Educational Media and Technology Yearbook 39

Michael Orey
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Educational Media and Technology Yearbook

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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 4-year span, in this case 2010 through 2013, as the years to count (since at the time of writing, it is still 2014 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 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 2010 through 2013 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.

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* during the years 2010 through 2013, inclusive

Rank	Institution	Total points
1	University of Georgia	6.9
2	Stanford University	6.3
3	Utah State University	5.0
4	University of Wisconsin	4.4
4	San Diego State University	4.4
6	The University of Texas at Austin	3.9
7	University of Missouri	3.8
7	University of Twente	3.8
9	Brigham Young University	3.7
10	The Pennsylvania State University	3.5
11	University of Maryland	3.2
12	Aristotle University of Thessaloniki	3.0
12	Arizona State University	3.0
12	KU Leuven, Belgium	3.0
12	National Institute of Education, Singapore	3.0
12	Purdue University	3.0
17	Utrecht University	2.8
18	University of Pittsburgh	2.7
19	University of California Berkeley	2.6
20	McGill University	2.5
20	Nanyang Technological University	2.5
20	Columbia University	2.5

The University of Georgia came out as the top LDT program in the world, the same as last year. The rest of the top 5 was a bit of a shake up. Stanford jumped from number 4 to number 2. Utah State, University of Wisconsin, and San Diego State cracked the top 5 this year. Arizona State dropped from 3 to 12 and Nanyang Technological University dropped from 5 to 20. Indiana University dropped out of the top 20 completely from the number 2 position last year. The University of Texas, University of Twente, and Penn State University made the top 10 while not making it to the top 20 last year. Those are some of the biggest moves this year.

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 grants and contracts for that program over the academic year of 2012–2013. The only institutions that are both on the list for publications and grants are the Utah State University (3 for publications and 6 for grants), University of Missouri (7 for publications and 11 for grants), and Arizona State University (12 for publications and 3 for grants). So, using publications and grants, Utah State may be the top program in the world for research productivity.

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. We also show the total number of faculty which is the sum of full-time and part-time faculty. Rutgers comes out on top for this list. The University of Hong Kong and Regis University have very large numbers of part-time faculty. The others on this list are a bit more traditional in that they have no part-time faculty or at least the number of full-time faculty is greater than the number of part-time faculty (Tables 4 and 5).

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. The University of Georgia is number 1 on publications and 2 on Ph.D. graduates, Utah State University is 3 and 12, University of Missouri is 7 and 4, and Arizona State University is 12 and 12.

Our last top 20 list is based on the number of master's 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. Regis University is the top in terms of graduates which perhaps is not surprising given that their combined full-time and part-time faculty comes to 165. Towson is right behind them, but in terms of total faculty, they are doing this with just 22 faculty. Rutgers was our number 1 for full-time faculty and a consequence is that they also make number 3 in master's graduates. The only universities that made out top 20 list for publications and also made the master's degrees conferred list are the University of Georgia and Utah State University.

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

Rank	University	Department	Total
1	Old Dominion University	Instructional Design and Technology	25,000,000
2	University of Massachusetts, Amherst	Learning, Media and Technology Masters Program/Math Science and Learning Technology Doctoral Program	5,700,000
3	Arizona State University	Division of Educational Leadership and Innovation	2,000,000
4	Wayne State University	Instructional Technology	1,600,000
5	New York University	Educational Communication and Technology	1,500,000
6	Utah State University	Department of Instructional Technology and Learning Sciences	1,350,000
7	The Ohio State University	Educational Technology	1,200,000
8	University of North Carolina, Wilmington	Department of Instructional Technology, Foundations and Secondary Education	1,199,546
9	Georgia State University	Learning Technologies Division	915,000
10	Rutgers-The State University of New Jersey	School of Communication and Information	830,000
11	University of Missouri-Columbia	School of Information Science and Learning Technologies	763,934
12	Indiana University	Instructional Systems Technology, School of Education	600,000
12	University of Geneva	TECFA—Master of Science in Learning and Teaching Technologies	600,000
14	Ohio University	Instructional Technology	500,000
14	University of Central Florida	Instructional Design and Technology	500,000
16	University of Memphis	Instructional Design and Technology	400,000
17	Bloomsburg University	Instructional Technology and Institute for Interactive Technologies	350,000
18	North Carolina State University	Digital Teaching and Learning Program	325,000
19	Emporia State University	Instructional Design and Technology	284,112
20	University of West Florida	Instructional and Performance Technology	260,000

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)

1	Rutgers-The State University of New Jersey	School of Communication and Information	21	36
2	The University of Hong Kong	Faculty of Education	20	110
2	Valley City State University	School of Education and Graduate Studies	20	31
4	Towson University	College of Education	17	22
5	University of Missouri-Columbia	School of Information Science and Learning Technologies	16	18
6	Regis University	School of Education and Counseling	15	165
7	Indiana University	Instructional Systems Technology, School of Education	12	22
8	University of Georgia	Learning, Design, and Technology Program	11	11
8	The University of Oklahoma	Instructional Psychology and Technology	11	11
10	Hacettepe University	Computer Education and Instructional Technology	10	25
10	Utah State University	Department of Instructional Technology and Learning Sciences	10	11
10	Anadolu University	Computer Education and Instructional Technology	10	26
10	Anton Chekhov Taganrog Institute	Media Education (Social Pedagogic Faculty)	10	30
14	Ball State University	Masters of Arts in Curriculum and Educational Technology	8	12
14	Keimyung University	Department of Education	8	10
14	Western Illinois University	Instructional Design and Technology	8	13
14	Georgia Southern University	College of Education	8	8
18	Boise State University	Organizational Performance and Workplace Learning	7	15
18	George Mason University	Learning Technologies	7	11
18	Valdosta State University	Curriculum, Leadership, and Technology	7	12

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

Rank	University	Department	Total
1	Georgia State University	Learning Technologies Division	14
2	University of Georgia	Learning, Design, and Technology Program	11
2	Wayne State University	Instructional Technology	11
4	Ohio University	Instructional Technology	10
4	University of Missouri-Columbia	School of Information Science and Learning Technologies	10
6	University of Houston	Learning, Design, and Technology Graduate Program	9
7	George Mason University	Learning Technologies	8
7	Indiana University	Instructional Systems Technology, School of Education	8
9	Hacettepe University	Computer Education and Instructional Technology	6
9	University of Memphis	Instructional Design and Technology	6
9	Syracuse University	Instructional Design, Development, and Evaluation Program	6
12	Towson University	College of Education	5
12	Morehead State University	Educational Technology Program	5
12	Utah State University	Department of Instructional Technology and Learning Sciences	5
12	Arizona State University	Division of Educational Leadership and Innovation	5
12	Rutgers-The State University of New Jersey	School of Communication and Information	5
17	Anadolu University	Computer Education and Instructional Technology	4
18	Kansas State University	Curriculum and Instruction	3
18	University of Toledo	Curriculum and Instruction	3
18	Kent State University	Instructional Technology	3
18	Old Dominion University	Instructional Design and Technology	3
18	The University of Southern Mississippi	Instructional Technology and Design	3

Please note that the list only goes to 18, but since there was a five way tie for 18th, the next university would be 23rd place

Table 5 Top 20 LDT and LIS programs by the number of master's graduates

Rank	University	Department	Total
1	Regis University	School of Education and Counseling	200
2	Towson University	College of Education	180
3	Rutgers-The State University of New Jersey	School of Communication and Information	121
4	Azusa Pacific University	School of Education—Teacher Education	90
5	Georgia Southern University	College of Education	75
5	New York Institute of Technology	Dept. of Instructional Technology and Educational Leadership	75
7	Bloomsburg University	Instructional Technology and Institute for Interactive Technologies	70
8	California State University, East Bay	MS Ed, option Online Teaching and Learning	60
8	University of Central Florida	Instructional Design and Technology	60
8	George Mason University	Learning Technologies	60
11	California State University Fullerton	Program: Educational Technology	54
12	Wayne State University	Instructional Technology	48
13	University of Texas at Brownsville	Educational Technology	45
14	Richard Stockton College of New Jersey	Master of Arts in Instructional Technology (MAIT)	42
15	University of Central Arkansas	Leadership Studies	40
15	San Diego State University	Learning Design and Technology	40
15	University of Georgia	Learning, Design, and Technology Program	40
18	University of Nebraska-Omaha	College of Education Department of Teacher Education	39
19	Valley City State University	School of Education and Graduate Studies	36
20	Utah State University	Department of Instructional Technology and Learning Sciences	35

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.

Athens, GA

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

Chapter 1
EMTY Introduction

Lucas Vasconcelos

The ever-increasing use and impact of technology in education is undeniable. The prevalence of computers and other technological devices both at the workplace and at home has increased the need for schools and higher education institutions to train and prepare twenty-first-century professionals who can successfully utilize technology for personal and professional purposes. Educators from different fields and grade levels have strived to learn and implement a plethora of technologies to make their students prepare for the upcoming needs of the job market. While many of these technologies used in education continue to evolve over the years, others have just emerged to promisingly address the learner's needs from a different perspective or to address emergent needs. They include but are not limited to websites, videos, blogs, wikis, apps, social media, web 2.0 tools, online games, and virtual worlds. Therefore, educators and researchers have the never-ending challenge of staying abreast of current technologies, adjusting their teaching methods and striving to harness learning.

Regardless of whether these technologies are designed solely to be used in educational settings or they are created for commercial purposes and then adapted to the classroom, using and managing technology-enhanced learning environments is still a challenge for instructors, especially the ones who did not have many opportunities to learn as students how technology may have a significantly positive impact on teaching and learning processes. As Mann (1999) explains the paradox, "technology from the last generation has been proven inadequate and that from the next generation is unproven. With either negative data or none, the field is left to those who promptly make the next generation of technology the worst enemy of the current generation as in, 'next year it will be cheaper, faster, smaller or even—more constructivist. So let's wait'" (p. 241).

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In academia, the role of technology in education is on the spotlight. In fact, a sound number of researches have focused on the use of technology for educational purposes in the last years. As a matter of fact, from 2004 to 2009, manuscript submissions to *ETR&D*, a top-ranked international journal, increased by 72 % (Ross, Morrison, & Lowther, 2010). This growing interest on the topic has shed light onto the instructional technology field and fostered the creation of journals, conferences, and higher education degrees on instructional technology. It is not hard to realize the excitement and frisson many researchers and educators express in their publications or conference presentations toward the impacts of technology in education and how it enables students to learn beyond the campus boundaries or the school walls. On the other hand, critics have argued that technology may improve learning as long as if a good teacher is using it, i.e., the reason for effective teaching and meaningful learning does not rely on technology itself, but on the teacher's expertise, knowledge, and strategies to employ it.

Regardless of whether researchers and practitioners are blindly euphoric, skeptically discouraged, or somewhat in between these extremes, it is important to keep in mind that technology is only a tool, not a learning objective. In other words, effective teaching does not rely on technology use as the ultimate goal, but as the means to achieve instructional goals and to foster new learning experiences. Outcomes such as enhanced academic performance, increased students' motivation, addressed diverse needs, and facilitated collaboration and communication are only a few of the innumerable advantages of using technology in education. Nevertheless, effective teaching and meaningful learning can only be achieved when technology use is thoughtfully planned and carefully aligned with pedagogical curriculum standards, content, and goals. Furthermore, it should be grounded on learning theories.

Further research is still needed in the field of instructional technology due to the fact that technology has been adding new dimensions to the concept of schooling (Lan, 2000). Research has become quite important for professionals from this field because they have the opportunity to review successful experiences and failures related to technology integration research results which might help shape future educators' teaching methods and practices. For instance, they might teach science classes using robotics, math with online games, foreign languages with apps, and so forth. The list of possibilities is endless.

Accounting for the importance of shared research results in instructional technology, this book presents a series of chapters written by scholars in the field. This section of the book presents an overview of these chapters, which were categorized into four overarching topics: (a) issues and trends in the field, (b) game-enhanced learning environments, (c) current researches on teaching and learning with technologies, and (d) pedagogical approaches in technology-enhanced learning environments.

Issues and Trends in the Field

It is important to determine and examine what has shaped attitudes, theories, methodologies, and approaches to the field of instructional technology. Abbie Brown and Tim Green's chapter reports the results of research on the trending topics and issues in instructional technology published on major annual reports. Data was categorized into four main research strands: overall developments, corporate training and developments, higher education, and K–12 education. With regard to overall developments, the authors found out that national and private funding opportunities for academic research are slightly growing due to the continuous US economy recovery. In corporate training and development, the authors reported (a) a slight increase in corporate learning expenditures; (b) the top three content topics for corporate instruction, which are still delivered as instructor-led classroom training in 54 % of cases; and (c) only 39 % of corporate training cases are technology based.

Results on trends and issues on higher education show that faculty and students still have different profiles regarding technology use. Only a small percentage of responding faculty believes online learning is as efficient as face-to-face learning, yet 61 % of them still believe technology can bring a positive impact to education. Grounded on reports, the authors claim the need for increased faculty training and support to develop their digital fluency. Students, on the other hand, have increased access to technological devices, express a preference for blended learning environments, have increasingly enrolled in online courses, and desire a greater integration of technology in academic settings. As for K–12 education, there has been a 2.5 % increase on the total expenditure in instructional technology. Parents, students, and teachers have had more access to technology than in the past, and as a consequence, students are increasingly using mobile devices in the classroom to enhance learning, taking online classes, and using social media and tools to learn outside of the classroom. In conclusion, Brown and Green highlight that even though digital content, online learning, and mobile learning are consistently growing trends, the issues faced in the past year are still unsurprising.

Game-Enhanced Learning Environments

Digital games have been used as educational tools to harness learning for a long time, and the debate on their use has been going on for almost forty years (Egenfeldt-Nielsen, 2007; Games & Squire, 2011). In his chapter, Adam Mechtley draws on cultural–historical activity theory (CHAT) and on epistemic cognition (EC) to highlight the importance of accounting for situated context (historical, social, cultural aspects and constraints) in the process of designing serious games for science education. In addition, he stresses the role of empowering students to recognize and value their individual epistemic aims in science classrooms. After distinguishing and defining inquiry- and expertise-based approaches, Mechtley argues in favor of the latter by stating that the focus of meaningful learning should not be to emulate scientists by fostering understanding but to enable learners to accommodate acquired knowledge and use it to address future real-world situations.

When reviewing the literature on CHAT and EC with an emphasis on their affordances and limitations, Mechtley identifies a lack of empirical data generated by design-based researches that account for context into the process of designing games. In the discussion section, the author explains how learners' epistemic aims, i.e., knowledge-related goals, add up to motivation and learning efficiency in game-enhanced learning environments. He also reviews a few successful games related to science education and makes some final considerations about meaningful learning, games, design, and context to be used as food for thought for future game design projects.

Daisyane Barreto's chapter also provides insights onto online games in education. A comprehensive explanation is conducted on how the words "play" and "game" are oftentimes interchangeably used. After distinguishing them and explaining how these constructs are interrelated, Barreto defines and distinguishes digital games and virtual worlds. Grounded on Olson (2010), the chapter also introduces children's motivations to play digital games, and they are classified as (a) social needs, which can be categorized as intrinsic (competition) or extrinsic (collaborative); (b) emotional needs, which are endogenous or exogenous fantasy; and (c) intellectual needs, which consist of an optimal level of challenge throughout the game, sensory and/or cognitive curiosity toward features of the game, and intellectual conflict, respectively.

As an attempt to shed some light on the process of designing virtual worlds for educational games, Barreto presents and ponders research results regarding the use of two types of virtual worlds in educational settings: Club Penguin™, a commercial virtual world repurposed to be used in the classroom, and Whyville, which was designed solely to harness learning. In summary, both virtual worlds enable children to make sense of content, rules, and social practices through a discovery-based approach.

Current Researches on Teaching and Learning with Technologies

Researches on technology integration to enhance teaching and learning practices are also very relevant for the field of instructional technology. As a matter of fact, current research projects in academia reflect not only the trends and issues in the field but also the scholar's viewpoints of which phenomena and technologies demand further disciplined observation and experimentation that will lead to a better understanding.

Jane Howland, Joi Moore, and Julie Caplow's chapter presents current ongoing researches in the School of Information Sciences and Learning Technologies from the University of Missouri. From the overarching focus on improving performance and access to learning technologies, two major research strands emerge: design of innovative tools and interactions and online learning. Faculty members whose primary focus is to design and develop innovative tools approach this activity from three different perspectives: workflow performance, project-based orientation, and human–computer interaction. Faculty members who aim at enhancing online learning have an eye on online features such as course organization, discussion forums interactions, and students' perceptions of online learning.

Joan Hughes, Min Liu, and Paul Resta's chapter also discusses research projects on technology integration conducted within the Learning Technologies Program at the University of Texas. Their focus, however, relies especially on K-16 educational settings. John Hughes' research has the overarching goal of examining how new and practicing teachers are prepared to optimally use technology to support students' learning. From this broader goal, two research strands emerge: how universities prepare preservice teachers with regard to their knowledge, attitudes, and practices in using instructional technology and technology integration efforts in elementary, middle, and secondary grade schools. Similarly, Min Liu's research has the overarching goal of supporting teacher's teaching and students' learning through effective use of technologies. In this chapter, the results of only two of her research strands are discussed: the design of immersive, new media environments to support learning and motivation and the affordances and constraints of using mobile technologies.

Pedagogical Approaches in Technology-Enhanced Educational Environments

Pedagogical applications of technology in instructional situations are very relevant to the field because they provide empirical results and insights into a specific approach or tool. Maneksha Dumont and Victor Lee's chapter reports the results of an intervention in an alternative high school wherein they document students' experiences of designing, developing, crafting, and sharing computationally enhanced pets or "DigiblePets." With the purpose of increasing awareness to sociocultural aspects of technology-enhanced environments, encouraging creativity, and promoting engagement to at-risk students, the researchers planned a multi-week unit with 12 workshops in which students could learn and tinker with programming language, a prototype program, arts and crafts materials, and the facilitator's expertise.

Using a variety of data collection methods, especially students' own words and descriptions, the chapter presents and compares three students' descriptions and reflections on the project. The analysis of their narratives provided insights on the varied nature of participation and engagement on the computational craft design project. Overall, all students were very successful because they were able to fully develop their interactive and responsive pets. However, a couple of challenges emerged from that experience: (a) hybrid design media such as computational crafts were not given much credence by students, who would rather separate computational, physical, and interactive elements from the multimodal aspects (as a result of this compartmentalization, they did not fully engage with all those aspects, but they stuck to the ones of their preference); and (b) students showed pride and accomplishment toward their products, and they were only comfortable with showing them off in more spontaneous situations to friends, favorite teachers, and staff. As for the sanctioned final design exhibit event, they were oftentimes reluctant to participate.

Susan Land, Heather Zimmerman, Gi Woong Choi, and Brian Seely's chapter presents five design guidelines generated from preliminary design-based researches to create and implement an informal, outdoor, and mobile learning environment. As an attempt to enhance families' visits to an arboretum in Pennsylvania by engaging them in scientific observations, the researchers designed a mobile application equally informed by learning theories and context. The result was an open-ended, ubiquitous, interactive, and learner-centered tool named *Tree Investigators*, which has a focus on trees, their life cycles, and seasonal changes.

As a result from this design and development experience, the authors created design guidelines to inform that process: (a) design a learning environment, not a stand-alone technology, which is only one component of a more complex interaction process between families, technology, naturalist guide, and the specimens within the natural setting; (b) use mobile computer content and prompts from the naturalist to amplify disciplinary aspects of an informal setting; (c) use mobile computer content and prompts from the naturalist to scaffold connections between on-site observations and scientific concepts that explain and represent them; (d) use digital photography attributes of the mobile computer to enable learners to articulate and reflect on their observations and disciplinary concepts; and (e) support all family members, not just parents, to engage as epistemic agents.

Ruele and Mwendapole's chapter presents principles for developing a design- and technology-based curriculum that can be used as a framework to harness twenty-first-century skills such as creativity and innovation on students and to prepare learners to a broader range of career opportunities. The authors describe the background and context of the design and technology education in Botswana, as well as the structure and content of the Botswana General Certificate of Secondary Education (BGCSE) design and technology syllabus. Even though the syllabus is composed of six topic areas, for the purposes of this chapter, the authors focus on only two of them: design and technology. They examine how these two strands are currently employed in the Botswana school curriculum, and at the end of the chapter, they provide insights and recommendations on how to address Botswana's vision of economic diversification by realigning the school curriculum in terms of design and technology skills.

Amina Cviko, Susan McKenney, and Joke Voogt's chapter presents the results of a study with Dutch kindergarten teachers in curriculum design and implementation of PictoPal activities. Their roles throughout the project are classified as executor-only, re-designer, and co-designer. Through the use of case study analysis, each teacher role was examined, and a cross-case analysis was employed to compare their perceptions of (a) their roles, (b) curriculum practicality, (c) co-ownership, (d) integration of on- and off-computer activities, and (e) pupil learning. After reporting and discussing significant differences among teacher's perceptions, the authors recommend that elementary teachers should take part in collaborative design ICT-rich activities in order to prepare them to support early literacy development in kindergarten.

Implication of These Studies to the Field

Based on the chapters presented in this introductory section of this book, the four overarching topics in the field of instructional technology are (a) analysis of trends and issues in utilizing technology to improve teaching and learning processes, (b) online game-enhanced learning environments, (c) ongoing research projects conducted within university departments on teaching and learning with technologies, and (d) pedagogical approaches to technology integration in education. It is important to notice that these topics are the *current* trends in instructional technology, but next year, different topics might be the target of a great deal of research. The ubiquitous, ever-changing nature of technology requires scholars and educators to stay abreast of their most recent changes and, consequently, to ponder and examine the impacts such changes might have on their teaching methods, strategies, and techniques, as well advantages and/or drawbacks.

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Chapter 2
Issues and Trends in Instructional Technology: Leveraging Budgets to Provide Increased Access to Digital Content and Learning Opportunities

Abbie Brown and Tim Green

We continue the tradition of reporting the past year's issues and trends that shape attitudes and approaches to instructional technology. This chapter is comprised of four sections: Overall Developments, Corporate Training and Development, Higher Education, and K–12 Settings. The trends and issues described are based on major annual reports sponsored and/or conducted by organizations including the Association for Talent Development (ATD, formerly ASTD), EDUCAUSE, Gartner Incorporated, the New Media Consortium, the Online Learning Consortium (formerly the Sloan Consortium), and Project Tomorrow. These reports require time in terms of data collection, interpretation, and publication and thus reflect the issues and trends of large groups over long periods of time. For a more immediate review of trending topics in instructional technology, please refer to the authors' biweekly podcast, *Trends and Issues in Instructional Design*, *Educational Technology*, *and Learning Sciences* (Brown & Green, 2014b).

Overall Developments

The nation's economy has slowly continued to recover. Funding for K–12 and higher education rebounded slightly since the last review. The levels of funding, however, particularly in K–12, have not rebounded to the 2008 level prior to the

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decline of the economy. Despite this, K–12 and higher education sectors continued to provide funding to support instructional technology use and initiatives for teaching and learning. Private sector funding for technology once again increased slightly in comparison to the previous year. In all three sectors, instructional technology purchases for hardware, software, and services remained a priority.

Corporate Training and Development

Similar to previous issues and trends chapters of this yearbook (e.g., Brown & Green, 2013, 2014a), we continue to track corporate application of instructional technologies primarily by referring to the *State of the Industry* (Miller, 2013) report published by the American Society for Training and Development (ASTD, though it should be noted that the organization recently renamed itself the Association for Talent Development, ATD). The report is based on data collected from 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 475 business organizations. A secondary source used to track corporate trends is Gartner Incorporated's *Hype Cycle for Emerging Technologies* report (LeHong, Fenn, & Leeb-du Toit, 2014).

Learning Expenditures

ASTD reports average corporate learning expenditures increased slightly, from $1,182.00 per employee in 2011 to $1,195.00 in 2012 (Miller, 2013). Smaller enterprises generally paid more, averaging $1,800 per employee; this is at least in part due to the smaller organizations relying on external services and tuition reimbursement plans, as well as having fewer learning and development employees on staff. Larger organizations paid significantly less; companies comprised of 10,000 or more spent an average of $700 per employee (Miller, 2013).

