for instruction. Mobile devices and electronic technologies in general continue to be of significant interest to business-oriented instructional designers; it is notable that in the 2012 volume of the journal, *Performance Improvement*, at least seven of the articles published focus on the use of computer-based, primarily mobile, technologies for instruction.

Also of note are recent business technology trends identified in the, *Gartner Hype Cycle Special Report for 2012* (Fenn & Raskino, 2012). New technologies of particular interest to instructional designers include:

- Big Data—loosely defined as massive amounts of data (30 terabytes or more) analyzed for the purpose of seeing trends and opportunities (see Weatherington, 2012; IBM Information on Demand & Business Analytics Forum. (Producer), 2012).
- The Internet of Things—generally defined as information networks based on everyday objects embedded with sensors and/or transmitters such as RFID tags (see Chui, Loffler, & Roberts, 2010).
- Cloud Service Brokerage—organizations and individuals are making greater use of cloud computing technologies, which allow individual users and groups to access and refine documents and data from multiple devices and locations.

Both Big Data and The Internet of things are concepts that address the interpretation and management of huge amounts of data to improve predictions and processes. Cloud service issues are directly related to mobile computing and the increased use of mobile devices such as tablets and smartphones. Overall, the trends of the recent year reflect relatively steady spending on employee instruction; continued focus on instruction to support management and supervision, professional and industry-specific information, and business processes, procedures and practices; use of multiple methods of delivery, ranging from face-to-face sessions to E-learning, with a continued increase in the popularity of E-learning methods; and increased attention on the potential for instruction delivered to mobile devices.

Higher Education

We review higher education's instructional technology application by referring primarily to the, *ECAR Study of Undergraduate Students and Information Technology* (Dahlstrom, 2012); *The EDUCAUSE 2011 Core Data Service Report* (Grajek & Arroway, 2012); *The NMC Horizon Report*: *2012 Higher Education Edition* (Johnson, Adams, & Cummins, 2012a), and the Babson Survey Research Group's, *Going the Distance*: *Online Education in the United States*, *2011* (Allen & Seaman, 2011) and, *Digital Faculty*: *Professors*, *Teaching and Technology*, *2012* (Allen & Seaman, 2012). The ECAR, EDUCAUSE, and Babson Survey Research Group reports are based on large-scale, national, and international surveys. *The Horizon Report*, sponsored by the New Media Consortium, is a report generated by an international body of experts convened as an advisory board.

Campus Technology Support and Use of Technology for Instruction

Data gathered for the EDUCAUSE Core Data Survey (Bichsel, 2012; Grajek & Arroway, 2012) indicates that 91 % of the institutions surveyed provide wireless access in some or all student housing rooms; 85 % provide cable television in some or all student housing rooms (Grajek & Arroway). Ninety-nine percent of the institutions surveyed support a course management system (CMS); 65 % of the faculty use CMSs, but 48 % make use of only basic features (Grajek & Arroway).

Of the institutions surveyed by EDUCAUSE, the most popular and common technologies in place for instructional use include, clickers, document management tools, and wireless Internet connectivity (Bichsel, 2012). Bichsel also notes that three of the more substantial changes reported since the previous year are: increases in the number of distance learning classrooms (up 14 %); provision for document management tools (up 16 %); and use of hybrid courses (up 15 %) (Bichsel, 2012).

A significant technology trend is the continued increase in the number of portable devices (laptops, tablets, smartphones, etc.) students bring with them to campus and to class (Bichsel, 2012; Dahlstrom, 2012). Bichsel refers to these as "user-provisioned technologies," (2012, p. 2), and notes their increased use is causing a shift to an, "… 'anytime/anywhere' and interactive learning environment," (2012, p. 2).

Learning Online. Online learning continues to gain in popularity. According to the, *Online Education in the United States*, report (Allen & Seaman, 2011), over 6.1 million students took at least one online course during the fall 2010 term, an increase of over half a million since the previous year's report. While the ten percent growth rate for online students is relatively low compared to recent years, it far exceeds the less than one percent growth of the higher education student population for the year reported; 31 % of all higher education students now take at least one course online (Allen & Seaman, 2011). The, *ECAR Study of Undergraduate Students and*

Information Technology, also reports 31 % of the students surveyed took at least one online course in 2012; this is more than double the number of students taking online courses since 2008 (Dahlstrom, 2012).

Most fully online programs of study report growth, though a significant number report steady enrollment (Allen & Seaman, 2011). Academic leader and faculty perceptions of online learning changed little in the past year, though in Allen and Seaman's most recent report, the percentage of academic leaders who rate online learning outcomes as similar or superior to face-to-face instruction has increased from 57 % to 67 % (2011). The vast majority of institutions that offer online instruction provide some form of training for teaching faculty; most common are internally running training sessions and informal mentoring (Allen & Seaman).

MOOCS. Though not mentioned in any of the most recent survey reports, massive online open courses (MOOCs) have become a "hot topic" among educators this past year. Articles in recent issues of *MIT Technology Review* (Carr, 2012) and *Communications of the ACM* (Vardi, 2012) have addressed the potential impact of MOOCs on higher education. MOOCs are presented free-of-charge by institutions including Stanford and MIT, and multiple thousands of students from around the world register for them. MOOC participants do not accrue credits toward a degree, though some courses offer a certificate of completion (Papano, 2012). MOOCs may be viewed as a natural next step, developing from the Open Courseware movement (Butin (2012). Instructional technology professionals and institutions of higher learning are currently struggling with how to best approach MOOCs since they represent a significant disruption to such established practices as course delivery, faculty-assigned time, and student-fee revenues (Carr, 2012). The extensive number of MOOC-related messages posted on the ITFORUM listserv during the months of November and December in 2012 (e.g., Schankman, 2012) are excellent examples of a variety of differing views on the subject, and an indication of how the instructional technology community has focused its attention on MOOCs this past year.

Faculty Use of Technology for Instruction

According to the report, *Digital Faculty*: *Professors*, *Teaching and Technology*, *2012* (Allen & Seaman, 2012), university faculty are making increased use of digital media and online resources for instructional purposes.

Both the EDUCAUSE Core Data Service Report (Grajek & Arroway, 2012) and the Digital Faculty report (Allen & Seaman, 2012) indicate that faculty are commonly making use of a CMS to share syllabi, communicate with students and record grades, but only a small portion of faculty make use of the any other CMS functions (e.g., discussion forums).

According to the faculty and academic administrators responding to the surveys that form the results reported by Allen and Seaman (2012), more than one-third of faculty regularly assign books that are available in electronic formats and 43 % of instructors indicate they at least occasionally create digital teaching materials, open