According to the ASTED report, employees continue to use an average of approximately 30 learning hours a year (Miller, 2013). This has remained constant in recent years, and Miller suggests problems in gathering accurate data may be caused by the use of nontraditional training methods such as e-learning, mobile device-based instruction, and informal learning, all of which are more difficult to measure and report than traditional, instructor-led, classroom training.

The average ratio of learning and development staff members to employees was 1:299 (based on adjustments made for outsourcing) (Miller, 2013). The cost per learning hour increased by $4 to $89, which is a smaller increase than recent years' past but still significant. Miller suggests the increased per hour cost may be attributable to technology development costs (e.g., the need to purchase hardware and/or develop software such as tablet-based apps). On average, corporations spent $1,772.00 for every hour of learning they created, which continues a trend in increased spending in this area (Miller, 2013).

Instructional Content

Similar to the previous year's report, ASTD's most recent industry report indicates the top three content topics for corporate instruction are managerial and supervisory, profession and/or industry specific, and business processes, procedures, and practices (Miller, 2013). These three topic areas account for a third of the instructional content available within the responding organizations (Miller, 2013). The content areas that account for the least amount of instructional content are executive development, customer service, and basic skills (Miller, 2013).

Methods of Instructional Delivery

Instructor-led classroom training continues to be the most popular form of delivery. On average, 54 % of all corporate training takes place in traditional, face-to-face, instructor-led settings (Miller, 2013). Technology-based delivery accounts for an average of 39 % of corporate training: this includes (in order of popularity) self-paced online learning, self-paced nonnetworked computer instruction, instructor-led online instruction, instructor-led remote broadcast, DVD or CD recordings, and mobile technology (which accounts for less than 2 % on average) (Miller, 2013).

Gartner Incorporated's *Hype Cycle for Emerging Technologies* report (LeHong et al., 2014) indicates that virtual reality is a maturing technology currently placed in the "slope of enlightenment" phase of the Hype Cycle, suggesting it is a technology to look at closely in terms of instructional delivery. Gamification and augmented reality, however, are currently in the cycle's "trough of disillusionment" and may need more time before it may be realistic to consider its uses for corporate training (LeHong et al., 2014).

Higher Education

We review higher education's instructional technology application by referring primarily to the *ECAR Study of Undergraduate Students and Information Technology* (Dahlstrom, Walker, & Dzubian, 2013), EDUCAUSE's *2013 CDS Executive Summary Report* (Lang, 2014), the *NMC Horizon Report*: *2014 Higher*

Education Edition (Johnson, Adams Becker, Estrada, & Freeman, 2014), the Babson Survey Research Group's *Grade Change*: *Tracking Online Education in the United States* (Allen & Seaman, 2014), and *The 2013 Inside Higher Ed Survey of Faculty Attitudes on Technology* (Jaschik & Lederman, 2013). The ECAR, EDUCAUSE, Inside Higher Ed, 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 panel of experts.

Campus Technology Support and Use of Technology for Instruction

According to the EDUCAUSE Core Data Service (Lang, 2014), funding for campus information technology (IT) services and systems increased over the past reporting year, with a median reported increase of 19 %. On average, 10 % of an institution's IT budget supports educational technology services specifically (Lang, 2014).

The New Media Consortium's *Horizon Report* observes that social media (e.g., Facebook) is regularly used by educators, students, alumni, and the general public to share news about scientific developments and other news of interest to the academic community (Johnson et al., 2014).

Learning Online. Online learning continues to gain in popularity. According to Allen and Seaman (2014), over 7.1 million higher education students (33.5 % of the total population) took at least one online course during the 2012–2013 academic year. The ECAR Study of Undergraduate Students and Information Technology (Dahlstrom et al., 2013) also reports an increase in undergraduate enrollment in online courses. While online enrollment increased by 6.1 % in the last year, Allen and Seaman observe this is the lowest reported increase since they began the report series over a decade ago.

MOOCs or massive online open courses were not mentioned in most of the studies used to prepare this chapter prior to the previous year (Brown & Green, 2014), but they are reported more often in the most recent studies. Only a small percentage of institutions have experimented with producing MOOCs in the past reporting cycle, but the number has increased from 2.6 to 5 % (Allen & Seaman, 2014). Dahlstrom et al. (2013) report that although undergraduates are taking more online courses, few have taken a MOOC.

Overall, campus administrators support online learning, but Allen and Seaman (2014) report 26 % of academic officers consider online learning outcomes to be inferior to face-to-face instruction. The Horizon Report recommends institutions leverage hybrid and online learning to "encourage collaboration and reinforce real world skills" (Johnson et al., 2014, p. 10). The authors believe this to be an important consideration for instructional technology professionals as they continue their work supporting both online and hybrid teaching and learning.

Faculty Use of Technology for Instruction

Reports from *The 2013 Inside Higher Ed Survey of Faculty Attitudes on Technology* (Jaschik & Lederman, 2013) conducted by the Inside Higher Ed and Gallup focus on faculty perceptions and use of online instruction, lecture capture technologies, learning management systems, and adaptive learning tools.

Faculty on the whole have mixed reactions to online learning: a small percentage of faculty responded that online learning can achieve learning outcomes equivalent to face-to-face courses, and roughly 60 % feel that online instruction offered by institutions that also offer face-to-face courses is an important indicator of the quality of the online instruction (Jaschik & Lederman, 2013). About half of the responding faculty felt lecture capture has potential to positively impact learning, but only 19 % reported actually using lecture capture (Jaschik & Lederman, 2013). One third of responding faculty state they have used adaptive learning tools; 61 % of respondents, however, agree these tools have the potential to positively impact higher education (Jaschik & Lederman, 2013). Just over three quarters of responding faculty stated they use learning management systems (LMS) to post their course syllabus; about half use LMS to communicate with students, and about one third use LMS to provide books or other materials (Jaschik & Lederman, 2013). According the Jaschick and Lederman, faculty are approaching MOOCs with caution: the vast majority of faculty feel recent news coverage has overstated MOOCs' value.

The *Horizon Report* notes that, in general, faculty are not receiving the training and support they need to increase their "digital fluency." They state, "Despite the widespread agreement on the importance of digital media literacy, training in the supporting skills and techniques is…non-existent in the preparation of faculty" (Johnson et al., 2014, p. 22).

Student Use of Technology for Learning

According to the *ECAR Study of Undergraduate Students and Information Technology*, *2013* (Dahlstrom et al., 2013), in general, students prefer blended learning environments and are beginning to experiment with MOOCs; they are ready to make greater use of their mobile devices for academics, while at the same time, students are concerned about privacy and institutional and faculty use of technology to connect with them has its limits. Basic technology services, such as an institution's website and course management system (CMS), are the most valued technologies among students (Dahlstrom et al., 2013). Open educational resources (OER), e-books, educational gaming and simulations, and e-portfolios are still considered experimental technologies by most students (Dahlstrom et al., 2013).

While laptops are still cited as the most common and most used devices for academics, undergraduate students typically own two or three Internet-capable devices; ownership of smartphones and tablet devices increased significantly in the past reporting year (Dahlstrom et al., 2013). Students report, however, that they are frequently discouraged or prevented from using mobile devices while in class (Dahlstrom et al., 2013). Students continue to prefer face-to-face meetings, e-mail, and the CMS as ways to communicate with their instructors (Dahlstrom et al., 2013).

About three quarters of undergraduate respondents to the ECAR survey indicate that they value the ways technology can help them achieve their academic goals and prepare them for the workplace (Dahlstrom et al., 2013). The vast majority of survey respondents would like to see greater integration of their personal digital technologies in academic settings: students would like to see increased use of lecture capture, more robust use of CMS/LMS, and the integration of their mobile devices into course activities and outside of class (Dahlstrom et al., 2013).

K–12 Education

As with previous issues and trends chapters (e.g., Brown & Green, 2013, 2014, 2011), we have predominantly consulted three national annual reports as the basis for reporting the application of technology in the K–12 sector. These reports are *Technology Counts 2014*, *The 2014 Horizon Report*: *K–12 Edition*, and the Project Tomorrow's Speak Up Report, *The New Digital Learning Playbook*: *Understanding the Spectrum of Students*' *Activities and Aspirations*. *Technology Counts 2014* is the 15th annual report published by *Education Week*. This report focuses on the overall state of educational technology in K–12 schools. The *Horizon Report*, produced by the New Media Consortium and the Consortium for School Networking (CoSN), focuses on emerging technologies or practices that are likely to gain use within K–12 over the next year to five years. *The New Digital Learning Playbook* reports are the most recent in a series of reports published by Project Tomorrow that focus on students', parents', teachers', and administrator's perceptions about the use of instructional technology and the availability these groups have to technology. The reports are a synthesis of data collected from 325,279 K–12 students, 39,986 teachers and librarians, 32,151 parents, 4,133 school/district administrators, and 577 technology leaders. Data was collected from 9,005 public and private schools from 2,710 districts (Project Tomorrow, 2014, p. 16).

While the major issues—the continual growth of online learning, the increased use of mobile devices, and the use of social media and other collaborative tools—have remained relatively consistent over the last two reviews (Brown & Green, 2013, 2014), an additional area emerged. This area is the use of digital content and curriculum in traditional and online environments.

Funding Technology

State funding for K–12 education continues to remain below level prior to the economic downturn in 2008. Although state budgets have begun to improve, 35 states provided less funding on a per-student basis during the 2013–2014 than they did during the 2007–2008 school year. Fourteen of the 35 states have cut per-student spending (inflation-adjusted) by more than 10 % since 2008. Only 13 states (Alaska, Connecticut, Delaware, Maryland, Massachusetts, Minnesota, Nebraska, New Hampshire, Nevada, North Dakota, Rhode Island, Tennessee, Wyoming) have increased (inflation-adjusted) spending per student since 2008. Three primary reasons have contributed to the lower funding levels of K–12: state taxes revenues remain below 2008 levels, costs are rising, and federal aid to states has dropped (Leachman & Mai, 2014).

According to a report published by the Education Division of the Software and Information Industry Association (SIIA), an estimated 7.9 billion dollars was spent during 2013 on digital content and education software. This was an increase of 2.7 % from 2012 and a 6.4 % increase over the past 3 years (Richards & Struminger, 2013, p. 1). Of the monies spent in this area, 42 % was spent on digital content, 41 % on instructional support, and 17 % on platforms and administration. Instructional support saw the largest increase in expenditures with a 36 % increase from 2012. Reading, language arts, and mathematics were the content areas where most funds were spent for digital content. Testing and assessment was the largest category, followed by professional development, where funds were spent in the instructional support category (Richards & Struminger, 2013, p. 2). This is most likely due to the implementation of the Common Core State Standards (CCSS) and the associated mandates for student testing on the CCSS. It is estimated that the total expenditure for IT in K–12 during 2014 will increase to nearly 10 billion dollars—a 2.5 % increase from 2013 (Cox, Morris, & Halpin, 2014). The top areas where funds will be spent are Common Core and online testing, network and infrastructure upgrades, computing devices (particularly mobile devices), cybersecurity and school safety, and professional development (Cox et al., 2014).

Mobility of Learning

Increased student access to mobile devices continues to be a trend. According to *The Digital Playbook*: *Understanding the Spectrum of Students*' *Activities and Aspirations* (Project Tomorrow, 2014):

- 89 % of high school students surveyed have personal access to a smartphone.
- 73 % of students in grades 6–8 have personal access to a smartphone.
- 50 % of grades 3–5 students surveyed have personal access to a smartphone. (p. 5)

Personal access to laptops was reported as 66 % (high school), 66 % (6–8), and 62 % (3–5).

Increasingly, more Title I schools are providing access to mobile devices to students. Over 25 % of high school students surveyed from Title I schools indicated being given access to mobile devices to complete coursework. This can be compared to only 13 % of high school students in non-Title I schools. Twenty-four percent of students in grades 6–8 and 22 % of students in grades 3–5 in Title I schools indicated having access to a mobile device at school. Districts and schools that do not have the funds to support the purchase of mobile devices to increase student access are continuing to explore bring-your-own-device (BYOD) approaches (Fairbanks, 2014).

There is increasing parent support for mobile devices in schools. Sixty-four percent of parents surveyed indicated that they would purchase a mobile device for their child for use at school, if the device were allowed (Project Tomorrow, 2014, p. 4). Sixty-one percent of the parents indicated that they preferred to have their child in a classroom where a mobile device is allowed.

Students are increasingly using mobile devices in the classroom to enhance their learning experience and to make the learning process more effective. According the report, Trends in Digital Learning: Students' Views on Innovative Classroom Models (Blackboard, 2014), high school students surveyed reported that they are engaged in the following activities using their mobile devices:

- Checking class grades (72 %)
- Looking up information (65 %)
- Using a calculator (61 %)
- Communicating with classmates and teachers (46 %)
- Taking notes in class (44 %)
- Taking photos of class assignments (40 %)
- Reading books and articles on a mobile device (40 %)
- Taking online tests (39 %)
- Using social media to work on projects with classmates (37 %)
- Receiving timely reminders and alerts about deadlines and tests (36 %) (p. 9)

Social Media and Digital Tools

Students continue to have limited access to social media in school. Despite this, students are increasingly using these tools for personal use and, increasingly, to complete schoolwork. The social media tools students are using have changed since the last review. According to *The Digital Playbook*: *Understanding the Spectrum of Students*' *Activities and Aspirations* (Project Tomorrow, 2014), students reported less engagement in the use of traditional social media tools such as Facebook (p. 7). Tools such as Instagram, Snapchat, and Vine have become the tools of choice by students in grades 6–12 (44 % surveyed). Twitter is becoming a popular choice of high school students as a tool for communication and information. Twenty-eight percent of high school students reported using Twitter (p. 7).

Students are using other social media and digital collaborative tools as well. According to *The Digital Playbook*: *Understanding the Spectrum of Students*' *Activities and Aspirations* (Project Tomorrow, 2014), students in grades 6–12 are engaged in the following activities:

- 66 % text (a 37 % increase since 2008).
- 38 % stream online TV shows.

- 28 % in grades 6–8 are creating and posting videos online.
- 25 % follow a favorite blog.
- 23 % play massively multiplayer online games.
- 12 % have their own blog. (p. 7)

In addition to these activities, students are using digital tools for learning outside of the classroom. Students are engaged in two main activities—digital writing and reading. High school students reported spending approximately 14 h using technology for writing (Project Tomorrow, 2014, p. 6). The top writing activities reported were:

- Essays and school reports
- E-mail
- Creative writing, journaling, and poetry
- Captions for photos
- Text for social media sites
- Blog posts
- Text for multimedia presentation
- Tweets
- Conversational text in games
- HTML coding (p. 6)

There is increasing preference for digital access to reading materials. Thirty-three percent of high school students indicated a preference for schoolwork reading to be digital rather than analog. Fifty-one percent indicated that online textbooks should be an essential element within future schools (Project Tomorrow, 2014).

Online Learning in K–12 Settings

Interest in online learning opportunities continues to grow. In the previous review (Brown & Green, 2014), we reported that, according to the report *Keeping Pace with K–12 Online and Blended Learning*: *An Annual Review of Policy and Practice* (Watson, Murin, Vashaw, et al., 2012), there were 619,847 students who took a one-semester online course during the 2011–2012 academic year. Although there are no specific new data we could locate for the 2012–2013 school year, we believe the number of K–12 students taking an online class has increased. The *2013 Trends in Online Learning*: *Virtual*, *Blended*, *and Flipped Classrooms Report* (Blackboard K-12 & Project Tomorrow, 2014) stated that the annual Speak Up survey data reported that 20 % of middle school students and 30 % of high school students reported taking an online learning experience as part of their educational experience. Forty-one percent of students in grades 6–12 reported being interested in taking an online class, while 26 % of students in grades 3–5 want to take an online class. Students perceive that online learning is a new pathway for their education that allows them to personalize and to be in more control of their learning experience (Blackboard K-12 & Project Tomorrow, 2014).

Parent interest in online learning for their high school-aged children is increasing as well. "While over a third of all parents (36 %) wish that their child's school would make a larger investment in online classes, 48 % of high school parents want more online courses available at their child's high school" (Blackboard K-12 & Project Tomorrow, 2014, p. 9). Parents who have participated in an online class for work or job training have increased expectations that their child's school should offer online learning opportunities (Blackboard K-12 & Project Tomorrow, 2014).

According to the *Trends in Digital Learning*: *Students*' *View on Innovative Classroom Models Report* (Blackboard & Project Tomorrow, 2014), 43 % of administrators surveyed reported that they were now offering online courses to meet the needs of their students. Sixteen percent of administrators surveyed indicated they are not yet offering any online courses (p. 3). Additionally, "40 % of district administrators surveyed indicated that the implementation of blended learning environments as having the greatest impact on transforming teaching and learning in their districts today" (Blackboard & Project Tomorrow, 2014, p. 1).

Conclusion

Digital content and online learning opportunities were a consistent trend among corporate training, higher education, and K–12 settings. Issues related to continued budget decreases affected all three sectors, with K–12 and higher education affected more significantly than in corporate settings. Online learning opportunities in particular continue to rise in popularity, and greater confidence in online as an effective instructional strategy was expressed in all three sectors. Students in higher education and K–12 settings are now looking more to faculty and those who design instruction such as e-learning to guide them in using digital resources and social media for educational purposes. Mobile devices have become virtually ubiquitous in all three settings, creating greater expectation for their use in teaching and learning. The issues most instructional design and technology specialists faced this past year are unsurprising in that each of the trends reported have been observed in previous years, but the increased perception of the importance of guidance in the use of both hardware and available content is notable.

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Chapter 3
Situated Gaming: Beyond Games as Instructional Technology

Adam Mechtley

Introduction

"Why are we doing this?" In spite of how commonly students ask this question, many science education researchers can easily neglect this point in their own work. As Rudolph (2003) has pointed out, though the question of "ultimate goals" for science education certainly receives scholarly attention, it has not always been integrated into the more prevalent "technical" research. For example, the enhancement of learners' participation in social life (i.e., engaging with science to do personally valued or socially meaningful things) has not always framed research focused on achieving particular learning outcomes (e.g., producing arguments with an idealized structure, articulating views on science content or practices that overcome common misconceptions). This tendency can be more pronounced in subfields dealing with technology- or game-enhanced learning environments, where the effects of design decisions and modes of automated assessment are prevalent concerns (e.g., Clark & Martinez-Garza, 2012; Clark et al., 2011).

While science education researchers in general may occasionally (and with varying levels of explicit attention) appeal to concepts such as understanding social, historical, and epistemic norms of science (i.e., nature of science, NOS) or engaging in scientific practices or discourse, neither of these goals is quite the slam dunk they may appear to be at face value. For example, understanding NOS is commonly characterized as something along the lines of learning some set of declarative tenets (e.g., science is theory laden, theories and laws differ, claims are tentative; see Abd-El-Khalick, 2012 for a characteristic formulation). At least one problem with this approach—or even to appropriating scientific content (a category to which this version of NOS may arguably belong)—is that *understanding* and *belief* are not the

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same things (Chinn & Samarapungavan, 2001). A child may be able to masterfully recite something that scientists (or those who study scientists) believe, yet he or she may independently hold incompatible beliefs. Furthermore, simply understanding NOS gives us little insight into learners' practices (i.e., what they actually do with this understanding). Nonetheless, instruction revolving around practices such as inquiry and argumentation (or construction and critique; Ford, 2008), while instead focusing on learning scientific discourse in embodied experiences, is often aimed at making learners behave like scientists. For instance, children may be tasked with performing experiments and arriving at a consensus about some aspect of Newtonian physics, plant biology, or electromagnetism. Whatever value such experiences may have for learners, the extent to which they support the forms of activity that learners encounter in daily life generally remains an assumption.

As a consequence of these issues, some recent proposals have advocated for relocating engagement with both scientific discourse and NOS in forms more common to everyday experience. For example, Allchin (2011) has argued that for scientists and nonscientists alike, practices such as adjudicating expertise and identifying or locating missing but important information are essential. In this regard, he has proposed that learners "should develop an understanding of how science works *with the goal of interpreting the reliability of scientific claims in personal and public decision making*" (p. 512, emphasis in original), such as by evaluating scientific information found in magazines, newspapers, government documents, and websites. An important but subtle affordance that such an approach offers over those focused on the emulation of scientists is that the structure of the learning task more closely aligns the motivation for the appropriation of scientific content, practices, and/or language with its use in practical contexts. Science is cast as having *instrumental* value both in the learning context and in the envisioned goal/use context.

Although the incorporation of everyday experience into the science classroom in some way or other goes back at least as far as Dewey (see Rudolph, 2003), the gap between *motives* for everyday activity and classroom activity can vary considerably as a consequence of cultural and historical elements of the school setting. For example, assigning a laboratory- or computer-based inquiry task generally positions the performance of science as an end unto itself or as a means for learning or reinforcing some content knowledge. On the other hand, giving students some degree of agency in selecting their own inquiry tasks creates the possibility that they will use science as a tool for pursuing some personally meaningful objective. In both cases, however, the task is still effectively positioned as a school assignment, which carries with it a set of both affordances and obstacles. Rather than deeply engaging with science for some personally meaningful task, students may ultimately pursue goals that could be in tension with the desired learning outcomes. For example, a student may have a fairly stable concept of what a "correct" answer looks like for a school assignment (e.g., use of technical vocabulary, recitation of declarative statements) and may consequently not engage with practices that underlie a task's purpose (e.g., evaluation or synthesis of competing ideas under conditions of uncertainty).

Consequently, in order to supplement scholarly advances regarding both the goals of science education and the technical aspects of science learning, I argue here that there is a need for research aimed at the design of science learning experiences that (a) can motivate the formation of activity systems where scientific content, discourse, and/or epistemic norms are fluidly recruited as tools for accomplishing objectives that are meaningful to the learners, but that also (b) explicitly account for the cultural affordances offered by the settings in which the designs are instantiated. In accord with a design-based research (DBR) perspective, I recognize there can be no one-size-fits-all solution to this problem, yet I also emphasize the need for designs that can scale to multiple locations and that are sustainable. While technology can help serve these latter goals, we must not treat it as a thing that can be unproblematically inserted into new settings.

In the remainder of this chapter, I argue that serious games provide one possible avenue for addressing the need for advances in the design of science learning experiences, but also point out that the limited empirical literature we have suggests that we need to employ a little more creativity in imagining what such games could look like in order to serve this goal. In order to frame the interaction between design and context, I draw on elements of cultural–historical activity theory (CHAT) to account for rich aspects of the settings in which designs are implemented, as well as the motives that shape learners' activities. I then discuss some recent research concerning epistemic cognition (EC) to underscore the importance of motives and goals in activity systems when trying to interpret learners' actions in terms of science learning outcomes. I conclude by considering some implications for the design of science-based games that could serve both students and researchers rather than slavishly and unimaginatively reflecting only the needs of contemporary standardized accountability mechanisms.

Gaming the System

Just over a decade ago, Gee (2003) penned a groundbreaking piece of educational scholarship, in which he argued that good commercial video games, in contrast to many common classroom practices, embody powerful principles of learning, particularly when learning is characterized from a sociocultural perspective (e.g., Lave & Wenger, 1991). Throughout the text, he enumerates 36 different principles of good learning, providing illustrations of exemplary games in which they might be seen, while also discussing implications for traditional school-based learning. Among these learning principles, he points to the importance of *situated meaning*. When learning unfolds according to this principle, he argues that "the meanings of signs (words, actions, objects, artifacts, symbols, texts, etc.) are situated in embodied experience" rather than being "general or decontextualized" (p. 108). For example, a practice such as controlling variables in an experiment, rather than merely being reviewed in a lecture or textbook, ought to be introduced and enacted when it is grounded in a particular activity where it is useful and meaningful to the learners. In good video games, argues Gee, there is such a correspondence between learning and meaningful context.

Although Gee did not focus explicitly on using games in classrooms or developing games for educational purposes, his work has nevertheless been appropriated in research efforts involving so-called "serious" games, which are conventionally taken to be those created for specific educational purposes rather than for amusement and whose design necessitates balancing players' subjective experiences (i.e., enjoyment) with learning objectives and instructional design principles (e.g., Aleven, Myers, Easterday, & Ogan, 2010). Given the radically different contexts of use between such games and those Gee discussed, it is unsurprising that some of his points may be maladapted to serious games as they have traditionally been conceived.

For the most part, the existing record of empirical evidence concerning serious games actually tells us little that speaks to the present problem. Most studies involving serious games ask questions like whether or not people can learn from games or whether they learn more effectively from games than they do from some conventional mode of instruction, where "learning" here stands in for "perform competently on a standardized assessment" (see Honey et al., 2011; Young et al., 2012).

However, a recent meta-analysis reveals some interesting points, albeit somewhat indirectly. Wouters, van Nimwegen, van Oostendorp, and van der Spek (2013) examined studies that compared applications of serious games to conventional modes of instruction in terms of learning outcomes, retention, and motivation. While they concluded that game-based instruction was more effective in terms of the former two measures, they were unable to identify a statistically significant difference in terms of motivation, contrary to their expectations. Although one can challenge their broad view of motivation (which grouped an assortment of related affective measures) or the validity of post-activity affective measures (which were featured in most of the studies they analyzed), their result is unsurprising if considered from a CHAT perspective. For example, the authors' results suggest that "relative to conventional instruction methods, serious games are more motivating *when they are not combined with other instruction methods*" (p. 10, emphasis added), though their benefits in terms of learning outcomes statistically vanish under such conditions. Moreover, they offer as one possible explanation the effect of self-determination, noting that "an essential difference between leisure computer games and serious games is that the former are chosen by the players and played whenever and for as long as they want, whereas the type of game that is used and the playing time are generally defined by the curriculum in the case of serious games" (p. 13). In short, their results help make the case that the conditions framing game use ultimately shape the activity systems that form in the setting. CHAT helps unpack this problem by providing a rich perspective on context, which incorporates not only the history, norms, and expectations inherent in the environment but also how these elements interact with the game to shape motives for activity and goals that participants adopt.

Motives and Activity

Although the general notion that "context matters" appears in prevalent theories of learning (e.g., Lave & Wenger, 1991), activity theory provides a unique lens for articulating what exactly I mean when I speak of the "context" in which participants encounter serious games. Activity theory, broadly construed, has been applied to problems across a number of scholarly disciplines, including human–computer interaction (e.g., Nardi, 1996a), often to provide more ecologically valid accounts of phenomena under study. Without delving too far into the history of modern perspectives on activity theory in educational research, it is fair to say that they stem historically from the work of Vygotsky (1978) and his associates (e.g., Leont'ev, 1981), whose work in this regard was aimed at describing how *subjects*' actions performed on *objects* are mediated by *tools*. In this sense, subjects may be individuals or groups, while objects and tools may be tangible or intangible. For example, an object might be a material thing or an idea, while tools might include methods, material artifacts, or even language. Tools mediate the interaction in the sense that they "[empower] the subject in the transformation process with the historically collected experience and skill" they embody, but they "also [restrict] the interaction to be from the perspective of that particular tool or instrument only; other potential features of an object remain "invisible" to the subject" (Kuutti, 1996, p. 14). Games and simulations that model scientific phenomena fall into this category, as they are necessarily limited representations that reflect ideologies implicitly informing their designs (Squire, 2006). To this structure, Engeström (1987) has explicitly added the *community*, which consists of those other actors who share the same object as the subject from whose perspective the activity system is described. Correspondingly, he suggests the model must add *rules* (e.g., norms, conventions), which mediate interactions between the subject and its community, and *divisions of labor*, which mediate interactions between the community and the object. This structure, the *activity system*, simultaneously constitutes the basic unit of analysis and the context. In short, the tool-mediated actions of subjects must be understood in terms of their relation to the activity system as a whole. In a now-classic example, Leont'ev (1981) described how the actions of a type of individual participating in a collective hunt—the "beater"—can only be understood with reference to his or her actions in a system of joint activity, as his/her particular action of chasing animals does not, by itself, satisfy the need for food or clothing (the object of the activity). Moreover, the *object* of activity itself—not just the set of variables constituting the environment—is an essential part of the context. Two actors engaging in the same behavior in the same physical setting (e.g., looking at the sky while walking) may be engaging in fundamentally different activities (e.g., bird watching or meteorology) and hence are said to be in different contexts (Nardi, 1996b).

Although there are of course many ways of approaching a research problem from the basic activity system model, some perspectives (Leont'ev, 1981; see also Engeström, 1987; Kaptelinin, 1996; Kuutti, 1996) provide convenient terminology I employ in the present discussion and so merit briefly reviewing. Namely, an activity system is fundamentally defined in terms of its object, which constitutes the *motive* for the activity. For example, an activity system may be said to exist in a software development firm where the motive for activity is to produce an updated version of a program. Within this activity, individual actors take *actions* in the pursuit of specific, conscious *goals*. In this sense, a goal is distinct from the motive of the activity, given that individual actors may in fact be unaware of the motive, particularly as a consequence of the divisions of labor. In the present example, in addition to designers, engineers, and project managers, a number of administrative and/or service personnel (e.g., IT, receptionists) may have different levels of awareness of the program update, but each carries out his or her own specific actions with known goals, each of which contributes to the joint activity of updating the software (as well as to a number of other activities going on the firm). Finally, *operations* describe the concrete processes actors carry out in the course of their actions, dependent upon variable circumstances. In this regard, an actor could employ any number of operations while carrying out some action without perturbing its core (i.e., the goal). Because traditional approaches to science instruction often have little situational variation (particularly when embedded within the constraints of software-based environments), we provide few opportunities for learners to practice their problem identification capabilities. In essence, engagement with science is often a motive foisted upon learners, rather than an operation taken in the course of an action. While being empowered to engage with the epistemic features of science is necessary, it is also insufficient without an equal empowerment to make judgments about the sorts of situations where it could be fruitful to do so.

Building upon this groundwork, using CHAT specifically to conceptualize context helps us move "out of the head" in some ways that are germane to the present argument. According to the CHAT perspective (e.g., Cole & Engeström, 2007), any psychological functioning and culture within an activity system must be understood in terms of historically accumulated activity. In a classroom-based intervention, the norms, language, attitudes, and so on that have accumulated in the particular setting (via, e.g., students' families, prior schooling experiences, and their particular classroom culture) all exert some level of influence on the uptake of any design being instantiated. Likewise, the *leading activity* in participants' lives (i.e. a group's notion of behaviors expected of someone of ordinary ability at a certain level of experience) forms an important aspect of the setting's history. For example, play is a leading activity for many young children, while formal learning or engaging in complex peer relations might be considered a leading activity for older children in some cultures. Following from these points, games and other educational designs must be deployed in a setting for an amount of time that allows us to account for the formation and evolution of the phenomena under study. We cannot yield sufficiently explanatory accounts of activity from brief interventions followed by flights back to the security of our laboratories where we are free to pour over our data.

Object or a Boundary Object?

Returning to the topic of science-based games, a CHAT perspective implies that analytic accounts of design must incorporate not only features endogenous to the design but also their interaction with the context in which the game is deployed. While practitioners of DBR have long advocated for studying learning in naturalistic environments (Brown, 1992; Collins, 1992; The Design-Based Research Collective 2003), DBR researchers' simultaneous goal of generating generalizable design knowledge is a source of tension (Barab & Squire, 2004). Consequently, research can tend to focus on the effects of designed task structures rather than on effects of the context (cf. Barab et al., 2002; Squire, MaKinster, Barnett, Luehmann, & Barab, 2003). For instance, Sandoval (2004, 2014) formalized a scheme of conjecture mapping that provides a tool for researchers to organize relationships between their design decisions, mediating processes to which they give rise, and learning outcomes that result from these processes. According to this model, specific decisions about how to divide access to information among learners in a science learning environment may be conjectured to contribute to needs for justification. The needs for justification might in turn be conjectured to contribute to the construction of arguments with a desired structure. However, as Sandoval himself has pointed out, conjecture maps according to this form do not explicitly model theoretical interactions between the design and the context. Rather, he suggests that such influences would, over the course of iterations across a number of settings, feed back into the design. Although this approach is generally valuable and can help refine particular designs, it misses an opportunity to refine theories about how and why aspects of context mediate the effects of particular design decisions, as well as the ways designed experiences are used (or not used) more broadly.

Along these lines, an important consequence of a CHAT perspective on DBR is the centrality of motives as an explanatory contextual factor. Rather than tacitly assume that everyone in a classroom is part of some particular activity system (especially one with a motive we have attempted to engineer), we must first locate evidence of a common object or objects. In doing so, we need to demonstrate that the disparate goals and actions of learners somehow relate to the motive we propose is under study (see, e.g., Hakkarainen, 1999). While many classroom tasks can be described in terms of a joint activity that is motivated by arbitrary task demands (i.e. the instructor provides an assignment, and students begin performing actions in order to earn a favorable evaluation or avoid punishments), this activity system is only of interest insofar as it provides us a perspective on the movement of learners between other activity systems encapsulated in the space. In the case of a scientific inquiry task, for example, some students may be united by a motive of some sort of epistemic achievement, such as finding out whether or not wild animals in their community have been affected by suburban sprawl. On the other hand, some students' actions may be motivated by minimal requirements for task completion. In this regard, while some individuals' or groups' actions will occasionally be compatible with requirements of other groups' activity systems, understanding their goals and how or if they relate to motives organizing a joint activity is essential when trying to make claims about their learning.

From a design perspective, thinking of aspects of the design (e.g., computer software or tools embedded in it, task parameters, materials) as potential *boundary objects* provides a useful lens. Boundary objects are those objects, either abstract or concrete, "which are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites" and which "have different meanings in different social worlds" yet have a structure that "is common enough to more than one world to make them recognizable, a means of translation" (Star & Griesemer, 1989, p. 393). Boundary objects can therefore be useful insofar as they provide a common ground, a sort of "gathering point" for disparate activity systems. Task structures that encourage interactions around these objects provide opportunities for social exchanges that might unite otherwise disconnected activity systems. In the prior example then, a shared object like a repository where groups report their results could be considered a boundary object featuring in multiple distinct activity systems in one setting. A task structure that encourages groups to regularly revisit this repository and verbally report their results to others as part of the ongoing activity provides opportunities for all the groups sharing the repository to renegotiate meanings and goal orientations.

Epistemic Cognition and Epistemic Aims

Among other things, CHAT helps draw attention to our need to better understand participants' goals in the context of culturally and historically situated game play, especially if we hope to make claims regarding the epistemic nature of their behaviors and discourse. We need to think about both participants' goals (of which there are certainly many operating at any one time), as well as their perceptions of an activity's purpose. These aspects are of particular relevance to science education. Namely, if we think about professional scientific activity systems in CHAT terms, they share features with all sorts of complex social endeavors, but those motivated by the production or evaluation of knowledge include a number of unique features—tools, procedures, discursive practices, inscriptions, roles, and so on—that all help enforce certain sets of *epistemic norms* unique to the activity system in question. Accordingly, given an educational goal of empowering learners to recognize and engage with the products of these systems, skillful navigation of some of these epistemic norms is a common concern for science educators.

In this regard, over the last four decades, some education researchers have developed a line of work concerning what is now commonly called *epistemic cognition* (EC) (see Chinn, Buckland, & Samarapungavan, 2011; Greene, Azevedo, & Torney-Purta, 2008; see also Hofer & Bendixen, 2012; Hofer & Pintrich, 1997 for historical reviews). This subfield—historically referred to widely as *personal epistemology*—has broadly examined learners' ideas about knowledge, knowing, and/or justification. For example, such research may investigate whether individuals have specific ideas about the certainty of scientific claims, what these ideas are, whether individuals are conscious of these ideas and/or consistent in their application, and how these ideas relate to observable behaviors.

While most historical work in this subfield treated epistemic thinking as though it constituted personal theories specific to particular semiotic domains, recent scholarship has suggested that contextual variables, rather than stable beliefs or traits, exert a strong influence on EC (Elby & Hammer, 2001; Hammer & Elby, 2002; see also Sandoval, 2012). According to such perspectives, the apparent epistemic criteria students may use in a science classroom activity could depend upon their perceptions of its purpose, their instructors' use of particular analogies, their disciplinary expertise, and so on (e.g., Rosenberg, Hammer, & Phelan, 2006). An important consequence this position implies is that the goal of instruction is not the replacement of an incorrect/naïve epistemology with a correct/sophisticated one, but rather to design learning experiences in a way that maximizes participants' abilities to draw on epistemological resources that are *productive* in a given situation. The compatibility of these perspectives with CHAT hopefully does not require recitation here.

A critical advance that has stemmed from the situated perspective on EC has been the focus on *epistemic aims* proposed by Chinn and colleagues (2011). Specifically, they suggest that "epistemic aims are central to EC because aims determine whether other cognitions should be classed as epistemic or not," arguing further that "[many] beliefs can be ruled out as nonepistemic because they are not directed at epistemic aims" and that "[it] is impossible to adequately explain or predict learning and reasoning processes without knowing whether people have adopted epistemic aims or which aims they have adopted" (p. 147). Epistemic aims are essentially subjects' knowledge-related goals, such as acquiring "true" beliefs, avoiding false beliefs, attaining minimally justified beliefs, or achieving understanding or explanation. Along these lines, many examples cited in the empirical literature of apparent disconnects between learners' enacted and declared beliefs could be interpreted in terms of the presence/absence or form of epistemic aims. For example, in a classroom-based science activity, Sandoval and Millwood (2007) have suggested that motivation is often embedded in the demands of school tasks (i.e. being compelled to produce an assignment for an instructor), which may affect how students perceive their goals and thus the appearance of their epistemic beliefs.

Thinking about epistemic aims allows us to problematize the ways in which the concept of *authenticity* has been conceptualized in many strains of science education scholarship, primarily as a consequence of focusing on the emulation of scientists' practices in inquiry. For example, McGinn and Roth (1999) have offered recommendations for conducting authentic inquiry aimed at preparing learners "for competent participation in scientific laboratories, activist movements, the judicial system, or other locations/communities where science is created and used" (p. 14). By drawing on scholarship in the field of science studies, which broadly encompasses the history, philosophy, and sociology of science (e.g., Kuhn, 1962/2012; Latour & Woolgar, 1979), they recommend that curricula for student inquiry should incorporate elements such as persuasion and re-representation of ideas through visual inscriptions. Others have approached authenticity in terms of the extent to which classroom activities approximate epistemic characteristics of problems faced by professional scientists. In particular, Chinn and Malhotra (2002) have catalogued a variety of ways in which both textbook- and research-based inquiry tasks of various forms deviate from professional science and how these deviations can have consequences for students' epistemic beliefs about science. Specifically, most such tasks they review entail algorithmic processes with certain conclusions, rarely integrate work with a broad range of theoretical knowledge, and—at their best—tend to focus only on relationships between one independent and one dependent variable.

While I do not mean to dismiss these concerns out of hand, Chinn and colleagues (2011) point—particularly when considered in terms of CHAT—suggests that *authenticity of epistemic aims* (i.e. goals) is of equal importance. Although Sandoval (2012) has drawn direct connections with situated learning theory (Lave & Wenger, 1991) to bring attention to the extent to which EC is enacted in the context of specific cultural activities, the relationship between the context of activity and subjects' epistemic aims remains unexplored, which has a number of ramifications for science education in this vein. In short, while prevailing approaches tacitly assume the existence of an epistemic aim (the form of which is never specified) and proceed to analyze learners' cognition (embodied in discourse, inscriptions, or any other form) in terms of EC, taking CHAT seriously means that we need to both make the case for the existence of these aims and understand how aspects of the activity system (e.g., the design and the cultural/historical setting) effect or stymie them and any EC that arises.

Meaningful Science Through Play

In line with recommendations like those of Allchin (2011), it is worth reflecting on the types of activity systems we want to effect and how our (fully situated) designs might bring them about. The traditional model of a classroom activity could be envisioned as starting with an externally imposed task demand—the instructor conveys an assignment with some parameters or other—and then we cross our fingers and hope students will adopt among their goals some epistemic aims and form activity systems (consciously or not) aimed at producing or evaluating knowledge, all the while recruiting resources we provide in the design to reinforce epistemic norms we deem productive (or worse—"correct") for the problem at hand. It is my view that the biggest room for improvement in this model is the entry point—the task demand made at the outset. While Allchin's recommendations help position science as an instrument rather than as an end unto itself and while engaging with the types of objects he enumerates is undoubtedly valuable and more familiar than other types of tasks, simply being given articles and asked to do things with them is still a very singular practice. Consequently, I see much room for design innovations that help organize learners around motives that are more meaningful at the outset and which incorporate features that necessitate and support the recruitment of science as a productive and reflective tool during the course of learners' operations. Serious games that embed scientifically informed simulations (Honey et al., 2011) could satisfy these needs, but we need to be a little more imaginative about what they might look like in order to overcome some shortcomings in past approaches. In essence, serious games can be more than content-delivery vehicles or digital assignments. They can be tools for organizing activity around motives that meaningfully position engagement with science as a seamless consequence of participation in a social activity.

To move this line of reasoning forward, I draw attention to the fact that I have not indulged in attempting to define what constitutes a "game" as opposed to other types of activities. This omission is not an accident. In order to break from what I see as a lineage of counterproductive research agendas, we must adopt a social constructionist standpoint on the matter. Namely, researchers' opinions of what counts as a game are of little consequence when engaging in DBR. What matters is whether or not the learners engaging with the design perceive it as a game or—more to the point—that, whatever they perceive it as, they agree to take part in the conceit and become part of the activity system. In light of the imperfect examples from the empirical literature, however, it would be overly simplistic to assume that simply perceiving some experience as a game would be sufficient to motivate activity. I therefore wish to emphasize that the history of all elements in the activity system is influential in the motivation to play (see Hakkarainen, 1999). As such, the historical experiences that shape the meanings participants assign to the activity become important to consider.

While I have no empirical basis for making anything that could be construed as "design recommendations" or "best practices" here, leveraging ideas from CHAT allows for the exploration of some interesting possibilities beyond simply un-defining "game." Counterintuitively, I believe that chief among these possibilities are the affordances that might emerge from designing games that are intended to be played not only over long spans of time but also *across multiple contexts*—possibly even if they are intended to be first introduced to players outside of formal educational settings (e.g., they are "marketed" as games for entertainment, to be played at home or with friends). One affordance this could enable would be impacting the meaning learners ascribe to the game. For example, if a particular game is first encountered as a tool for enjoyment, this experience becomes an important piece of the historical accumulation framing its use in a formal learning environment. In contrast, many examples appearing in the literature position instructors or institutions as gatekeepers, and the games being used are only ever encountered in a school setting. Although it was not designed with school use in mind, the commercial game *Minecraft*, which focuses on open-ended creativity and constructing ever more complex virtual tools from raw materials, actually provides a useful example in this regard (see Duncan, 2011). With over 100 million registered users and over 50 million copies sold across a range of hardware platforms (Makuch, 2014a, 2014b), the game is fundamentally a (successful) commercial entertainment product. However, the game has attracted favorable attention from teachers (e.g., Short, 2012) and has even recently inspired the creation of purchasable curriculum materials designed by educators.

Such games that are designed to span multiple contexts over long periods of time also offer researchers the opportunity to produce a genetic account of the "idioculture" (Cole & Engeström, 2007) that arises around the game. This persistence of norms, tools, and so on can help researchers better understand how the design is appropriated in educational settings where it is deployed—ideally also for sufficiently long periods of time to allow for changes in local activity systems. In essence, a game that is substituted in place of an assignment at one point in a unit is very different from one that exists as a regular feature of practice in the setting, and the latter provides a more suitable platform for analysis in terms of CHAT.

Another possible lesson to be taken from *Minecraft* is that contrary to existing norms of serious game design, such games might actually benefit from *not* attempting to entirely encapsulate pedagogy. Apart from the potential for disruption of player flow that excessive pedagogy poses (particularly if the game were introduced in a context for entertainment purposes), it also fails to leverage the resources that exist in the learning context—namely, the instructor. For example, if a reflective exercise that is beneficial to some valued learning outcome is fundamentally disruptive to play, the design might benefit from removing the exercise from the game and instead finding a way to less disruptively incorporate the exercise as part of the interaction between the game and the educational context. Interestingly, *Minecraft* embeds no explicit pedagogy (e.g., tutorials) in the game's design at all. Although this absence may seem surprising at first blush, *Minecraft*'s rich online affinity spaces are the primary setting for its learning activity (Banks & Potts, 2010; Duncan, 2011).

Given that many scholars (Choontanom & Nardi, 2012; Gee, 2003; Steinkuehler & Duncan, 2008) have pointed to online affinity spaces as one of the most vibrant locations of learning happening around games, it is surprising that designs incorporating serious games generally neither require them nor provide facilities for their formation. As Young and colleagues have pointed out, "[if] learning outside the game can be as powerful as learning directly from game play, then educational research must begin to determine the role of social learning and discover how metagame learning as well as game play can be exploited for instructional goals" (2012, p. 83). In short, while games can offer valuable, individualized experiences, designing in features that actually obviate the need for social interaction may be counterproductive. Incorporating complex scientific systems, purposefully rationing information, and providing platforms for communication and collaboration could all go a long way in terms of guiding players' operations.

Ultimately, if serious games continue to be developed as tools to drop into existing activity systems, to try to add interest to existing motives that are not meaningful to learners, our understanding of their potential will be impoverished, and we may end up passing over an opportunity to try to deal with current challenges in the design of meaningful science learning experiences. While some have argued in favor of ensuring that game objectives and learning objectives correspond (e.g., Young et al., 2012), persisting with taking this perspective too literally may not be fruitful. Being directed to "do some science" may be no more interesting or meaningful when it happens in a piece of software than when it happens in a traditional classroom. In this regard, games such as *Quest Atlantis* (*QA*) (Barab, Sadler, Heiselt, Hickey, & Zuiker, 2010) and *Citizen Science* (*CS*) (Gaydos & Squire, 2010, 2012) stand out as examples that move in the right direction, given their positioning of science as a tool for performing actions in an activity motivated by narrative problems. The latter in particular focuses specifically on interacting with scientists to engage in citizenship tasks (e.g., players combat pollution in a local lake by using science to persuade characters representing different stakeholders). However, each game also embodies to differing extents the opportunities for improvement still available in terms of many of the points outlined previously. For example, while *CS* can be freely played online, *QA* is not generally available to the public. While *QA* can be used by multiple users, *CS* is a single-player game. While both feature some rich underlying models, each is framed by a (relatively brief) narrative structure with few opportunities for deviation, and so neither serves as a platform for ongoing participation or the formation of affinity groups. The challenge I now propose is to draw on their successes to both advance our theoretical knowledge and find novel ways to help address contemporary problems in science education, rather than simply focusing on making the acquisition of content more interesting than reading a textbook.

Conclusion

I began this chapter by asking: "why are we doing this?" By drawing on CHAT and contemporary EC research, I have attempted to underscore the importance of this question for learners as they attempt to make meaning out of the designs in which we ask them to participate. In the case of taking up or comprehending epistemic practices and norms in the sciences, it is critical that learners have a clear answer in mind. While some things can be learned while engaging in discovery, the prevailing technical scholarship in science education suggests that becoming conversant with the epistemic norms of science requires clear goals and a fair bit of conscious awareness thereof. While some methods of assessing students' capabilities in this regard may be better than others, any inability of the assessment method to ground EC in meaningful activity with authentic motives must be taken into consideration. Although I have focused primarily on science here, it is plausible the same arguments could be made for a number of other disciplines with their own epistemic norms (e.g., journalism, history, engineering).

I have suggested here that serious games that create circumstances requiring the use of science in some way or other may provide one means for authentically motivating learners' activity, but that our current approaches to designing such games and thinking about their relation to other elements of the learning context are an obstacle to the sort of learning we hope to see in science classrooms. As others have done, I stress here that such games ought not be a substitute for activities involving physical materials or real-world problems local to the environment in which the game is being played. Adequately addressing the needs of learners requires a multitude of complementary approaches, and each approach needs to make the case for its utility given the learning situation at hand. Moreover, taking the learning context seriously as constitutive of the activity system in which the design exists requires that we are sensitive to constraints imposed by the needs of educators and communities where they work. Among other things, teachers have limited amounts of time and a plethora of standardized assessment instruments to which they are accountable. Although we may have lofty ideas about how to meet what we see as the real needs of learners, we have little likelihood of finding willing partners if we do not simultaneously respect the very real constraints they experience in their own practice.

Finally, while most of the examples from which I have drawn have concerned digital games, emerging scholarship around non-digital gaming practices is revealing equally sophisticated affinity groups and practices (Berland, 2012; Chen, 2013). Because such games—in direct contrast to their digital cousins—lay bare their underlying systems rather than obscuring them as potential objects of inquiry, it will certainly be valuable to better understand the activity systems in which they feature. Without deeply exploring such rich territory, it can become easy to focus too greatly on the technological aspects of digital games that contribute to learners' participation. While these technological features are important and provide some unique affordances in terms of learning and research, it is important to not mistake their *mediation* of activity for *motivation* for activity. People play all kinds of games and become game players in many different ways. By spreading our search, we improve our chances of locating inspiration for designs that can leverage meaningful activities and transform learning opportunities across a multitude of settings.

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Chapter 4
Definitions, Motivations, and Learning Practices in Games and Virtual Worlds for Children

Daisyane C. Barreto

Introduction

Games have been part of people's lives since ancient times. One of the oldest games dated, an Egyptian board game called *Senet*, was originally created to be a simple pastime. Afterward, religious and spiritual meaning was conferred to the game to represent and communicate the shared beliefs of Egyptian society at that time (Piccione, 1980). Since then, games have evolved into sophisticated, animated, and programmable artifacts such as computers, handheld devices, and game consoles.

Playing games in the past would imply having a limited group of people, getting together at the same time and in the same physical space. With technological advances, games shifted the experience of play from physical to virtual spaces, from tabletop games to online games. Online games have been associated with many labels: multiuser virtual environments (MUVEs), massively multiplayer online role-playing games (MMORPG), massively multiplayer online games (MMOG), and even broader categories, such as virtual worlds or synthetic worlds (Castronova, 2005), have been used to accommodate environments that afford both gaming and non-gaming features. Due to the plurality of online worlds, it has been difficult to identify and organize appropriate research in the area of online games, particularly the ones that would discuss the use of these technologies to support children's learning.

Independent of the labels being used to classify online games, it is important to understand on how this technology, originated from traditional forms of games, has been designed and developed to serve purposes beyond recreation and leisure. Just as ancient Egyptian society made use of a game to communicate and perpetuate their cultural beliefs, today's current society is utilizing games for purposes other

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than entertainment. Recently, the main focus has been the use of games for educational purposes.

Using games for educational purposes is an approach to combine the qualities of games with academic content in order to enhance learning. This approach draws on the power of games to harness player's motivation. People play games for various reasons. Generally, the reasons to play games are related to experiences afforded by the game environment. Many game activities provide a sense of accomplishment, involvement, and choice to those who play them (McGonigal, 2011; Rigby & Ryan, 2011, Schell, 2008; Yee, 2014). These are common motivational factors that games can elicit. Thus, using games for educational purposes could be a way to support and motivate people to learn about topics they may not initially enjoy.

The purpose of this chapter is to present an overview of games and virtual worlds, including defining these terms and how these technologies could be employed to leverage learning. This chapter also addresses the motivational components in games, which is an area of interest for game researchers and educators. Additionally, this chapter includes research in educational and commercial virtual worlds for children as means to identify the educational and motivational outcomes of these technologies. Lastly, the chapter concludes with implications for the use of games and virtual worlds for educational purposes.

Understanding Games and Virtual Worlds

Defining games is a difficult task because of the inconsistency and ambiguity generated from term. Given a review of seminal work in the study of games, Salen and Zimmerman (2004) along with Juul (2005) observed that eminent theorists used the words "play" and "games" interchangeably. Indeed, the boundary between play and games is thin. Games can be a subset of play as well as play can be a subset of games (Salen & Zimmerman, 2004). Considering all possible activities categorized as play, playing games is one of them as it is playing a musical instrument or playing with a toy. These are forms of play. Still, play is a part of games. The interaction between player and game results in the experience of play, which is one way of understanding the larger phenomenon of games.

In an attempt to define games, Salen and Zimmerman (2004) categorized games as systems that allow players to engage in non-real context-based conflict. This conflict can be categorized as problem-solving activity (Schell, 2008). The problem is outlined by the rules of the game, and players seek to solve it within the game environment. In addition, games have goals that result in outcomes. These outcomes can be quantified by a value or numerical score, which determines whether a player has won or lost the game. Besides these features, there is a relationship that emerges and consequently sustains play, as a player interacts with the game. This relationship can be defined as game play. In Juul's (2005) definition of games, it is the potential outcomes of the game that trigger a player to invest time and effort into the game, i.e., how a player perceives the game outcomes leads to his/her attachment to the game. Moreover, Schell (2008) argued that games are designed to promote a "playful attitude," meaning that players are motivated to engage in game play. If players are not enjoying the game, then the game activity becomes an exercise, a chore, or even a work-related task. In this context, not only the characteristics of a game should be taken into consideration but also the relationship between the player and the game.

Until now, games have been discussed as an isolated definition and its relationship with the player. Nevertheless, games can also be integrated into much larger experiences such as online worlds. These spaces cannot only host the games but also offer opportunities for the player to interact and engage in other pleasurable activities that do not necessarily include game features (i.e., rule-based activities). Hence, the remaining part of this section covers a definition of virtual worlds, starting with the origins of this new technology.

The origins of virtual worlds came from two sources: the fantasy role-playing game (RPG) *Dungeons and Dragons* and the early computer-based role-playing environment *Multi-User Dungeons* (MUDs). Dungeons and Dragons was invented by Gary Gygax and Dave Arneson in the mid-1970s (Kelly, 2004) wherein players take and perform roles from fantasy adventure stories in face-to-face game sessions. This taking on roles idea is the defining characteristic of the RPG genre. Overall, these genres of games allow players to create and customize their characters based on physical attributes, abilities, races, and classes that are part of the game storyline, which is usually determined by a Dungeon Master (DM). The DM is usually the player directing the game as he or she unfolds the game story and the decision-making scenarios that other players might face on the game. Today's online gaming worlds have borrowed the fantasy medieval style scenarios from Dungeons and Dragons as well as its character role customization.

Similarly, MUDs also involve role-playing adventures; however, the interactions among players and the storyline happen on the computer, usually via text. That is, players are given written descriptions of the storyline and expected to act upon them by means of typed commands. Thus, this concept of text-based interaction and the capacity to play with other players over the Internet have resulted in the development of MMOGs and virtual worlds.

There have been some definitions of MMOGs (or its variant MMORPG) as well as virtual worlds, but few have distinguished these two terms. For instance, Steinkuehler (2004, 2006) defined MMOGs as online games in which players can create "digital characters" and interact with other players and objects within a two- or three-dimensional computer graphic environment. Dickey (2007, 2011) also highlighted interactivity as a component of MMOGs, but expanded her definition by adding that these are "persistent" and "networked" environments. Interestingly, some authors (e.g., Bell, 2008; Cannon-Bowers & Bowers, 2008) used similar words, such as interactivity, persistence, and networked computers, to define virtual worlds. Although MMOGs and virtual worlds share similar technologies, the relationship and the concept behind these environments have not been addressed. The reason for this similarity in their technology is because MMOGs are, in fact, part of virtual worlds (Schroeder, 2008). In other words, all MMOGs are set in virtual worlds, but not all virtual worlds are MMOGs. Virtual worlds may or may not present games or gaming narratives as part of their environment; however, MMOGs must have such components.

Thus, MMOGs are virtual words that either include games or are a game in itself. Now, virtual worlds can be defined as two- or three-dimensional computer graphic environments where users can interact with each other or objects in the world via customized digital characters, also known as *avatars*. This interaction can occur through graphical user interface, text chat, or voice over Internet Protocol (VoIP). Moreover, these worlds are (a) *massive*, which means they support a large number of users at the same time; (b) *persistent*, which means they will continue to function, change, and expand even after a user has logged off; and (c) *networked*, which means that users' computers can be connected through the same online space.

In summary, RPGs, such as Dungeons and Dragons and MUDs, contributed to the origins and development of virtual worlds and MMOGs. Although both virtual worlds and MMOGs share similar characteristics, a distinction was made regarding these environments. A virtual world was defined as a broader term used to identify online spaces that support a massive number of users, at the same time, and in which users manipulate customized digital characters to interact with the environment and other users. Meanwhile, MMOGs were characterized as a type of virtual world that can either be games or include games.

Games in Education

The debate on the role of games in education is not new. Indeed, digital games have been used for educational purpose for almost 40 years now (Egenfeldt-nielsen, 2007; Games & Squire, 2011). The use of digital games in education has taken two approaches: (a) repurposing commercial games for educational settings (e.g., Dickey, 2011; Squire, 2004) and (b) designing games solely for educational purpose (e.g., Barab, Thomas, Dodge, Carteaux, & Tuzun, 2005; Nelson, 2007). The first, repurposing commercial games for educational settings usually involves educators designing lesson plans and activities around a chosen game (Shelton & Scoresby, 2011). Although educators usually choose commercial games aligned with the content to be taught, there might be a disconnection between the game and the learning goals. In these instances, students may not see the connection between their actions within the game and expected learning outcomes. Moreover, students could be easily distracted by other game features, which may hinder learning or distract focus from the task.

The second approach, which involves designing games for educational purposes, started in the early 1970s and became known as *edutainment* games. Edutainment games have been criticized by a large number of researchers because of their repetitive drill-practice features and lack of meaningful activities grounded in constructivist learning theories (Bruckman, 1999; Egenfeldt-nielsen, 2007; Okan, 2003; Papert, 1998). Although some educational games were successful in the marketplace, others failed to compete in the commercial market. According to Leyland (1996), there were four problems that could have led to this failure: (a) odd balance between educational content and game features, (b) players' lack of control in the game, (c) contradictions between players' and parents/schools' intentions toward the game, and (d) compromised quality of the game by integrating educational content from a game developer's perspective.

Since then, educational games have changed their name and label to incorporate new game design and development methods for learning. Current games for educational purposes have considered the alignment between learning goals and game mechanics (e.g., Shelton & Scoresby, 2011) and players' control over actions within the game through avatar manipulation (e.g., Barab, Gresalfi, & Arici, 2009). The divergences between players' and parents/schools' intentions as well as the quality of "fun" are still a challenge issue.

Motivation and Learning in Games

People's motivation to play games has received particularly increased attention from scholars lately (e.g., Olson, 2010; Rigby & Ryan, 2011; Yee, 2006, 2014). The motivation to play games can vary from a satisfaction of achievement (e.g., when a player gains power or progress in the game) to a need to connect with others through play. Children's motivations to play digital games follow similar needs. Their motivations are usually related to social, emotional, and intellectual needs (Olson, 2010). Indeed, games are designed to enable experiences that satisfy those needs. Thus, this section covers the intrinsic motivational characteristics of games and how these characteristics can be designed to promote learning.

Social Interaction

Social interaction can either be an intrinsic or extrinsic component of games. The intrinsic aspect is when a player plays a game with one or more players. For example, virtual worlds can enable players to interact and play with other players via an online environment. Now, the extrinsic aspect is when players interact with others around the topic of games. For instance, during or after a game play, players can teach or exchange information about strategies to be successful in a game. Within these two aspects of social interaction, there are at least two modes in which players can engage with others in game play: cooperative and competitive mode. Regarding these modes of interaction, Rieber and colleagues (2009) found that children enjoyed competing against each other because of the fast-paced outcome. Ke (2008) found that when children were asked to collaborate, the more knowledgeable child would usually lead the game play or provide the answers to the others. Moreover, Pareto, Haake, Lindström, Sjödén, and Gulz (2012) noted that children's game play would often combine collaboration and competition modes. Children would even collaborate among themselves to compete against the computer as way to make game play interesting and engaging. Nevertheless, Siyahhan, Barab, and Downton (2010) found that collaboration in games could be jeopardized if players have different intentions.

Besides collaboration and competition, researchers have found that teaching other children how to play is a key social aspect in games. For instance, Olson (2010) found that children taught their peers how to do certain things in games, especially they shared information such as "cheat codes" with their peers to be successful in game play. Nevertheless, some authors (Linderoth, Lindström, & Alexandersson, 2004) argued that this exchange of information is often associated with gaming-related issues and not the learning content embedded in games.

Fantasy

Fantasy is an intrinsic motivational component of digital games (Malone, 1981) and is usually the context in which the academic content of learning games is set. Fantasy can be incorporated into a game as (a) *endogenous fantasy*, in which the learning content is an intrinsic part of game play, or (b) *exogenous fantasy*, in which the learning content is an extrinsic part of game play (Rieber, 1996). Some research studies presented findings in favor of games for learning that incorporated endogenous fantasy. Habgood and colleagues (2011) found that children had the most improved scores when exposed to endogenous fantasy type of games. Moreover, Ke (2008) noted that children would be more engaged and perform fewer "wild guesses" when learning was situated with game play. Indeed, Lepper and Malone (1987) indicated that "fantasy activities should contain motivational goals that reinforce, rather than compete with, instructional goals" (p. 279). Thus, the fantasy component in games for learning needs to be intrinsically connected with the academic content in order to be an effective learning tool; otherwise, learners can be distracted by the other game features (e.g., Ito, 2008; Shelton & Scoresby, 2011) and, consequently, lack engagement in the learning activities proposed by the game.

Challenge and Curiosity

Another motivational intrinsic component found in games is challenge. Challenge is frequently connected with the goals that a player needs to achieve while playing a game. Nonetheless, these goals must include outcomes that are uncertain, unfinished, or unclear (Bruner, 1966; Malone, 1981). These uncertain outcomes in games can be referred to the constraints part of a game environment. For instance, in a game where the goal is to combine numerical symbols to match a number presented on the computer screen, the player may need to attend to adversary factors such as time, speed, difficulty level, and other factors that can prevent a player to reach his/her goal easily.

The motivation for challenging situations has been explained by Csikszentmihalyi's (1990) *flow* theory. Flow is an optimal experience that results from the balance between the *challenges* of an environment (or a situation) and the current *skills* that an individual possesses. To illustrate, an individual could engage in an experience, such as playing a game, because it offers him/her an initial challenge. As the individual keeps playing the game and improving his/her skills, he or she seeks more opportunities in the game that will increase the challenge level of that situation. Nonetheless, the challenge level needs to meet the individual's skills. That is, if the challenge level in the game is too high and above the player's current skills, he or she will get frustrated and anxious during game play and, consequently, will not experience flow. In contrast, if the challenge level in the game is too low and below the player's current abilities, he or she will get bored during game play and, consequently, will not experience flow.

Regarding the use of digital games, challenge seems to be a crucial element to motivate players. For instance, Olson (2010) noted that children considered challenge to be a key factor to make a game fun to play. In addition, Rieber et al. (2009) found challenge to be a game element that could leverage children's intrinsic motivation. Ke (2008) found that whenever the challenge presented in a math game was "too difficult," children would demonstrate signs of distress and would start guessing the math answers. In contrast, Moline (2010) found that adolescent gamers, when playing their favorite games, had positive experiences once they faced challenging situations within the game. Thus, examining the challenging experiences that players face during game play could be essential to understand under which circumstances players feel challenged as well as the quality of these experiences and to distinguish between the level of challenge proposed by the game environment and by the academic content embedded in the game.

Besides challenge, curiosity is another intrinsic motivational factor associated with games. Malone (1981) discussed two types of curiosity that could create an intrinsically motivating environment in games: (a) *sensory curiosity*, which involves using multimedia features to grab player's attention, and (b) *cognitive curiosity*, which involves creating an environment that evokes intellectual conflict. Although both types of curiosity are important to develop an intrinsically motivating game environment, cognitive curiosity is the one that sustains and keeps the player coming back to the game. Because the information displayed in the game is either limited or conflicting, the player keeps coming back to solve and complete that information. Indeed, uncertain or unclear situations, such as playing a puzzle game, can create an intriguing environment in which an individual feels rewarded by the outcome of the activity itself, i.e., finding the solution for the puzzle. According to Bruner (1966), the uncertain outcome of a task is what motivates an individual to pursue it in the first place as well as the individual's needs to control the situation that he or she is facing. Thus, for Bruner (1962), engaging in discovery activities could stimulate curiosity and potentially sustain an individual's attention.

Certainly, digital games can provide spaces in which players can find and explore new things and, consequently, stimulate and sustain their curiosity. For instance, Olson (2010) noted that children enjoyed learning and finding new things in the games. Additionally, Shelton and Scoresby (2011) noticed that high school students employed exploratory strategies (i.e., walking around the game environment with their avatar) to collect information needed to solve a problem posed by a game. In fact, Lepper and Malone (1987) emphasized that curiosity could promote positive effects on learning by stimulating and focusing learner's attention on the activity and tasks presented in the game. Nevertheless, Kirschner and colleagues (2006) reviewed empirical studies that employed such learning strategies (i.e., discovery learning and other related approaches) in computer-based instruction, and most studies presented negative outcomes against these practices. The authors' criticism to such approaches was on the minimal guidance given to the learner as well as the expectation that the individual should accomplish all by himself or herself. According to the findings from this review, learners benefited from guided practice, especially if they were novice to the academic content. Conversely, when learners had significant prior knowledge or expertise on the content, both traditional and discovery learning methods could work toward positive learning outcomes.

Overall, games are designed to enable experiences that allow players to satisfy social, intellectual, and emotional needs. The social interaction and fantasy component in games can provide a sense of involvement among players and between players and games. Challenge and curiosity are other game characteristics that provide a sense of accomplishment when players reach the end goal of a game or find new objects in that game space. Still, it is important to investigate whether discovery learning practices can be beneficial for both gaming and academic content learning.

Learning with Virtual Worlds

As the environments for playing games move from physical to online spaces and the number of children playing in these virtual spaces increases, it is crucial to investigate children's interactions with these technologies. Examining what and how children are learning with virtual worlds can be essential to support the design and use of these tools for educational purposes. Therefore, this section examines studies conducted in two virtual worlds (i.e., an educational and a commercial environment) to identify the outcomes in relation to learning and motivation.

Whyville

Whyville is a two-dimensional (2D) online environment in which children can be introduced to science content by playing mini-games. Children can also engage in other activities such as text chatting with each other, earning virtual money, and customizing their own avatar. This particular virtual world is very similar to Club Penguin™. That is, both environments share equivalent structures (e.g., small virtual locations within a large virtual world), gaming system (e.g., playing games to earn virtual money), and social interaction (e.g., players can chat and play with each other). There have been a number of studies (Feldon & Kafai, 2007; Fields & Kafai, 2007, 2010a, 2010b; Kafai, 2010; Kafai, Feldon, Fields, Giang, & Quintero, 2007; Kafai, Fields, & Cook, 2010; Kafai, Quintero, & Feldon, 2010) conducted with *Whyville* to examine the culture that children developed in this environment. The findings from these studies are discussed below.

The overall research conducted with *Whyville* has focused on understanding the culture created in this environment, including understanding (a) the topics of conversations among players, (b) players' social interactions, (c) players' preferences, and (d) how players engage in investigations (Kafai, 2010). For the most part, the findings from Kafai's research team have indicated that children's gaming experiences seemed to be successful in this type of environment. Overall, the learning outcomes were related to gaming literacy such as how children learned specific actions within the game (e.g., Fields & Kafai, 2010b) or how they produced knowledge out of the game (e.g., Fields & Kafai, 2010a). In a particular case, Fields and Kafai (2010b) interviewed children and examined their log files to understand how they learn gaming skills specific to Whyville. The researchers noted that an activity such as "throwing a projectile" at another player's avatar had a "snowball" effect among participants. Children learned from peers how to do this action by either having their peers tell them how or demonstrating the action for them. Additionally, Kafai and colleagues (2007, 2010) indicated that children seem to create their own "theories" regarding how Whyville functions. That is, children would develop a hypothesis, based on their own or other players' experiences, regarding the causes and effects of a virtual disease which was spread and caught by avatars in this world.

Learning in Whyville could be described as a result of children's social interactions. Some features of Whyville are conducive to promote children's interactions (e.g., text chat or discussion board), which consequently can lead children to learn formal and informal content or skills. Indeed, social interaction is a motivational component in games that enables players to communicate and to feel a sense of relatedness with other players. Moreover, Whyville seems to be a vehicle to introduce and let children explore science content on their own, instead of teaching them. That is, children engage in discovery learning practices as they play and try to understand how a virtual world like Whyville operates. Engaging in discovery learning practices can challenge children's assumptions and stimulate their curiosity.

Club Penguin™

Introducing a particular academic content via game play is also a characteristic common to another virtual world known as Club Penguin™. Club Penguin™ is a two-dimensional (2D) environment, designed mainly for entertainment purpose, where children can play mini-games and engage in other activities such as customizing their penguin avatar or adopting virtual pets. Players can subscribe to a paid membership in which players have access to all game levels and accessories or a free membership, which limits the type of accessories players can buy and their access to games' levels. Even though the central focus of this world is on entertainment, there are still some games that expose children to educational content.

In contrast with Whyville, the number of studies (e.g., Burley, 2010; Marsh, 2010, 2011; Meyers, 2009) examining Club Penguin™ has been limited. Most of these studies have explored children's understanding and motivation to play this and other popular virtual environments for children. Indeed, Club Penguin™ was considered the most used virtual world among a group of primary school students in the United Kingdom (Marsh, 2011). In addition, children's primary use of the virtual world was to play games instead of interacting with other children online (Marsh, 2010). Furthermore, new literacy practices were common activities identified in these types of environment (e.g., Marsh, 2011; Meyers, 2009). In other words, these virtual worlds have been considered spaces for children to develop technical skills (e.g., how to create and log in to an online account) and to practice skills usually acquired in formal contexts (e.g., reading and information seeking).

Besides these findings, some authors (e.g., Burley, 2010; Marsh, 2011) have argued that children create their own understanding of and rules for these environments. For instance, children may decide to "become friends" with other online players based on their penguin avatar appearance and online possessions, which can be a reflection of their membership status (i.e., having a paid membership allows players to buy elegant accessories). Even though this friendship selection criterion is not encouraged by the virtual world, children employ it to choose their virtual friends. By employing this criterion, children start to develop their own mechanisms to make sense and operate within these worlds. This information might not be explicitly associated with children's learning outcomes; however, it provides insights of how children develop an understanding of the visual representations and "social status" in Club Penguin™.

Similar to Whyville, literacy practices within Club Penguin™ involve developing and managing social interactions (Marsh, 2011). Social interaction takes place in play activities such as sending heart emoticons to other players or replicating traditional offline forms of play like tag and snowball fight (Marsh, 2010). Besides social interaction, other motivational components such as fantasy and curiosity are apparent in the virtual environment. For instance, Club Penguin™ often provides a temporary holiday or movie-themed events wherein players can engage in dressing up their avatars based on the theme or participate in activities to find and collect items.

In summary, Whyville and Club Penguin™ are virtual spaces that enable children to establish and keep social interaction through play. Because both environments give players the freedom to participate in online game- or play-based activities, children often engage in discovery learning practices. These virtual worlds allow children to explore and make sense of content, rules, and social practices, within the game environment, through a discovery process. As a result, children develop their own understanding of how these environments operate. Through game playing, children can read and construct meanings within the context of games.

Conclusions and Implications

As discussed early in this chapter, the idea of combining education and entertainment into a game technology is not a new one. Pioneering work in the field started in early 1970s, and since then, multiple forms and labels of educational games have emerged as a result of technological advancements and new approaches to integrate academic content into games. Educators and researchers have been interested in understanding game technologies and their application for learning. Both seek to comprehend how the content and features of these games can be used in formal and informal settings. In addition, identifying if, and how, learning is occurring is crucial to expanding the knowledge on research with games.

Social interaction seems to be a common motivational component for virtual worlds. The online and multiplayer capabilities of these technologies might be reasons for social interaction to be a prominent motivational factor in the aforementioned studies. In addition, children's play in virtual worlds could be considered a simulation or an extension of traditional play. For example, children could use their avatars to play hide-and-seek, a usual offline game, in a virtual world. Thus, if educators consider implementing these technologies in formal settings such as schools, they should be aware that social interaction and play might take on a bigger role than other activities planned.

Moreover, technological artifacts are culturally constructed and interpreted by the social groups that use them (Pinch & Bijker, 1989). Even if the artifact was constructed for a specific purpose, such as education, it is still up to the users, children, to decide how to use them and create meaning out of the experience with the artifact. In the case of digital games and virtual worlds, it is important to investigate how children are playing and interpreting these technologies. Thus, educators should plan for debrief moments in which children can share their gaming experiences. These debrief moments might provide insightful information about children's learning, perceptions, and understanding of games and academic content within games.

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Chapter 5
Sizzling Innovation in Online Teaching and Design

Jane L. Howland, Joi L. Moore, and Julie Caplow

Introduction

The School of Information Science and Learning Technologies (SISLT) was created in 1997 at the University of Missouri (MU) as a result of a merger between the School of Library and Informational Science and the College of Education's program in Educational Technology. Within 6 years of the merger, SISLT became one of the largest graduate departments at MU. SISLT is the academic home of master's and educational specialist degrees in Educational Technology, a master's degree in Library Science, and a Ph.D. in Information Science and Learning Technologies. The SISLT faculty collaborates in offering a Ph.D. program in Information Science and Learning Technologies, making it unique in recognizing the synergy between these two disciplines.

Online master's and educational specialist degrees in Educational Technology were offered beginning in 2001, thereby establishing the SISLT Educational Technology program as an early leader in online teaching. In recognition of its long-standing reputation as a quality program, SISLT received the Outstanding Mature Program Award in 2012 for its online master's degree program in Educational Technology from *the University Professional and Continuing Education Association*, *Central Region*. The growth in the Educational Technology programs has been strategic, moving from a general Educational Technology emphasis to one that targets defined student populations and career goals. For example, as an increasing number of K-12 teachers enrolled in the program, courses specific to their needs were created, and a Technology in Schools focus area for the master's and educational

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specialist programs was introduced. Another example is the design and development of the Online Educator focus area. During the first decade of 2010, we saw an increasing number of online courses and programs being offered at both the secondary and postsecondary levels. In response, the Learning Technologies faculty introduced the Online Educator focus area in 2010, and an Online Educator Graduate Certificate Program was initiated in 2012.

From its inception, SISLT has embraced the opportunities for strategic partnerships and collaborations. In that vein, SISLT became part of the iSchool consortium in 2013. As an iSchool, the faculty of SISLT share the common fundamental interest of all iSchools in investigating and disseminating knowledge about the relationship between information, people, and technology. This fundamental interest is reflected in the number and depth of collaborations between the Learning Technologies and Information Science faculty within SISLT and with other academic and administrative units at the University of Missouri. Faculty have collaborated on research and funded projects with numerous University of Missouri units, including the College of Engineering, the School of Medicine, the University Hospitals, the School of Journalism, and the Sinclair School of Nursing. This collaboration has resulted in over 12 million dollars in internally and externally funded projects with which the Learning Technologies faculty have been principal investigators, co-principal investigators, or external evaluators.

The overarching focus of the Learning Technologies (LT) faculty in SISLT is improving performance and access as it relates to learning. Two major lines of inquiry within this overarching focus—the design of innovative tools and interactions, and online teaching—will be discussed in this chapter. Along with these lines of inquiry, the LT faculty are committed to access issues through funded projects and research that involve a variety of populations, support, and solutions.

Learning Technologies (LT) faculty research on online teaching began in the early days of Web-based course offerings with investigations into aspects of Web-based learning environments such as online learning management system (LMS) course organization (Caplow & Tsai, 2004; Moore, Downing, & York, 2002); discussion forum interactions (Howland, 2000; Marra, 2006; Marra, Moore, & Klimczak, 2004; Moore & Marra, 2005), student perceptions of learning and course effectiveness in Web-based course delivery formats (Caplow & Kibaru, 2012; Howland & Moore, 2002), and problem solving in online course environments (Kwon, Kumalasari, & Howland, 2011).

Along with long-standing experience with offering online courses, the LT faculty have developed tools to support learning environments while supporting research agendas. With innovation being one of our strategic goals, we have been successful at taking first steps in creating alternative content management systems (ShadowNetwork space—Laffey & Musser, 2006), social awareness analytics (Context-Aware Activity Notification System—Laffey, Amelung, & Goggins, 2009), 3D virtual environments (iSocial—Laffey, Schmidt, Stichter, Schmidt, Oprean, et al., 2009), and performance support tools for children with special needs (KidTools—Mitchem, Fitzgerald, Koury, Cepel, & Boonseng, 2009).

Design of Innovative Tools and Interactions

Three major perspectives guide the work of the LT faculty and students: analysis of workflow performance, a project-based orientation, and examination of human–computer interactions (HCI). As mentioned above, the LT faculty are actively engaged in the development of innovative tools and interactions that are informed by extant research and three major elements of workflow performance examination: needs assessment, task analysis, and cognitive load. As the tools are developed, an iterative process of research and revision informs the knowledge base relevant to the tools. A project-based orientation is reflected in the work of the faculty, in the structure of the Educational Technology courses, and in collaborative activities between LT faculty and their collaborators (e.g., students, industry professionals, faculty in other disciplines). In this way, there is integration with the scholarly and product production work of the faculty and the dissemination of knowledge and best practices to the Educational Technology students.

Examining Workflow Performance

Needs assessment: As with any problem, the LT faculty begins with some type of analysis to understand the performance problem before providing a solution. This activity is often referred to as needs assessment, performance analysis, or front-end analysis. It is the collection of informal and formal data to assist with defining and achieving performance goals. A performance analysis discovers different perspectives of a problem and the barriers to successful performance. Data might be collected during a client interview, informal or "water-cooler" meetings with employees, focus groups, chats with users, or from customer call logs. In the end, the information should provide insight into an organization, workplace, job, or individual. The analysis of cause or causes assists with aligning the appropriate intervention to a performance problem.

Task analysis: A task analysis is conducted to determine the actions or cognitive processes to achieve a task. It can mean many things because it is a complex process. For instructional design, "it is a process of analyzing and articulating the kind of learning that you expect the learners to know how to perform" (Jonassen, Tessmer, & Hannum, 1999, p. 3). There are several methods for capturing a performance, and many of the tasks can be observed, which aligns with a behavioral task analysis. However, many tasks are non-procedural and covert, which requires a different kind of analysis such as cognitive task analysis. LT faculty and students typically begin tool and interaction development processes with the analysis data to inform designs for new or existing technologies.

Cognitive load: Various forms of cognitive load exist during a person's workflow or implementation of a specific task. Intrinsic cognitive load describes the inherent complexity of the task. Alternatively, extraneous cognitive load refers to task or workflow elements that create additional processing that is unnecessarily added to working memory. Germane load describes the cognitive effort needed for schema construction. As users perform a task, they may be confounded by extraneous cognitive load within the interface. Whereas the intrinsic cognitive load remains relatively static, extraneous and germane loads are heavily influenced by the design of the materials or interface (Mayer & Moreno, 2003).

Project-Based Activities

Many of the SISLT faculty practice and research the design and development of innovative tools. As such, the different aspects of project-based learning are embedded in the training of our master's, educational specialist, and doctoral students. Within many of our courses, students are required to work in groups for projects that embody the main concepts and principles that are being explored in the course. A project could be an instructional design or work performance issue, or it could be the design and development of a tool. With the latter, students will most likely implement rapid prototyping to quickly create and evaluate mock-ups and wireframes of some technology. Rapid prototyping involves performing four traditional system development life cycles (analysis, design, development, and implementation) within an iterative process. The four phases are concurrently repeated until the users, designers, and developers are satisfied with the final product (Tripp & Bichelmeyer, 1990). This is an effective method for handling changes suggested by the users and unanticipated problems.

Human–Computer Interaction

The interdisciplinary nature of HCI aligns well with the activities within SISLT. As we design, develop, and evaluate innovative tools for performance and learning, there is a focus on how, when, and why people use different technologies. The major phenomena surrounding interactions lead to explorations beyond the interface design. For example, the technology, work, and organizational interactions present sociological and anthropological lenses to discovering usage patterns and behaviors. The physical characteristics of the technology and environment for user–computer interactions provide another angle that focuses on ergonomics. Our current environments for work and play provide a rich dataset for exploration and analysis of how people interact with tools. The SISLT faculty and students have made important contributions to innovative tools for learning and performance.

Online Teaching

Courses offered on the Internet can have different characteristics, such as students working in groups; posting on discussion boards and blogs; feedback from the instructor through email, video chats, telephone, etc.; and learning activities and assignments with due dates. Although there are inconsistent definitions of online courses, eLearning, and distance courses (Moore, Dickson-Deane, & Galyen, 2011), there is a clear understanding of types of interactions that define a course: learner–instructor, student, learner–learner, learner–content (Moore, 1989), and learner–interface (Hillman, Willis, & Gunawardena, 1994). When discussing learning in any type of environment, the LT faculty strategically plan how to gain attention and sustain engagement.

Online courses introduce an important characteristic that is not an issue in traditional face-to-face courses, which is usability. All tool interactions should be intuitive to support the completion of a desired performance or a goal (Nielsen, 1993). A system can enable a user to achieve a goal, but the lack of efficiency, engagement, and pleasing visual design can create a negative user experience (Moore, Dickson-Deane, & Liu, 2014). For example, the technical features that facilitate the process for accessing, organizing instructional content, and submitting an assignment may cause the learner to exert more time and cognitive effort toward the process rather than the instructional content. The usability of technical features is one aspect of a quality online learning environment, and the other perspective is the pedagogical usability. The tools, content, interface, and tasks must be able to facilitate learning for myriad learners in various learning contexts (Silius & Tervakari, 2003). In a review of evaluation tools for eLearning and online courses (Moore et al., 2014), common pedagogical criteria for these learning environments were identified as:

- Aesthetics
- Appropriate levels of learner control
- Ease in learning how to use the instructional interface (i.e., learnability)
- Navigational fidelity
- Amount of learner feedback
- Information presentation
- Learner satisfaction as it relates to the above criteria and overall experience

Course Organization

The initial focus of students in online courses is on searching out the materials that they need for the course, rather than delving into the course content and processes. In a Web-based course using an LMS, those materials can be found somewhere in the course management system "files." An analogy might be a school where instructors wheel in a file cabinet when a class begins and indicate that all the needed materials for the course might be found in that file cabinet. For each class, the folders are labeled slightly differently, and various materials are found across a variety of folders. Students must search through the file cabinet for each class, attempting to interpret individual instructors' organizational schemes. These differences may cause students to experience frustration in Web-based courses, particularly as they initially become familiar with the course and course organization on an LMS.

The longer this process of searching out course materials is, due to conceptual differences between instructors and students in their organization schema for course material organization, the longer students' foci are shifted from the course content to the course organization.

Where instructor course materials are placed in an LMS is an important element of effective and efficient online course navigation and student satisfaction (Moore et al., 2002). Boshier et al. (1997) investigated what they termed "the best and worst" design of Web-based courses and found that the biggest challenge for Web-based course designers was the conceptual differences between the users and the designer. Similarly, Moore et al. (2002) found a discrepancy between instructors' and students' perceptions of the appropriate placement of some instructor course materials. Building on the findings of Moore et al. (2002), Caplow and Tsai (2004) found that the placement of instructor course materials on one LMS indicated that there are some trends evidenced in where instructors place their materials. But there is still variation in where those materials might be found within general course content labels on different course sites. In addition, there was a general tendency for instructor materials to be placed under the preset labels of an LMS rather than under labels set by instructors (e.g., 72 % of the course syllabi were placed under the preset label *Course Information*, while 80 % of instructors placed course content materials under the preset label *Course Documents* in one LMS). The results of these studies indicate the importance of providing students with a conceptual schema for course organization as well as one for course content. Before quality instruction can happen, a high quality online learning environment must first be designed (Yang & Cornelious, 2005), and this includes important elements such as course organization.

Discussion Forum Interactions

Class discussion forums are widely used for communication in online courses; however, students may not fully participate (Dalelio, 2013; Mokoena, 2013; Nandi, Hamilton, & Harland, 2012). Instructors can employ a variety of strategies to ensure that discussion forums remain engaging, beneficial environments for student learning, including the use of small group discussions. Rather than attempting to read and respond to an entire class, groups of 3–5 students can respond to each other in depth. Allowing small groups to craft their own questions can open individualized paths of inquiry, resulting in meaningful learning (Howland, Jonassen, & Marra, 2012).

Discussion forums can provide a valuable venue for social learning and knowledge construction. A study of women's experiences in online courses found that when the learning context was relevant, matching professional and personal precipitating factors, women sometimes described reflecting on the relationship between their readings and discussions, a strategy that suggested a process of reflexive practice. Reflexive practice is usually associated with professional practice and allows one to "make judgments in complex and murky situations—judgments based on experience and prior knowledge" (Merriam & Caffarella, 1999, p. 232).

The women connected concepts from the instructional material to their professional situations and, through dialogue with others, constructed knowledge that they could then apply in their professional situations, i.e., their schools. Although they recognized the need to rely on themselves, they also valued learning that came from sharing personal characteristics and knowledge through interactions with others. These relevant interchanges contributed to the overall climate of the online class. The opportunity to collaborate with professionals dealing with similar challenges broadened their judgments, and the women recognized the importance of other students in their learning (Howland, 2000).

Student Perceptions of Learning in Online Courses

Instructional design decisions both prior to and during an online course can influence students' perceptions of the course (Howland, 2000). Courses may be set up in such a way that students have little interaction, reflecting a "teacher-centered" model (Simonson, Smaldino, Albright, & Zvacek, 2009). Instructors of online courses have unique challenges in communicating and connecting with their distance students. Courses in which instructors are intentional in creating a sense of a learning community can overcome the feelings of isolation that may occur with students in online courses. Palloff and Pratt (2007) emphasized the importance of creating social presence, defined as "the ability to portray oneself as a 'real' person in the online environment" (p. 4), as a means to aid in the development of community and prevent the sense of disconnection or isolation. In brick and mortar classrooms, students see and hear each other from the first day of class. In online courses, an introductory discussion board is frequently the first instance of students beginning to create their "presence." They may be asked to describe their program, state their learning goals, tell where they are physically located, and perhaps share some personal information such as hobbies or pets.

Social presence can be enhanced by utilizing asynchronous video communication (Borup, Graham, & Velasquez, 2010). However, Pacansky-Brock (2013) observed, "many audio/visual tools are synchronous, eliminating the critical asynchronous communication experience, which is essential to engaging and supporting a diverse student population with complex work and personal schedules. In short, identifying a tool that allows for asynchronous, voice or video-based conversations that are easy-to-view from multiple devices and supports accessibility accomodations (sic) is a tough order to fill" (p. 6).

VoiceThread is an asynchronous online tool that allows individuals to have digital, multimedia conversations around PowerPoint slides, an image, document, audio file, or video. This tool offers multiple possibilities for use in online courses.

VoiceThread has proved useful in literacy education (Smith & Dobson, 2009) and second-language learning (Pallos & Pallos, 2011; Sun, Yu, & Gao, 2013).

In order to increase the sense of real, live humans as online classmates, many SISLT courses are utilizing tools such as VoiceThread. Beginning a course with introductions that are made via VoiceThread rather than an LMS's discussion board can greatly support the establishment of social presence, as students can "meet" each other through audio and video introductions, as well as text. The sense of immediacy is enhanced.

VoiceThread is a tool that can support the principles of "meaningful learning" which posits that learning tasks should be active, intentional, constructive, authentic, and cooperative (Howland et al., 2012). Instructors of face-to-face courses may include guest lecturers or invite experts to join a class to interact with students. VoiceThread has proven a successful means for conducting and delivering interviews with experts in the field of education who bring different perspectives and experiences to share with students.

VoiceThread is also an ideal environment for providing feedback to students. For example, students may create PowerPoint presentations to demonstrate understanding of a concept or procedure and provide narration in VoiceThread. As the instructor views the VoiceThread, she or he makes comments directly on each slide. In online courses, this increases the sense of instructor presence when audio and/or video is used for the feedback. Creating a reflection VoiceThread can help students synthesize their learning and give instructors a deeper sense of individual students' learning outcomes.

The challenge of managing a large number of students on a single VoiceThread can be solved by dividing students into small groups to create group VoiceThreads. These groups might engage in discussions or create collaborative projects using VoiceThread. By sharing collaborative group projects with the entire class, each group could give and receive feedback from peers. By assigning a variety of topics to different groups, shared VoiceThreads can provide the means for an entire class to contribute and learn from each other.

From the onset of development, VoiceThread's creators were committed to complying with the US Rehabilitation Act Section 508, making the tool accessible to all. VoiceThread has built-in features such as closed captioning and multiple forms of commenting (e.g., text, audio, video, phone commenting). Continued design improvements have led to VoiceThread Universal, an interface to support screen-reading software. As VoiceThread evolved, it has become integrated into LMSs such as Blackboard, giving instructors increased access to the tool.

Funded Projects That Support Access for Learning and Performance

Learning Technologies (LT) faculty, in collaboration with Information Science faculty as well as faculty from other colleges and universities, have creatively developed tools and strategies to support access for a variety of learners at various levels.

Further, collaborative projects among the SISLT faculty have resulted in relationships between SISLT, business, and governmental agencies. Many of our projects are housed within the Allen Institute (http://alleninstitute.missouri.edu/), a physical space that supports SISLT faculty, staff, and students in research and development activities. The following is a brief description of selected projects.

Information Experience Laboratory (IE Lab)

The IE Lab is a usability laboratory in the Allen Institute that conducts research and evaluates technology. It offers SISLT students an authentic opportunity to engage in usability testing of websites and software for clients on campus, statewide, and globally. Among former clients are the Cerner Corporation, International Society for Performance Improvement (ISPI) St. Louis Chapter, East China Normal University Distance Education College, and Tamkang University Libraries. The IE Lab also offers workshops that teach participants how to conduct usability studies through methods such as Think Aloud, Task Analysis, and Information Horizons. SISLT faculty offer graduate courses related to usability, including HCI and Interaction Design.

KidTools, KidSkills, and StrategyTools

KidTools and KidSkills are electronic performance support system (EPSS) software developed by SISLT faculty in conjunction with faculty at California University of Pennsylvania and Arkansas State University (http://kidtools.org/MeetTheDevelopers.php) that help students take control of their learning, behavior, and problem solving to improve success in school (Mitchem et al., 2009; Mitchem, Kight, Fitzgerald, & Koury, 2007).

The tools are research based and have undergone extensive testing with actual students in classroom settings. They are based on strategies of self-talk and creating specific, concrete plans for behavior, along with tools that help adults support and mentor students in reaching successful outcomes. These software programs include a library of tools provided as easy-to-use templates for children to personalize and use independently in school and other settings.

There are two versions of KidTools and KidSkills: eKidTools and eKidSkills for elementary students, ages 7–10, and iKidTools and iKidSkills for intermediate/middle school students, ages 11–14. Within eKidTools, there is a set of PictureTools made for preschool/primary children that do not require reading abilities. Children can move up and down the levels to use the tools that best fit their skills and needs. These tools have been especially useful for students and teachers in inclusive classrooms.

StrategyTools (http://strategytools.org/) is an EPSS from the developers of KidTools and KidSkills consisting of 54 tools that support high school youth as they prepare to transition to adult life. Examples are tools that help students get organized, learn new information, demonstrate learning, and solve personal problems. The "Moving into the Future" section of StrategyTools includes a budgeting tool, education and job searches, and a social services agency finder. StrategyTools helps youth develop learning strategies, self-regulation skills, and the self-awareness and planning needed for successful transition from high school to adulthood.

iSocial

iSocial is a 3D-based virtual learning environment for use in schools to enhance the social competence of youth with an autism spectrum disorder (Laffey, Schmidt, Stichter, Schmidt, & Goggins, 2009; Laffey, Schmidt, Stichter, Schmidt, Oprean, et al., 2009). The iSocial project (http://isocial.missouri.edu/iSocial/) involved the development of software code and visual representation to create a three-dimensional virtual world that effectively delivers a clinic-based program designed to help youth on the autism spectrum improve on critical social competencies.

Assessing Women and Men in Engineering

Dr. Rose Marra is Research Director for the Assessing Women and Men in Engineering (AWE) Project, which provides assessment tools for people involved in K-16 formal and informal educational outreach activities to help determine the extent to which desired outcomes are being attained. In 2008, 7 years after its inception, AWE became a permanent part of the Society of Women Engineers (SWE). AWE is also a partner organization with the National Girls Collaborative Project (NGCP), which is aimed toward advancing the agenda in gender equity for Science, Technology, Engineering, and Mathematics. Utilizing a collaborative model, the NGCP trains and assists others in creating STEM-related collaborations, provides small grants to STEM-focused programs serving girls, and utilizes and evaluates research-based exemplary practices in engaging girls in STEM activities (http://www.ngcproject.org/).

Inspired Electronic Health Records

The Health Information Technology for Economic and Clinical Health (HITECH) Act and meaningful use adoption have pushed for widespread electronic health record (EHR) adoption across the USA. However, among the barriers to EHR adoption are issues with usability, readability, loss of efficiency and productivity, and divergent stakeholder information needs, which are all packed into one format. To address these issues, physicians, programmers, and interaction design researchers designed and developed an e-book (http://InspiredEHRs.com) to present clinical scenarios and common recommendations for efficient EHR designs (Belden et al., 2014).

Conclusion

The future is encouraging and inviting as SISLT faculty and students continue to pursue avenues of research and innovative tools that support performance in the workplace and learning environments. With several of our faculty collaborating with the MU Informatics Institute, College of Engineering, Sinclair School of Nursing, and School of Medicine, along with external organizations such as university libraries and medical systems (i.e., Cerner), we are positioned to continue our path of technology innovation, training of future scholars and practitioners, and significant contributions to online learning.

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Chapter 6
ICT Research Into K-16 Teaching and Learning Practices

Joan E. Hughes, Min Liu, and Paul Resta

We are faculty members in the Learning Technologies Program at the University of Texas at Austin. Our program serves graduate students at the master's and doctoral levels (http://www.edb.utexas.edu/education/departments/ci/programs/lt/). We teach courses and conduct research on various aspects of using technologies in teaching and learning. While a common thread of our research is to examine and understand how technologies can be used to support teaching and learning, each of us has our own specialty area. In the following, we will describe our research interests and present major findings from our research in the past few years.

Joan E. Hughes' Research

My research scholarship examines how new and practicing teachers are prepared and able to use digital technologies to optimally support their teaching and their students' learning. One research strand focuses on how universities prepare preservice teachers for the teaching profession. Most recently, I have conducted a 7-year cross-sectional and longitudinal study of a technological innovation (1:1 laptop infusion) in teacher education. The innovation, which began in 2002, required preservice teachers to own laptops during their preparation. I have examined preservice teachers' technological knowledge, attitudes, and practices in this context.

I learned that a technology-rich environment such as in this innovation does not necessarily yield the optimal knowledge, attitudes, and experiences that position preservice teacher graduates to use digital technologies in support of transformative subject-specific learning in the PK-12 classroom. Digital technology can have a

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positive effect on learning (Bransford, Brown, & Cocking, 2000), yet preservice teachers do not innately know how to harness technology's affordances for meaningful learning and instruction in the classroom, and teachers will make gatekeeper decisions regarding technology when working in schools (Zhao, Pugh, Sheldon, & Byers, 2002). The common fallacy in general society is the assumption that young(ish) humans, such as university students, are "digital natives" or, in other words, the fallacy contends a person who grew up with technology is inherently technologically adept. Bennett, Maton, and Kervin (2008) began to reveal the fallacy of this "digital native" assumption. My research confirmed the fallacy among preservice teachers. In our work (Hughes, Gonzales, Wen, & Yoon, 2012), we saw evidence of what we call "the enduring grip" of productivity software (i.e., word processing, email, presentation, and Internet search), as these were the most used software activities among preservice teachers and their university faculty. Broader technical experiences were limited, even for personal purposes, such as only about 10 % of preservice teachers using online multiuser games, 10 % writing a wiki, 2 % creating podcasts, or about 20 % editing digital audio. We argued the overattention on productivity software does not provide preservice teachers the breadth of digital technology experience to support the many decisions concerning the use of digital information and communication technologies they will face in their new classrooms.

More analysis of my dataset (Hughes, 2013) indicated that graduates held moderate digital technology self-efficacy, positive attitude toward learning technologies, and moderate constructivist pedagogical philosophy—all factors that have been shown to support technology integration in the classroom. Yet, during their preparation, again we saw that productivity software activities were used most widely for educational purposes. Their most valued technologies for teaching subject matter were predominantly productivity software as well as general hardware, such as computers, projectors, and document cameras. When asked about their preferred technological tools and activities, they described teacher-centric uses three times more often than student-centered. I call upon teacher education programs to consider the degree to which their candidates are exposed to a range of contemporary technologies, especially content-specific technologies (such as Geometer's Sketchpad for math, online fieldtrips to historical sites that include primary documents in history/social sciences, or data collection software for science) and the preservice teachers' abilities to engage in future technology-related instructional decision-making. I argue that such knowledge may also be developed across the teaching career, and technological induction programs that support novice teachers in their first 3 or more years of teaching may support continued development.

In a recent paper (Hughes, Ko, Lim, & Liu, in press), we discovered that all preservice teachers in our dataset from 2008 to 2012 used general social networking sites, like Facebook, but between 40 and 90 % had never read/wrote blogs, wikis, or microblogs (e.g., Twitter). There was growth in the use of social networking for professional use, with 22 % reporting such use by 2012. The likelihood that preservice teachers felt they would use social networking in their future teaching became less likely across time. One might think it is good that preservice teachers do not plan to use social networking in their future as professionals in schools based on the general society's negative views of the use of mobiles and social networking in PK-12 schools and emphasis on cyberbullying and cyberdangers. Yet, there is a growing movement for "connected learning," in which educators use social technologies like Twitter to develop personal learning networks of colleagues from which to learn. In fact, the US federal government began "connected educator month" in October 2012 (and it continues each October) to inspire and support this kind of ongoing professional learning among educators. Furthermore, more PK-12 schools are allowing children to bring their own devices (BYOD), such as mobile phones, tablets, or laptops, to school to use for learning purposes. Children are motivated by social learning as well, and technologies like Edmodo software emulate the Facebook- and Twitter-like environments but in a restricted setting for educational purposes. My research reveals even among preservice teachers who learned in a technology-infused 1:1 laptop setting that they have had few experiences with social technologies (except Facebook). This lack of experience with blogs, wiki, and Twitter does not position them to consider its use in future teaching and learning—even their own professional learning. In this paper (Hughes et al., in press), we describe a sequence of social networking software experiences that could develop preservice teachers as learners, designers, and ultimately connected educators. From this and other datasets, I have other manuscripts in preparation that examine trends in preparation and interest in teaching online, faculty use of digital technologies in preservice teacher preparation, awareness of digital inequities among preservice graduates, and cross-sectional case studies of preservice teachers and graduates (novice teachers) which reveal the challenges of technology integration as a professional teacher in a school. This latter study straddles into my other research strand, understanding technology integration within PK-12 schools.

My other research strand examines technology integration efforts in elementary, middle, and secondary grade schools. A recent study (Russell & Hughes, 2014) examined technology integration in 1:1 iPad classrooms. We described how Brett and Julie, two veteran high school English teachers, used iPads in their classroom for teaching and learning activities during the first year of a school-wide 1:1 iPad implementation. Across Brett and Julie's practice, we identified the iPad increased efficiencies in the classroom, especially expediting organization and distribution of learning materials via the cloud (*Dropbox*), annotation of learning materials (*NeuAnnotate*), quick searching for poems of interest (*Poetry*), and electronic communications between students and teachers (*Mail*, *FaceTime*). iPad activities engaged students in new media literacies, including multimedia expressions (photo, filming with *iMovie*, *Fotolr PS HD*, *Snapseed*, and *Comic Life*) of learning and publishing/sharing with peers and audiences beyond the school but also introduced issues of privacy, safety, and control. Managing students' iPad use was challenging because the iPad provides multiple opportunities for off-task behaviors such as cheating to videogames. Brett and Julie were more concerned about their students' academic integrity than about any occasional off-task behavior.

My scholarship has also examined issues of technology leadership, a variable that impacts teachers' technology integration efforts. In the same 1:1 iPad implementation in a high school, we examined the practice of technology leadership (Hughes, De Zeeuw, & Ok, Accepted with revisions). Specifically, we identified the vision(s) and the process of setting a vision for the implementation, the opportunities for teachers/staff to learn and develop iPad technical and integration skills, and the ways in which leaders made the organization technologically ready for this implementation.

Results revealed that leadership activities were distributed across all the leaders in the district but included very few teachers. The vision began with the superintendent's recognition of a lack of technology focus in the 5-year plan, but the initiative took shape when four school leaders visited Apple headquarters for a multiday event, which included visiting a New Tech High School. They felt adopting iPads would facilitate a movement toward learning that involved personalization, individualization, student direction, activity based, and production. While the language used by leaders to describe the vision for the initiative was learning-focused, professional learning opportunities lacked alignment with the learning-focused vision. Opportunities tended to focus on technical learning (introduction to the iPad and "app" sharing), and leaders encouraged teachers to "discover" and "explore." Funded through taxpayer bonds, there were tremendous infrastructural changes to support the bandwidth needs. Midyear, they also hired a mobile integration specialist and noted the need for more educational technologists, as both would support meeting their learning-focused vision in the future. This initiative benefited from leaders who did not overplan and accepted the uncertainty of the path ahead and the certainty that the path would require shifts. By year's end, these leaders became clearer of their needs, namely, the need for more support and professional learning. Such support would have to prioritize their vision for transformed learning (over iPad software and hardware) in order for teachers and others to understand what this vision meant in practice.

I have also conducted school case studies that examined dimensions of technology integration from perspectives of teachers, school leaders, and teachers. A recent paper (Hughes, Read, Jones, & Mahometa, under review) from this dataset used multiple regression to identify predictors of middle school students' Web 2.0 activities out of school, a composite variable of 15 technology activities that positioned users as creators, collaborators, communicators, and/or sharers. Three middle schools, which represented slightly different demographic and economic characteristics, participated where sixth and seventh grade students completed a questionnaire. Independent predictor variables included three demographic (gender, ethnicity, grade level) and five computer use variables (technological gadgets owned, Web 2.0 activities in school, traditional technology activities in school, parental limits on computer use at home, assigned homework requiring a computer) and three interaction examinations between categorical variables (school, female, ethnicity) and variables of interest (total gadgets, in-school Web 2.0 activities, and in-school traditional technology activities). A model explained 25 % of the variance in the prediction of Web 2.0 activities outside of school, with statistically significant predictors including school, ethnicity, grade, total gadgets, and the interaction of school and in-school Web 2.0 activities.

Min Liu's Research

The overall goal of my research is to support teachers' teaching and students' learning through effective use of technologies. My research interests center on educational uses of new media and other emerging technologies, particularly the impact of such technologies on teaching and learning, and the design of new media enriched interactive learning environments for learners at all age levels. I have conducted studies examining various technologies using pedagogical approaches such as project-based learning, problem-based learning, and ludic simulation/game-based learning in K-16 settings. My current R&D projects include studying the design and effectiveness of immersive, rich media environments on learning and motivation, learning analytics in serious game environments, examining the affordances and constraints of using mobile technologies in teaching and learning, understanding MOOCs as an emerging online learning tool, and using Web 2.0 tools to facilitate instruction. In the following, I will describe the research findings along two of these research lines for the past 2 years.

Designing Immersive, New Media Environments to Support Learning

Given the growing interest in game-based learning, educators are exploring its affordances. Can an immersive 3D multimedia learning environment that uses a game-based learning approach, *Alien Rescue*, motivate students to learn and in what way? A series of studies using a mixed methods design have been conducted to examine motivation and learning and the design of the learning environment to facilitate problem-solving.

In the study by Liu, Rosenblum, Horton, and Kang (2014), all sixth graders from two public middle schools ($n = 430$) in a midsized southwestern city in the United States participated. *Alien Rescue* is designed for sixth-grade science. These sixth graders used it in their daily 50-min science classes as their curriculum for space science for 3 weeks. The findings using ANOVA with repeated measures showed that the sixth graders significantly increased their science knowledge scores after using the program. The average gain score from pretest to posttest for School 1 was 24.29 with $M_{\text{male}} = 23.34$ and $M_{\text{female}} = 25.78$, and 13.31 with $M_{\text{male}} = 12.28$ and $M_{\text{female}} = 14.46$ for School 2. It is worth noting that for both schools, female students had higher gain in points than their male counterparts. The qualitative data using open-ended responses provided additional evidence to support the quantitative results. Sixth graders stated what they had learned: our solar system (51 % out of 515 units of responses), the scientific instruments (16 %), alien species (8 %), scientific concepts (e.g., magnetic fields, gravity, and temperature scales) (7 %), problem-solving (4 %), conducting research (4 %), managing a budget (2 %), and working with others (2 %).

Liu, Horton, Kang, Kimmons, and Lee (2013) examined middle school students' experience in using *Alien Rescue* with 383 sixth graders and 447 seventh graders. The findings of this study showed that sixth and seventh graders perceived the environment as having substantial ludic characteristics and educational value. The word "fun" has the highest frequency out of a total of 1,072 words extracted out of the 358 statements in a word cloud. The results indicated that having a playful experience is important for this age group, and participating in a ludic simulation can help motivate students to learn school subjects.

The results of these studies with both quantitative and qualitative data showed that the sixth graders were motivated toward learning and had fun while learning. The design of *Alien Rescue*—coupling a real-world scientific inquiry process with a playful experience delivered through a 3D immersive, discovery, and sensory-rich approach—is effective for this age group. The findings of these studies were consistent with our previous research (Kimmons, Liu, Kang, & Santana, 2012; Liu, Horton, Olmanson, & Toprac, 2011) and suggest game-based learning can be used as a tool to support learning (Barab, Thomas, Dodge, Carteaux, & Tuzun, 2005; Gee, 2003).

Design is critical for a learning environment to make a positive impact on learning and motivation. Liu, Horton, et al. (2014) described the design and development model of *Alien Rescue* in detail. An important aspect of the design is to build cognitive scaffolding to support sixth graders' problem-solving. This was investigated in two recent studies (Bogard, Liu, & Chiang, 2013; Liu, Yuen, et al., 2013). A group of 12 cognitive tools have been built in *Alien Rescue* aiming to support problem-solving practices among sixth-grade learners who typically exhibit characteristics of novice problem solvers. Our research has shown that students' use of cognitive tools corresponds with different problem-solving stages, and strategic use of tools to support various problem-solving processes can possibly lead to higher performance within the problem-solving environment. This finding highlights the importance of designing cognitive tools to support the range of problem-solving processes that students apply in solving complex problems and encourage tool use in a way that corresponds to the learners' developmental level (Jonassen, 2006).

Another related significant factor is to understand how teachers use technology in the classrooms. The study by Liu, Wivagg, Geurtz, Lee, and Chang (2012) examined how a group of ten middle school teachers implemented *Alien Rescue*. Four factors were identified that provided the impetus for these teachers to consider the adoption of technology-based PBL instruction: (1) the PBL program addresses the teachers' curricular needs, and implementing it has campus administrative and technical support; (2) the pedagogy employed in the environment is aligned with teachers' pedagogical beliefs; (3) the PBL program offers a new way of teaching and promotes the development of higher-order thinking skills; and (4) the PBL program challenges students in a captivating manner and supports the learning needs of all students. In addition, teachers' implementation techniques were documented in detail to address the lack of "how to" in PBL implementation in K-12 classrooms as indicated in the literature.

Examining the Affordances and Constraints of Using Mobile Technologies

Both the *2012 Horizon Reports for Higher Education* and *K-12 Edition* (Johnson, Adams, & Cummins, 2012a, 2012b) predicted that the time to adoption for mobile apps is 1 year or less. There is much enthusiasm about mobile technologies and the opportunities they can bring to education. Empirical research is much needed to examine the affordances and constraints of using mobile technologies in education. There is also a need to review the literature on any documented research evidences of the impact of the mobile technology on teaching and learning.

Two reviews of literature on mobile learning have been conducted, one focusing on adult learners (Liu, Geurtz, Karam, Navarrete, & Scordino, 2013) and another on K-12 education (Liu, Scordino et al., 2014). Liu et al., 2013 reviewed 103 empirical data-based studies from 2005 to mid-March 2012 in 44 refereed journals. Of these 103 studies, 91 studies occurred in higher education and 12 in corporate training. Only studies with clearly stated research purpose/questions and evidence in which data were collected and analyzed were included in the review. Descriptions of projects or articles merely discussing benefits and/or limitations of mobile devices were not included. The findings of this review indicated that research conducted in adult education since 2005 focused on such topics and related issues such as (a) affordances made possible by mobile devices to expand teaching and learning beyond traditional classrooms, provide ubiquitous and just-in-time learning opportunities, and introduce new possibilities; (b) exploration of mobile use to support content learning, especially in such subject matter areas as language learning, sciences, and health sciences; (c) design and implementation of specific mobile systems and tools and usability-related issues; and (d) user perceptions toward mobile use. Several trends were observed such as an incremental growth in the number of peer-reviewed journal publications on the topic in more recent years, an apparent enthusiasm about benefits of mobile technology, and small sample sizes in many of the studies.

Building upon this review of literature, the second literature review examined data-based studies published on mobile learning in K-12 from 2007 to September 2012. A total of 63 studies from 15 refereed journals were selected for analysis. The findings were organized in four themes: (1) comparison studies, (2) non-comparison studies, (3) mobilized learning, and (4) academic content areas. Of the total 63 research articles, 21 % ($n=13$) compared the effectiveness of mobile learning to traditional learning (i.e., classroom-based, paper and pencil approaches), while 79 % ($n=50$) represented exploratory investigations about the potential of mobile learning using various data sources. The findings of this review revealed that the research conducted so far was primarily exploratory in nature and focused on understanding the educational affordances of using mobile devices in instructional practices. Affordances examined in the studies were identified within the contexts of multiple academic disciplines such as natural sciences, mathematics, social studies, language arts, and ESL. Several trends were also observed. There was an increasing growth in the number of data-based studies published; studies were concentrated in four academic areas—natural sciences, Language arts, math, and social studies; a disproportionate representation of geographic regions was observed where m-learning research was conducted in Asia (Taiwan in particular) having the largest representation; and finally, 55 % of the studies were conducted at the elementary school level.

In addition to these two reviews of literature on m-learning, I have conducted several studies to investigate a mobile initiative by a large school district in the southwest region of the United States to provide iPod touch devices 24/7 to teachers and students of English Language Learners (ELL) (Liu, Navarrete, Maradiegue, & Wivagg, 2014a, 2014b; Liu, Navarrete, & Wivagg, 2014; Liu, Wivagg, Maradiegue, & Navarrete, 2013). These studies used mixed methods and case study methodologies to examine this 2-year implementation from perspectives of ELL teachers and students at elementary, middle, and high school levels. ELL students are those who speak diverse languages and with different levels of English proficiency; they represent distinct academic challenges in language acquisition. The school district was interested in exploring new opportunities and possibilities introduced by the mobile technology. Multiple quantitative and qualitative data sources were used such as interviews with the teachers, classroom observations, and surveys and interviews with the students. These studies documented how the ELL teachers used iPod touch in their teaching and what ELL students considered useful in helping them to learn. The findings indicated that the iPod touch was used to support language and content learning, provide differentiated instructional support, and extend learning time from classroom to home. Audio books, Internet access, and activities using media creation tools such as voice recorder and video camera were found to be especially important for these ELL students. The findings examining these ELL students and teachers at elementary, middle, and high schools provided evidences to support the affordances of mobile learning as identified in the literature: mobile learning can offer (1) flexibility and accessibility, (2) interactivity, and (3) motivation and engagement. However, multiple challenges were highlighted such as significant time demand on the teachers (i.e., learning and incorporating the devices, monitoring and managing the devices), technical issues (i.e., Internet bandwidth, breakage and loss of devices), and the need for ongoing professional training and dedicated supporting staff.

Paul Resta's Research

My research and scholarship has focused on online collaborative learning environments, digital equity, and technology and teacher education.

My research in online collaborative learning environments has focused on the use of peer assessment to support collaborative learning and to understand the nature of learning experiences of students working in cross-cultural, cross-national learning teams, both in a synchronous 3D virtual world environment and in asynchronous text-mediated communication environments. One of my studies uses the framework of engagement and social presence theory to explore differences in student perceptions related to their interactions in both collaborative environments. The study results indicated that students working in the virtual world have a heightened sense of social and cognitive presence compared to working together in a text-only environment. The heightened sense of social presence was also closely related to the students' level of engagement and satisfaction in the course.

Also, my work has focused on designing transnational collaborative learning projects in virtual worlds. The chapter *Challenges and Strategies in Designing Cross-National Learning Team Projects in Virtual Worlds* (Resta & Shonfeld, 2012) presents the principles and strategies related to the design of cross-cultural collaborative learning projects in virtual worlds that have been found effective in our studies.

Although there is growing interest in the use of virtual worlds for educational purposes, instructors, and instructional designers often confront problems in creating learning activities in these environments. The article *Teaching with Virtual Worlds*: *Factors to Consider for Instructional Use of Second Life* identifies a number of factors and issues that need to be considered in designing educational activities in virtual worlds (Mayrath, Traphagan, & Resta, 2010).

With the growing interest in the application of constructivist approaches to learning, there is also a need to move beyond the traditional behaviorist-based instructional design approaches that have been used for many years. To help provide the field with another approach to better meet the needs of constructivist learning environments, an ecological approach to instructional design was developed (Resta & Kalk, 2011). Traditionally, the instructional designer's task has been to devise a solution in which the learner is situated in a bounded environment that is linear and self-enclosed. In contrast, the ecological approach to instructional design calls for learners to be immersed in authentic experiences, building deep understanding through technology-mediated interactions with peers and mentors, in an environment that is at once comfortable yet challenging. To design these experiences, instructional designers need to look beyond the traditional, systematic sequence of design steps to think in nonlinear ways about creating high levels of engagement. The ecological approach to instructional design incorporates both an ecological structure and elements of an activity system (Bronfenbrenner, 1995; Engeström, 1987). The social and collaborative elements of the ecological approach are informed by the work of Vygotsky (1978) who proposed that we can only understand each individual person by examining the societal context in which that person lives.

In online collaborative learning environments, instructors can easily establish criteria to assess the quality of a learning team's intellectual product or performance. However, it is often difficult to assess the contributions made by individual team members to discussions, to idea formulation, and even to an intellectual product. The problem of the "free rider" in virtual learning teams has been well documented (Brooks & Ammons, 2003; Johnston & Miles, 2004; Tu & Lu, 2005) and remains a problem in collaborative learning.

Peer and self-assessment may be an effective alternative to conventional faculty judgment, not only for the group but also for individual members. In peer assessment, team members apply a set of standards in order to make critical judgments about the work of the collective as well as the contributions of others in the group (Sluijsmans, Dochy, & Moerkerke, 1999). Self-assessment also gives students the chance to reflect on their own performance in the same way as they judge the work of their peers. In self-assessment, learners take responsibility for monitoring and making judgments about their own learning, requiring students to think critically about what they are learning, to identify standards of performance, and to apply them to their own work (Resta, Awalt, & Menchaca, 2002). My research on peer and self-assessment in online collaborative learning environments has led to the development of the Online Assessment Tool (OAS) that is now used by faculty members in a number of universities. The tool enables each member of a learning team to compare how they have assessed their contributions to their virtual team and how their team members perceive the member's contributions (Resta & Lee, 2010). The tool continues to be refined based on ongoing studies of self- and peer assessment.

My work has also focused on issues of digital equity and the digital exclusion of peoples. Much of my past work has focused on the ways that technology may be used to empower indigenous schools and communities. I served as Principal Investigator of the Four Directions project that worked with Native American schools across the country to enable them to use technology to create a curriculum that reflects their culture and history. More recently, I have worked with UNESCO in developing policy tools to help member countries develop national policies to empower their indigenous populations. One product of this effort is the UNESCO Policy Brief entitled: *ICT and Indigenous Peoples* (Resta, 2011a). I have coauthored an article entitled *Digital Equity and Intercultural Education* (Resta & Laferrere, in press) that addresses the global issues and trends related to digital exclusion of peoples, as does the EduSummIT 2011 Report: *Building a Global Community of Policy-Makers, Researcher and Teacher to Move Educational Systems into the Digital Age* (Resta, Searson, Patru, Knezek, & Voogt, 2012).

My research and scholarship has also focused on a number of critical issues confronting education and teacher education. Teacher education in the United States has been increasingly criticized, both at the national and state level, for not developing teachers who are able to prepare digital age learners with the knowledge and skills needed in a rapidly changing technology-based global society. Teacher education, however, is a complex system, and many contributors are involved, including state legislatures, state certification boards, national and regional accreditation associations, educational professional associations, teacher unions, teacher education institutions, schools, and the federal government. Most of these stakeholders agree that teacher education needs to change to meet the needs of digital age learners, but diverse policy contexts and a lack of shared vision pose barriers to collaborative action among the stakeholders to affect change.

To help build a shared vision, I organized the *Invitational Summit on Redefining Teacher Education for Digital Age Learners* that brought together the leaders of the major stakeholder groups (national accreditation agencies, state departments of education, colleges of education, educational professional associations, business leaders, and others) to create and build consensus around a new vision for teacher education in the digital age. The leaders worked in small groups as a whole to:

- Identify the characteristics of a 21st educator
- Define the critical elements of an educator preparation program to produce such a teacher
- Identify the institutional, state, and national policy structures that support the creation of these programs

The development of the vision led to a set of policy recommendations at the institutional, state, and national levels to facilitate the redefinition of educator preparation. The summit report (Resta, 2011b) presents the shared vision developed by the stakeholders. It was presented at an invited Congressional briefing and also used in the development of the new national teacher education standards by the Council for the Accreditation of Educator Preparation (CAEP). The summit report is available at www.redefineteachered.org.

At the international level, a book was developed for the United Nations Educational, Scientific and Cultural Organization (UNESCO) entitled *Information and Communications Technologies in Teacher Education*: *A Planning Guide* (Resta, 2010). The book was designed to help countries in developing national plans for infusing technology into teacher education and has recently been translated into five languages. Another book, *Teacher Development in an E-Learning Age*: *A Policy and Planning Guide*, currently in press, is designed to help countries in the strategic use of online learning to prepare teachers in their countries who lack access to teacher preparation programs in their area.

Over the past two decades, learning that takes place or is tracked within a computer-mediated environment has grown exponentially. As a result, a tremendous amount of data is being generated that has the potential to reveal powerful insights into the teaching and learning process. Turning this mass of data into useful insights, however, requires new techniques that can effectively facilitate exploration and discovery. Data visualization offers a range of powerful tools to facilitate data-intensive educational research, as well as to communicate to students, parents, teachers, administrators, and policy-makers valuable and actionable insights made possible by these data-rich learning environments. To enable educators to understand the implications of big data and the increasingly important role of data visualization to help improve learning and educational decision-making to support research and inform policy, I organized the first *Invitational Summit on Educational Data Visualization*. The Summit brought together educational leaders and data visualization experts to identify emerging trends and the ways data visualization will impact education going forward. The summit also developed a set of recommendations to guide the future development of educational data visualization. The summit presentations may be viewed at www.edvis.org, and the summit report is in press.

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Chapter 7
Understanding the Opportunities and Challenges of Introducing Computational Crafts to Alternative High School Students

Maneksha DuMont and Victor R. Lee

Introduction

In recent years, the integration of computation with crafting has garnered increased attention. Partly spurred by the growth of the "maker movement" and also by recognition of the importance of broadening computational interest and proficiency, computational crafts have become more familiar to educational technologists and designers. For example, computation has been combined with textile design in summer camps for young people (Buechley, Eisenberg, Catchen, & Crockett, 2008) and integrated into media as pervasive as paper (Eisenberg, Elumeze, MacFerrin, & Buechley, 2009). Additionally, maker spaces are being established in major metropolitan areas, Maker Faires are becoming increasingly ubiquitous (Dougherty, 2012), university courses in computation and crafting are being established (Lee & Fields, 2013), and museums are beginning to bring computational crafting into their repertoires (Brahms & Werner, 2013).

Schools are also starting to benefit from craft technology (Kafai et al. 2014). Different from other computational technologies and curricula featured in schools, for example, Lego Mindstorms (http://mindstorms.lego.com) or Hour of Code (http://code.org), hybrid technologies combine known hands-on creative endeavors, like sewing or blending art materials, with computer programming in open-ended design projects. However, despite the rapid and still growing awareness of computational crafting by designers and researchers of educational technologies, much is still unknown about the range of considerations one must make when bringing these technologies into a school setting.

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This chapter reflects on one effort to document both the promise and challenges that come with bringing computational crafts into an alternative school setting. Alternative schools were developed separately from the conventional system to assist disenfranchised, at-risk youth that have not been successful in the traditional school environment in meeting high school graduation requirements through individualized programs, remediation, and adult skill development (Pang & Foley, 2006). Because alternative schools encompass a student population that struggles academically, they are not typical spaces for testing radically new educational technologies. Yet, computational crafts are thought of as powerful because they provide new forms of access; have appealing, unintimidating, recognizable components not typically associated with computational domains; and encourage many different ways of knowing (Eisenberg, 2003; Turkle & Papert, 1991). Computational crafts have potential for developing necessary thinking skills, promoting aspects of empowerment and appealing to a diverse population who may not otherwise relate to computing.

An overarching belief in this project was that real narratives of user experience can be valuable for informing design (Cooper, Reimann, & Cronin, 2007; Norman, 2002; Pruitt & Grudin, 2003). This chapter is organized to highlight three narratives of student experiences with a computational craft project. Students' own words and descriptions of their activities throughout the design life cycle are used to highlight and reflect upon how different approaches to and work throughout the project can shift our notions about ways of participating. The final portion of the chapter will speak to two main considerations from this project that may aid other designers and researchers motivated to bring computational crafts to school classrooms.

Theoretical and Methodological Overview

This project was heavily influenced by Constructionism, a learning philosophy and educational theory. Briefly, Constructionism posits that remarkable learning occurs in environments where learners are deeply engaged in individual projects of personal interest (Papert, 1980). Further, a Constructionist environment depends on public sharing of created artifacts as a way to propagate learning by encouraging learners to explain, defend, question, and show pride in their and others' work. Drawing from existing literature, and discussed more extensively in DuMont (2014), students designed, developed, and crafted their own computationally enhanced pets, or "DigiblePets." DigiblePets are essentially physical toys that interact with a user via a computer program. A multi-week unit involving the creation of DigiblePets was designed also with an eye toward using strategies for increasing consideration of sociocultural aspects of technology-rich learning environments (e.g., Bielaczyc, 2006; Edelson, Pea, & Gomez, 1996), encouraging creativity in learning activities (e.g., Sawyer, 2012), and promoting emotional engagement in school, especially for at-risk students (e.g., Fredricks, Blumenfeld, & Paris, 2004).

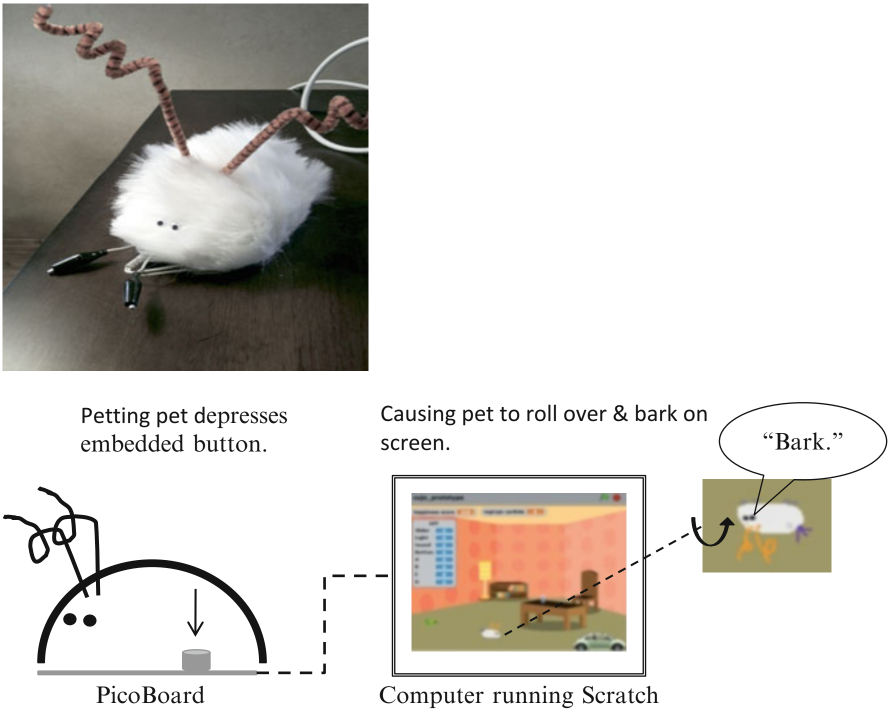
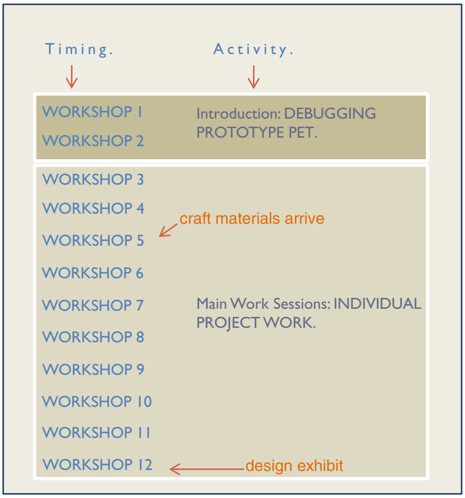


Fig. 7.1 A DigiblePet prototype (*above*) and depiction of how DigiblePets work using a logic board (PicoBoard) and corresponding Scratch computer program that allows the pet to interact with a user (*below*)

The first author, a former veteran high school math teacher and former software developer, served as the designer and facilitator for the intervention with support from the alternative high school staff. Data and resulting analysis were intended to provide insight into understanding both the opportunities and challenges that come with introducing computational craft activities in an alternative school setting.

For the project, 9 high school junior and senior students (4 females and 5 males) participated in a 5-week long design project that took place over 12 workshops. Students worked in small teams ($N=4$) to design, program, and make their own digital pets. The pets had physical bodies made from various art materials embedded with a small logic board (PicoBoard) that connected to a computer and interacted via computer programming code using MIT's Scratch open-source coding platform (see Fig. 7.1). The students were all programming novices and the designed curriculum included a 2-workshop introduction to the technology, project, and computer programming code through debugging a prototype project. Following this, student teams worked on designing and programming their individual logic boards and computer projects by tinkering with programming code and had unlimited access to the prototype program, pet, and facilitator's expertise. At the fifth workshop,

Fig. 7.2 Basic workshop overview



the craft and art materials arrived. At the end of the 5 weeks, the students held an after-school design exhibit for invited guests to showcase their work (see Fig. 7.2).

All four student teams successfully created a new and unique DigiblePet with different functionality. For example, pets reacted on screen when touched and spoken to in the physical world, performed tricks when certain computer keys were pressed, reacted when it got dark, and danced virtually to music. How students participated in the project varied greatly. Students partook in computer programming and were exposed to other computationally related skills, including debugging, crafting, designing interactions, and design thinking. However, not all students participated in all of these areas. Despite a number of obstacles, the student population was engaged in the project, connected with their pets, and exhibited pride in their work. Although students showed genuine interest during the project and often showed off their pets to others within the school, only a few students agreed to attend the design exhibit held after school. Many did not attend even when course credit was in jeopardy.

The student narratives below are based on analysis of the data collected, including video setup to record each group's daily work, screen recordings of each group's computer program, field notes, observations, interviews, and a post project assessment. The process of narrative preparation involved an initial review of field notes, observations, and interviews to establish a general understanding of the project life cycle and highlight key individuals who displayed different working styles. Then, the entire video corpus was reviewed and portions of video transcribed in which the noted individuals figured prominently in an interaction with another student or with the technology. The result was then crafted into a set of contrasting cases (Yin, 1989) and iteratively refined to become the narratives that appear below.

The three narratives, which juxtapose one another, provide insight into how different students engaged with the project. One of the students, Jamal, followed the predicted trajectory, anticipated by designers of computational crafts. Jamal engaged in all disciplines associated with the project. The artistic crafting portion of the project became the catalyst to broadening his interest and eventual participation in computer programming and interaction design. The other two students, Tegan and Carlos, followed very different paths. Instead of crafting leading to computation, Tegan programmed for her group from the start but abandoned programming completely to focus exclusively on the creation of the physical, craft-based portion of the project. Finally, Carlos only programmed for his group and refused to participate in any of the other aspects of the project. Together, these narratives help illustrate how the project evolved, forming a tableau of this alternative school classroom.

Jamal

Jamal was a senior student who worked alone on his project, saying on the first day that he did not "need" anyone else. Jamal was tall, lanky, and reserved. He dressed in baggy shorts and oversized single-colored t-shirts with new-looking athletic sneakers. While the other students constantly interacted with one another, Jamal kept to himself often with large headphones hanging around his neck pumping gritty rap music toward his ears. Academically, Jamal had a checkered history. He came into his senior year with 1 year's worth of high school credit in various subjects. This meant Jamal was trying to make up 3 years of high school in 1 year in order to graduate. Additionally, Jamal's family life was unstable. At the time of the project, both his mother and father were serving time in prison, and he was living with his grandmother in a remote location within the large rural district. Jamal said his bus ride took over an hour each way. Jamal spoke a little about his past, saying in interviews he had made several "mistakes" and was attending mandated weekly counseling and parole officer meetings. Jamal always greeted the researcher/facilitator warmly when entering the classroom and was ready to work upon arriving. Jamal had no previous programming or academic computing experience.

From the beginning, Jamal did not often ask for help. He successfully completed six out of seven debugging problems in workshops 1 and 2 independently. When he began working on his own pet, he selected a pre-drawn sprite from the Scratch library and tried to program it to walk across the screen, turn, and walk back across. He had substantial trouble making his idea happen, but instead of getting frustrated, Jamal exhibited a working pattern that included tinkering with the walking code, running into a bug, trying to tinker around the bug, and then, when not successful, abandoning the troubling code for the time being and moving to another aspect of his program. For example, Jamal worked for a time on walking, and then, when stuck, he tried to figure out how to import a new background from the Internet, which was prohibited by the school district. He worked on walking some more, but did not succeed in getting the code to function correctly. In this respect, many of Jamal's initial functionality ideas went unfinished.

In light of this, it seemed Jamal was not fully connecting to the project and was having trouble persevering through any one idea. Finally, at the beginning of workshop 5, Jamal said out loud, "I don't really like my dude [sprite]." He then deleted his sprite, along with all of the code he had generated. He did not make any verbal remarks when doing so; he just began to look for a new sprite (settling on a zebra). When asked in an interview about why he deleted his entire project, he said, "I guess I just lost interest." At this point in the project, Jamal stopped creating programming code and focused solely on the aesthetics of his design, taking time to make sure the new virtual pet looked the way he wanted.

During the next three workshops (5–7), Jamal worked diligently on parts of the project that mattered to him personally. He was not satisfied with his original character or programming ideas. So, Jamal chose a new character and spent the majority of workshops 6 and 7 painting sunglasses and sneakers for his character in Scratch. Unlike much of the typical time-constrained learning in school, spending two workshops occupied with a small, perfunctory part of the pet was a perfectly acceptable way to engage in this design project. For Jamal, these two accessories, the sunglasses and shoes, seemed to carry personal importance. Many days, Jamal wore athletic sneakers similar to the sneakers he was painting in Scratch, and while painting the virtual shoes, he referred to them often by name as "Nike 6 point 0s."

On the virtual design, Jamal worked without talking much to others and without breaks. At one point, he got very frustrated that one of the sneakers he had been designing looked like a high-top, when it was not supposed to be a high-top shoe. In the following episode, after over 20 min of creating the shoes, Jamal believed his last sneaker looked too high, but he was not sure how to adjust the shoes without erasing part of the character's leg. He determined that he needed to zoom in and recreate the zebra's leg at a more pixilated level.

Jamal Shit. That sucks dude.
(Looking at the paint editor in Scratch)
Hey if I put eraser on the zebra, it'll erase him right?
(Selects the eraser tool from the menu and uses it to erase part of the zebra's leg)
Oh yup. Dang it dude.
I just hafta like erase the black, cause they're too high.
They can't be high-tops.
(Continues to erase the sneaker and zebra's leg)

For Jamal, the sneakers "can't be high-tops." This was important enough to him that he was willing to do extra work, recreate the zebra's leg, in order to get them just right. When asked that day about his project, he declared that he had no programming code "Mostly because it took so much longer to make it (the accessories) look awesome on the computer screen." He wanted the relevant pieces of his project to "look awesome" and was willing to put in the time and effort to make that happen. He then declared that he would not be finished with his pet by the end of the project.

Jamal's transformation from lackadaisical, jumping from programming idea to programming idea without getting code to function and eventually abandoning his original project, to a dedicated, meticulous designer continued throughout the next

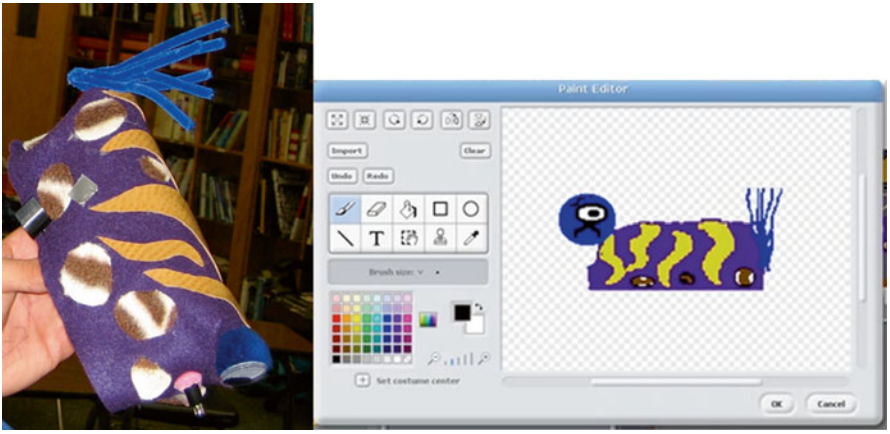


Fig. 7.3 Jamal's finished physical pet (*above*) and corresponding virtual pet made using Scratch's paint editor (*below*)

several workshops. For workshops 8–10, Jamal designed his physical pet, a purple-felt creature with big eyes and zebra skin stripes. He built the pet around a curved pie pan, found in one of recycling bins in the teacher's kitchen, with seriousness of purpose.

Jamal's physical pet was very deliberately constructed (see Fig. 7.3). He spent 3 days of concerted effort crafting the pet and devised a way to embed the PicoBoard to allow users to interact with the buttons and sensors without altering the pet's appearance. Some other groups did not embed the board at all and others had trouble embedding their board and required continued support. At the end of his tangible pet design phase, Jamal declared, "Yeah! I got my little guy! Unnn. Done. Little man." Jamal then worked to create a likeness of this tangible character on the screen to use in tandem with his zebra (now dubbed a background figure) (see Fig. 7.3).

On the final workshop day, Jamal began programming again. The facilitator had not pushed him to program earlier, although he was reminded during several workshops that he needed to think about coding at some point. Jamal was so invested in his physical/virtual pet design the facilitator had not wanted to divert him. At the end of workshop 12, Jamal was not satisfied with the programming he was able to complete and told the classroom teacher, "I'm not even done. Sorry, I've gotta stay here." He then stayed most of the way through the next class period until he completed his program. This was a surprising event given the teachers and administrators at the school declared that getting the students to attend the workshops would be one of the biggest obstacles to the project as a whole. This was also a marked contrast from Jamal's initial efforts, which caused him to lose interest. As intended, Jamal was beginning to show some person investment and connection to the project.

During workshop 12, Jamal ran into 4 bugs and resolved them by tinkering his way through the problems and asking the facilitator for coaching. He was the only student to resolve every bug he encountered on his independent project; he never left a bug unsolved or gave up on solving a bug in his final DigiblePet program. The functionality Jamal implemented included the zebra dancing to music using different costumes repeated in succession, responding to Jamal's voice, doing backflips when the slider on the embedded PicoBoard was moved a certain way, and speaking when the button was pressed.

Jamal then showed off his pet to an outside student who came to visit the class, explaining all the parts proudly. Jamal came to the design exhibit with an invited friend despite living so far away that he was not sure how he would get home. He was one of four students who attended the exhibit. He was the only student to bring a guest to the event. This show of dedication was unusual for Jamal and speaks to his connection to the project. When asked in an interview what it was like making a pet, he said, "I don't know it was fun. We just got to take it (the project) and go with it. It was kind of like a project. It was hands-on. And we got to make things…. Like when I first started making my own, I didn't really know where to start so that's why I kind of didn't do anything for a while. But then once I figured out what to do and everything, it came together."

In his interview after the unit, Jamal claimed regular school was stifling and boring and most often students had to "be all quiet." In contrast, he found the project to be fun and intellectually motivating. He enjoyed being able to decide how and what to build and create. For Jamal, the beginning of the project was somewhat difficult to relate to, but Jamal was able to ultimately make a personal, culturally resonant connection to his pet through painting accessories for his sprite and creating the tangible pet that grew into a zebra. This observation is consistent with other studies that show young people making culturally resonant connections to computing through developing multimedia designs, like youths' music video creations and "low rida" interactive art projects in Scratch (Peppler & Kafai, 2001).

After Jamal developed these artistic parts of his project, the rest of the project took off as well. In Jamal's case, the physical pet creation combined with being able to customize his project to reflect the things he liked, such as fancy shoes, in real life seemed to allow him to discover something relevant and personally meaningful in programming and design. The tangible aspects of the project were important; in an interview, Jamal said he signed up because "It was more hands-on and I'm into hands-on." However, it may have been even more important to have the freedom to pursue interests, how and when he wanted to. Jamal appeared to use time and freedom to learn and explore to connect to the project in a way that engaged him deeply, but once he discovered that connection, he was dedicated, effective, and successful. As proponents of computational crafts hope, personal meaning realized in a combination of tangible and virtual media design appeared to provide Jamal a way to connect to the project, whereas just one medium alone may not have. This connection then spurred Jamal to revisit computer programming in a new way: with purpose and dedication. The result was a focused, intricate computer program that showcased meaningful interactions between the user and the digital pet.

Jamal's case shows that engagement can be a process. Substantial participation in computation, namely, computer programming, occurred when the student was able to develop a personal connection to the project. This is precisely what designers of computational crafts hope will occur and serve as evidence of this possibility. However, the following two narratives provide different and perhaps more challenging accounts of student engagement.

Tegan

Tegan was a junior transfer student who chose to work with two senior boys, Rocky and Ted. She was a confident and charismatic girl who talked easily with her group mates. Unlike her classmates, Tegan claimed to enjoy math, saying she was good at it. She was always smiling and often toted a large frozen coffee concoction from the nearby fast-food restaurant to class. Tegan moved to the district the previous year from Florida with her mother, whose habits of borrowing money from her daughter to buy cigarettes Tegan spoke about disapprovingly to another student in class. According to teachers, Tegan struggled at the traditional high school for her sophomore year, failing nearly every class.

In keeping with her outward confidence, Tegan did much of the initial programming for her team in workshops 2–4, prior to the craft materials arriving. She had no previous programming experience but was ready and excited to implement her own aesthetic changes to the prototype project in the very first minutes of seeing the Scratch program. In fact, Tegan physically took the computer from her group mate and began making code changes to beautify the prototype program right away, which was reflective of her inclination to go above and beyond and take risks and her aptitude for computer programming. With Tegan at the helm, her group was the most successful at solving the given bugs on the two introductory days.

During the second workshop day, Tegan worked alone in Rocky's absence to solve the final and most intricate preprogrammed bug. This bug involved challenging concepts like understanding variables, mathematical conditional statements, and event handling between different sprites. Students had to change how characters interacted by modifying how users provided input and then the characters' reactions to the input. Tegan was the only student to successfully and completely solve this final bug.

The following several workshop days (2–4), Tegan's group worked to make a virtual pet and corresponding functionality. Tegan controlled the computer and Rocky supported her by adding ideas and sometimes directing her in what to try. Together, they created a monkey with many costumes that walked, danced, captured and ate bananas, "partied," and climbed a ladder to get onto the bed in his room. The monkey spoke, listened to music, and had an elusive bunch of bananas to chase. Tegan led the programming the group created.

At the end of workshop 4, Anna, the classroom teacher, came over to check out what Tegan had been working on. After seeing the ladder functionality, the classroom teacher said "Oh that's cool!" and "That's a good idea!" Tegan immediately warned the teacher very seriously, "Don't take it!"

Fig. 7.4 Tegan's monkey

The response reflects a tendency for Tegan to want others to see her work but not copy her ideas. She was happy to fully commit to an aspect of the project but had a need to own that portion of the design process. As another example, when the group had a chance to begin crafting their physical pet, Tegan devoted all of the remaining workshops to creating their monkey. She no longer wanted anything to do with the virtual design, leaving her partners to refine the functionality and programming parts of their pet.

In an interview, Tegan talked about why she switched from being the primary programmer to later being the sole physical crafter. Tegan said she chose to give up programming and work solely on the physical pet because the boys were "Not crafty" and "They'd just mess it (the physical pet) up. Cause I had an idea in my head." Tegan seemed to have a feeling of responsibility to do the crafting for the team because she felt more capable. But importantly too, she added that she had an idea that she wanted the opportunity to create and did not want the boys' input to jeopardize this idea.

Tegan grew very attached to the physical monkey during the design process. She was often observed showing versions of her stuffed pet off to other students, teachers, and the principal. In an interview, Rocky talked about how the group had broken up responsibility by giving Tegan ownership over making the physical pet. He admitted that this arrangement made the group get along better because Tegan would "Get mad at us if we tried touching her monkey."

Tegan's monkey was very intricate (see Fig. 7.4) However, Tegan spent so much time attending to the monkey's appearance that on the final day, she was forced to crudely glue the logic board onto its back, exposing it to users, rather than embedding it into the pet as intended. When the project was over, Tegan asked to keep her monkey, even without its interactive components, as the board had to be returned.

Attachment and connection to a physical design is precisely what we hoped would occur with DigiblePets; Tegan was emotionally attached to the creation of the physical pet. However, the relationship she developed to the physical design component was so powerful that she ignored computing after having been initially quite interested and successful at it. She also ignored the interaction design work between the physical and virtual pets. It turned out that Tegan's affiliation with only specific aspects of the project at specific times did not lead her to continue to explore programming concepts. She even abandoned programming her climbing functionality that would allow the monkey to climb a ladder and jump on the bed, midway through creating it. This functionality was an idea she had been very excited about and adamant about protecting.

In her post-interview, Tegan talked about how making a digital/tangible pet influenced her decision to join the project because she thought programming would be boring but making an interactive physical pet sounded interesting. The premise of the project seemed to provide a way for Tegan to become more connected to programming. However, the creation of the tangible pet became a powerful draw, and the use of craft components actually served to steer Tegan away from more substantive engagement with computing.

Carlos

Carlos was a junior, Hispanic student. He had a heavy accent when he spoke English. Every morning, Carlos ate two egg sandwiches chased by a Monster caffeinated energy drink from the local gas station, saying they were delicious and necessary to survive school. Carlos never stayed in town long, going on extended trips, sometimes a month long, to visit his girlfriend in California. Carlos had dropped out of the traditional high school but was personally invited by the principal of the alternative school to come back and earn his high school diploma.

Carlos's story provides insight into a different way of connecting with the DigiblePets project. Carlos worked with Dino and Maya. The threesome spoke and joked a lot with one another, much of the time giving Maya grief about her boyfriend and another friend of theirs, talking about her pregnancy, or talking about electronics. Carlos began the project wholly interested in programming and ended the project with expertise in only that discipline. In an interview, Carlos claimed his interest in participating in the project stemmed from an interest in fixing computers for his friends and family. He was the only student to mention the opportunity to do programming as his reason for participating in the project.

Carlos jumped into the computational aspects of the project right away. He instantly took control of the computer. Carlos programmed all the functionality for the group's pet, an alien creature (Fig. 7.5). At the end of the project, the alien could make alien noises, put on sunglasses, wait for permission to ride a magic carpet, ride the carpet, walk around the landscape, jump on a trampoline to an alternate world, and differentiate between being fed "food" and a person's hand in the physical world. All of this functionality was based on interactions the user could have with the PicoBoard embedded in the physical pet. Carlos worked to create all the different

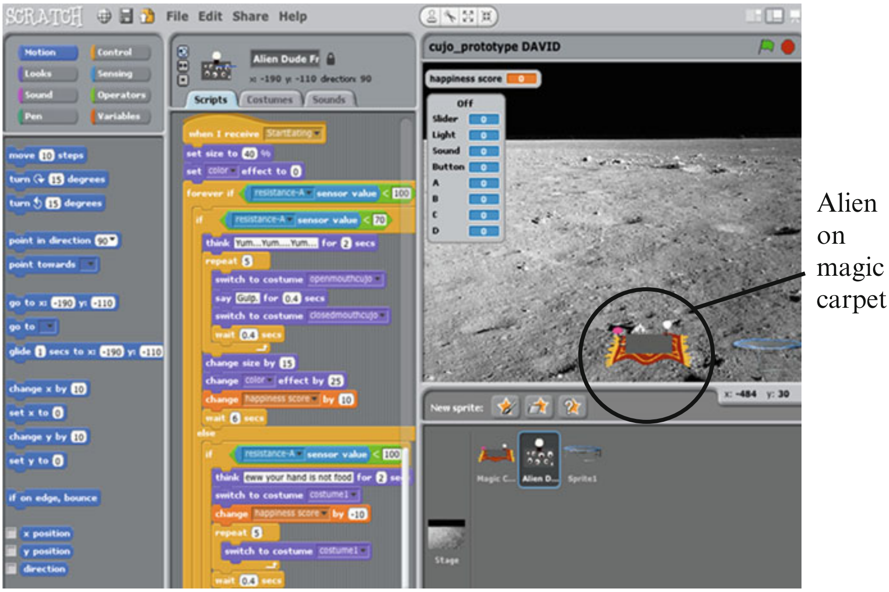


Fig. 7.5 Carlos's alien Scratch program

functions for his pet and refused to dismiss any of his own ideas, even when his partner Dino had ideas or told him it would be easier to do something different. Carlos seemed to take pride in his ability to create complex code and functionality, which was reflected in the intricacy of his final program.

Carlos had a very different role in the craft portions of the project. Carlos told Maya and Dino that they were "the art people" and dictated they do the work of creating the physical pet and ensuring that the user could interact with the PicoBoard. He rarely touched the physical pet. During workshops 8 and 9, Carlos declared himself finished with programming and proceeded to watch Dino and Maya as they struggled to work on the physical and interaction design. For example, during workshop 9, Dino and Maya tried to embed the PicoBoard out of sight within their cardboard box alien, a task that was more difficult than expected because of the multiple items, sensors, buttons, and sliders that needed to be accessible simultaneously through the box. Carlos essentially refused to be involved. Instead, he took the role of sitting back, barking out various comments.

Carlos was vocal about his perception of his artistic abilities, saying, "I suck at art" and "It's just that I'm not good at art and they (Dino and Maya) are." Yet, when faced with the other two doing the work, Carlos's banter was pejorative and authoritative. He made several comments like "This kid (Dino) is stupid" and "She (Maya) doesn't know what's going on." But he never helped them with the project he had worked so long to program. It seemed almost as though he refused to acknowledge that the physical pet and interaction design parts of the project would reflect on the success of the project as a whole and his role in it regardless of the quality of the computer program.

Carlos left the project as a confident programmer. He referred to his pet program as “the best one” and to his own programming skill as “the most advanced.” In an interview, Carlos reported he was happy with how his group’s pet turned out. About the whole project, he said in an interview, “It was fun” because “I learned how to program it and I got to mess around with the computer.”

For some designers of computational crafts, getting youth to participate in computing is the goal, meaning a student who comes into the project with an interest in programming is already on the hoped for path. The notion that the hybrid design technology did not hinder Carlos’ ability or interest in pursuing programming should perhaps be heralded. However, for other computational craft designers (DuMont & Fields, 2013; Fields, Kafai, & Searle, 2012), computational crafts should not just provide individuals with an interest in crafts with experience in programming but vice versa as well. One goal of the DigiblePets project was to broaden student participation in design and design thinking with physical and virtual media and also the interplay between these two types of media. Therefore, the fact that Carlos, quite successful as a programmer, did not participate in multiple aspects of design is not entirely desirable. He began the project believing he was not good at art and finished the project with renewed faith that he was good with computers but without any increased exposure to art, physical, or interaction design. To be more aligned with the project’s goals, Carlos’s interest in programming would have translated to a willingness to engage more fully with the more artistic or physical parts of the project. Although Carlos’ case sets parameters for greater success, he was deeply engaged in his portion of the project and gained experience in programmatic thinking.

Narratives as Insight

Jamal, Tegan, and Carlos’s stories show the varied nature of participation in a computational craft design project. All three students were engaged and successful in the aspects of the project they chose to engage with but had varying exposure to and success with all the domains associated with computational crafts. Jamal struggled to engage in the computational design and development of the project, but the artistic aspects of the project helped him develop a connection that reified his interest in pursuing, and being successful with, the computational components. Jamal’s was a hope for outcome and shows the potential for computational craft projects like this one to capture young people’s interests and parlay them into deep involvement in computational domains. Tegan was initially captivated by the computational aspect of the project and used it as a gateway to the crafting portion, abruptly abandoning her programming ideas. The opportunity for Tegan to increase her programming knowledge became thwarted by her emergent and strong personal interest in physical pet design. Finally, Carlos immediately took interest in the computational aspects of the project but never chose to engage in the other, more hands-on design aspects of the project. All three students successfully developed a pet with the aid of their group, so in a sense, the group projects were successful. However, all had very different experiences with facets of the project and therefore also dissimilar opportunities to gain skills and develop interests in new domains. Further, the students were reluctant to share in ways that were expected. Students were generally reluctant to build on one another's ideas or attend the design exhibit, even though they were observed showing off their pets throughout the workshops. As such, there are two major lessons to be earned from this project: (1) Sharing is contingent and (2) Hybrid media can be compartmentalized.

Sharing Is Contingent

The learning environment for this project was designed to remain true to the spirit of Constructionism. In particular, the tenet of sharing individual work was integrated into the project as an important part of the learning/making process and a key motivator to learning. However, how, when, and where sharing occurred during the project differed from intended and designed sharing. Instead of students being willing to banter about ideas with other groups and share when asked to, students chose their own ways and times for sharing or not sharing. Based on relevant literature, the theoretical assumption at the beginning of the project was that sharing would be motivational, especially with a group of students who do not often have a chance to be recognized in a positive way for their academic work. As a result, several aspects of the activity structure were designed to promote sharing with the class or larger community, for example, daily full group discussion sessions and the culminating design exhibit event. Interest in sharing was actually manifested at certain times; students wanted to show off their work to friends, favored teachers, and administrators. However, sharing most often occurred spontaneously with students dictating the parameters and players of the sharing. As mentioned earlier in this chapter, students were very disinclined to attend the culminating design exhibit, where sharing was intended to be the impetus, focus, and reward of their 5 weeks of effort. In observed cases where students shared on their own terms, for instance, Jamal showing off his work to a friend who wandered in the classroom, students exhibited pride and excitement in their work. But, contrary to expectation, students were oftentimes reluctant to share in deliberately sanctioned ways. For example, Tegan did not want her ideas to be used or modified by others. She warned the classroom teacher not to build from her ideas and warned her group not to interfere with her physical design.

Of note is that with this population of students, there were a lot of histories and structures in place that also discouraged sharing or viewed sharing as unfair or cheating. For instance, there existed a kind of sharing standard that seemed to prompt students, like Tegan, to claim ownership over ideas and discourage one another from helping others with ideas. An important lesson learned is that the notion of sharing a public artifact has an overlooked relational element. With whom you want to share, when you share, and how you share are important issues to explore. Endorsed sharing must be consistent with a broader history students bring with them to the learning environment because there is a vulnerability that may be present. Working with this population and observing if, when, and how sharing unfolded among the students helped make these contingencies for sharing far more visible.

Hybrid Media Can Be Compartmentalized

One reason hybrid design media, like computational crafts, are exciting is because they may be able to simultaneously engage all kinds of young people in multiple disciplines of design, for example, computer programming and crafting. Researchers and designers of hybrid design media intend for the technologies to link known, familiar interests and computing or vice versa in ways that are relatable, natural, and motivating (Eisenberg, 2003). An assumption underlying this project was that students would navigate this channel between tangible and virtual, craft design and computer programming, taking part in exploring both facets of design. Rather than adding credence to this notion, students demonstrated a desire to separate and isolate the computational, physical, and interactive elements of the multimodal design project. Students did connect to computing in different ways and many students who might not have otherwise participated in computing were compelled to participate in the project. But students did not always participate in all aspects of the project. Rather than providing multiple means of entry into different disciplines of design, in two of the presented cases, the multiple modalities of the design of students' pets allowed for division of labor, which segregated instead of integrating the different elements. For example, Tegan was drawn away from computing by a compulsion to take ownership over the physical pet design. Also, Carlos was never persuaded to participate in crafting the physical pet or helping develop how users would interact with the pet.

These examples are noteworthy because they challenge assumptions about hybrid media. The observations from this project provide evidence that even when the intent of both the designer of the media technology and the designer of the activity structure of a project using computational crafts is to integrate multiple disparate modalities into one design project, like art and computer programming, hybrid media can be compartmentalized by students.

Conclusion

Inspired by recent efforts to bring the popular maker movement to young people, this chapter highlighted an initial intervention at an alternative high school that combined computation with craft and design. The goals of this research were to provide a new type of experience to a student population that might otherwise not receive it and to identify and document some of the challenges that may come from introducing this kind of experience to this population. Students, who were not previously exposed to working on independent projects or computer programming, successfully designed, programmed, and crafted a digital pet. They built monkeys, aliens, and break-dancing zebras and wrote computer programs that allowed these objects to be interactive and responsive. During the course of the intervention, the students participated in myriad domains including design thinking, planning, computer programming, debugging, interaction design, and elements of art. Most students reported enjoying working on the project. Students were proud of the end result. Yet, it is noteworthy that the students showed different ways of engaging with the experience. For some students, like Jamal, several of the exciting potentials of computational craft experiences were realized. For others, like Tegan and Carlos, who did remarkably well at the aspects of the projects they chose to do, the full potential of computational crafts was not fully realized. Yet, working with these students helped to reveal both what were and were not actual pathways toward a multifaceted proficiency in all that computational craftwork entails. Hopefully, the efforts reported here are informative both for those who also want to make an impact in the lives of youth in alternative schooling environments and to those who are generally interested in understanding the opportunities and challenges that come from real-world implementation of making computational crafts in a classroom.

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Chapter 8
Design of Mobile Learning for Outdoor Environments

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Design of Mobile Learning for Outdoor Environments

Mobile devices are ubiquitous tools in everyday life (Traxler, 2013; Warschauer & Matuchniak, 2010; Yardi & Bruckman, 2012). Although it is not unusual to see people using smartphones or tablets to access the Internet, listen to music, or watch videos at any moment, scholars in the field of Learning, Design, and Technology are still developing theoretical conceptions of the potential of these mobile devices to inspire new forms of learning and engagement. While established theories and design principles have been adapted to mobile designs, emerging research suggests that the role of context needs more prominence in current conceptualizations of mobile learning (Sharples, Taylor, & Vavoula, 2005). Our work at Penn State contributes to this ongoing effort in the Learning, Design, and Technology field to develop empirically grounded design guidelines to advance the development of mobile learning environments.

Mobile technology has the potential to enhance the immersion and participation of learners in the actual settings where the knowledge being learned is to be applied. Perspectives on open-ended learning suggest that the learning context is defined not only by what occurs within one setting (such as a classroom) but also by the ideas and experiences that are uniquely established and pursued by learners across settings (Hannafin, Land, & Oliver, 1999; Land, 2000; Land, Hannafin, & Oliver, 2012). These interpretations originate from the learner's own experience, enhancing a constructive process of meaning making. Identifying learning as a process of constructing knowledge, rather than a simple, singular, and passive acquisition,

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promotes the learner to assume responsibility of the learning process, potentially creating a deeper learning experience (Hannafin & Land, 1997).

Similarly, mobile learning can be interpreted as a way to achieve seamless, open-ended learning. According to Looi et al. (2010), mobile learning can enable users to seamlessly transfer from one setting to another without disruption during the learning process. With the help of mobile devices, learning can occur across formal and everyday settings. Change of settings is one of the key concepts of mobile learning (Sharples, Arnedillo-Sanchez, Milrad, & Vavoula, 2009).

The potential of mobile technology to provide interactive elements, gamified narratives, and digital augmentation of informal learning spaces such as museums, parks, or botanical gardens is an emerging area of study (Hsi, 2003; Land & Zimmerman, 2014; Yoon, Elinich, Wang, Steinmeier, & Tucker, 2012). This focus on mobile computers in informal learning settings creates unique opportunities for learning research within open environments, complementing the anytime-anywhere affordance of mobile learning. Informal learning environments use various pedagogical forms to support learning, such as 2-h self-directed visits, 1-h guided tours, week-long summer camps led by an informal educator, and short 10-min demonstrations led by volunteers or staff. Regardless of the form, the design of informal learning environments requires respecting both the free-choice element of the informal spaces (Falk & Dierking, 2002) and the learners' multipurpose agenda, which blends leisure and education, in the design decisions (Zimmerman & Land, 2014). In our work, we argue that mobile devices, due to their portability and ubiquity, can be integrated into informal learning spaces on demand with informational resources, media, and additional learning activities that can enhance the free-choice learning experience.

Education researchers and practitioners have been exploring the use of mobile devices to enhance outdoor learning environments. More specifically, researchers have conducted outdoor learning studies in settings such as woods (Rogers et al., 2004; Zimmerman et al., 2014), gardens (Chen, Kao, & Sheu, 2003; Huang, Lin, & Cheng, 2010; Zimmerman, Land, et al., 2013), urban watersheds and ponds (Kamarainen et al., 2013; Liu, Peng, Wu, & Lin, 2009; Squire & Jan, 2007), trails (Tan & So, 2011), and parks (Chen et al., 2003). These studies used mobile devices to enable observation, data capturing, or data sharing of the outdoor setting (e.g., Chen et al., 2003; Liu et al., 2009; Rogers et al., 2004). In this chapter, we present design theory based on our research conducted at the Arboretum at Penn State in order to advance conceptions of how mobile computers can enhance learning within technologically enhanced informal learning environments.

The Tree Investigators Informal Mobile Learning Environment

Through our work with the Augmented and Mobile Learning Research Group (http://sites.psu.edu/augmentedlearning) at Penn State, we have conducted a series of design-based research studies on the use of mobile technologies in outdoor settings like arboretums and nature centers (e.g., Salman, Zimmerman, & Land, 2014; Zimmerman, Land, et al., 2013, Zimmerman et al., 2014). Our focus is on enhancing families' scientific observations and explanations and the role of mobile devices in supporting those practices. *Tree Investigators* is designed as an open learning environment (Land, Hannafin, & Oliver, 2013), rather than a stand-alone app to support a self-guided tour. Taking the open learning perspective within our informal mobile learning environment means that we design for interactions that include other learners, a naturalist guide, mobile technology resources, and the specimens within the natural setting. Our technologically enhanced pedagogy relies on a naturalist to guide groups of families through the Arboretum. The naturalist works with learners on guided tours to deploy the mobile resources we developed to help them look more deeply at ecological concepts, which, inherent within the space, are not readily visible.

Our initial *Tree Investigator* learning environment was designed to support families in the process of tree identification as they were guided to explore a variety of broadleaf and needle leaf trees at the Arboretum at Penn State. Our early research findings (Zimmerman, McClain, & Crowl, 2013) suggested that the mobile app supported learners to engage in high levels of describing and naming talk (see perceptual talk Allen, 2002) around scientific observations; however, learners' conceptual talk that was interpretive and explanatory was less prevalent. Given our focus on ecology, we intended to enhance conceptual thinking and talk around natural cycles (e.g., life cycle, seasonal cycle, water cycle, rock cycle), which led our team to refine our *Tree Investigators* design to support open-ended and conceptually focused activity (Land & Hannafin, 2000; Land, Hannafin, & Oliver, 2012). This second iteration of the *Tree Investigators* mobile app design and research on life cycles of trees is the focus of this chapter.

For our second iteration of our design, called *Tree Investigators II*, we utilized the literature on scaffolding (Ge & Land, 2004; Land & Zembal-Saul, 2003; Quintana et al., 2004) as a stronger grounding for our redesign. We refined *Tree Investigators* based on three primary considerations: (a) increasing the conceptual focus of the learners' experience by focusing the app design and naturalist-led activities around ecological cycles; (b) fostering more learner-directed activity during the mobile learning experience through the utilization of digital photography; and (c) documenting additional evidence of learning through the creation of a knowledge artifact. Given our pedagogical focus was on guided tours in informal learning settings, our redesign work incorporated changes to both the guided participation from a naturalist on-site and the technological supports that were delivered through mobile computers.

Informal Mobile Learning Environment Design Guidelines

Based on our review of the literature as well as our own research findings, we employed the following general guidelines for enhancing our *Tree Investigators* mobile redesign:

1. Design a learning environment, not a stand-alone technology.
2. Use mobile computer content and prompts from the naturalist to amplify observations to see the disciplinary aspects of an informal setting.

3. Use mobile computer content and prompts from the naturalist to scaffold connections between on-site observations and scientific concepts that explain and represent them.
4. Use digital photography attributes of the mobile computer to allow learners to articulate and reflect on their observations and disciplinary concepts.
5. Support all family members, not just parents, to engage as epistemic agents.

Table 8.1 provides an overview of these five design guidelines, along with supporting strategies and examples, which are discussed more fully in the paragraphs that follow.

Design a Learning Environment, Not a Stand-Alone Technology

Overarching theoretical perspective on our design comes from the presumption that learners are engaged in a sociotechnical system where the technology, people, and setting all contribute to learning. These perspectives are build from a framework of distributed cognition (Hutchins, 1995), sometimes referred to as distributed intelligence (Pea, 1993) where thinking is accomplished with both internal mental resources and external resources in one's setting, including technologies, language and inscriptional systems, and other people. Distributed intelligence/cognition focuses on the learning within a sociotechnical system (Halverson, 2002; Hutchins, 1995), where individuals are understood to be only one part of a learning network. We used distributed cognition as a theoretical tool to understand how families think together about the trees they saw based on their interactions with mobile learning devices, each other, and the naturalist present on-site. Pea (1993) suggests that researchers can leverage distributed intelligence in their designs; here, we focus on distributed intelligence manifests through (1) augmenting through computing and (2) augmenting through guided participation.

Consequently, our first design guideline was conceptualized holistically as a sociotechnical system that relied on guided participation with a naturalist, technologically enhanced learning with a mobile app, sensory experiences on-site with trees, and social interactions with others as needed for learning. Table 8.2 shows the activities within the Tree Investigators II informal mobile learning environment.

Use Mobile Computer Content and Prompts from the Naturalist to Amplify Observations to See the Disciplinary Aspects of an Informal Setting

Our second design guideline for informal mobile learning environments specifies the selection of prompts for the naturalist and app because it entails structuring the activities of learners. Our goal is to use the mobile materials and the naturalist to

Table 8.1 Design guidelines for *Tree Investigators II* (expanded and adapted from Zimmerman & Land, 2014)

Informal mobile learning environment design guideline	Design strategies to support learning	Example from our Tree Investigators (T.I.) project
1. Design a learning environment, not a stand-alone technology	Consider the learners engaged in a sociotechnical system where the technology, people, and setting all contribute to learning	• We relied on guided participation with a naturalist, technologically enhanced learning with a mobile app, sensory experience on-site, and social interactions with others as needed for learning
2. Use mobile computer content and prompts from the naturalist to amplify observations to see the disciplinary aspects of an informal setting	Direct attention to specific features and characteristics that highlight important scientific concepts (Eberbach & Crowley, 2009; Huang et al., 2010)	• We employed digital photography on the T.I. app to include ideal specimens that the learners could compare to the actual specimens on-site to begin to see important aspects of shape, texture, and color of tree components
		• We also designed T.I. materials to amplify observations *across* trees to see broader disciplinary concepts embodied in the space (i.e., tree life cycles)
	Provide visualization of non-visible scientific aspects through technological augmentation (Rogers et al., 2005)	• The T.I. mobile app provided contrasting images of scientifically relevant characteristics not evidenced in the gardens (e.g., seasonal elements)
3. Use mobile computer content and prompts from the naturalist to scaffold connections between on-site observations and scientific concepts that explain and represent them	Provide a conceptual organizer (Quintana et al., 2004) illustrating conceptual processes present in the informal setting	• The mobile app interface represented a conceptual organizer of the tree life cycle. All mobile materials were indexed through that life cycle organizational scheme
	Design activities and mobile resources that allow for application of concepts to new instances	• Learners were supported to investigate tree life cycle concepts across two contrasting specimens (e.g., oak and pine)
	Provide contextualized expert guidance (Linn & Slotta, 2000) to encourage deliberate comparison and explanation with images (Liu et al., 2009) or text and guiding questions (Yoon et al., 2012)	• Naturalist-guided families to make comparisons between the images and text in the T.I. app to the specimens on-site. These comparisons encouraged conversations related to scientific concepts and ecological explanations of phenomena

(continued)

Table 8.1 (continued)

Informal mobile learning environment design guideline	Design strategies to support learning	Example from our Tree Investigators (T.I.) project
4. Use digital photography attributes of the mobile computer to allow learners to articulate and reflect on their observations and disciplinary concepts	Capture and annotate photographic artifacts in order to support extended thinking about an informal site (Land, Smith, & Zimmerman, 2013; Smith & Blankinship, 2000)	• Participants were supported to take photographs as evidence to support claims, and then they use these photographs to make a collage that represented their understanding of a tree's life cycle stages
5. Support all family members, not just parents, to engage as epistemic agents	Design materials so the whole family, not just the adults, to have access to the scientific information (Zimmerman, Reeve, & Bell, 2008, 2010)	• Use photographs and clear line art and simple text to allow for children to be able to see the important scientific ideas
		• When text is used, it was written at third-grade level

Table 8.2 Illustration of activities within the Tree Investigators II informal mobile learning environment that blend across the sociotechnical system

Location	Activities
Needle leaf tree at the Arboretum	• Families and naturalist visit a pine or spruce tree (as an example of a needle leaf, evergreen tree)
	• Families use the Tree Investigators app to read and look at digital images about its life cycle
	• Naturalist provides additional content and directs their attention to individual life cycle characteristics
	• Families engage in conversations about what they see and how their observations relates to science
	• Naturalist asks clarifying questions regarding what learners have read and what they are observing on-site
Broad leaf tree at the Arboretum	• Families and naturalist visit an oak tree (as an example of a broad leaf, deciduous tree)
	• Learners use the Tree Investigators app to read and look at digital images about its life cycle
	• Naturalist provides additional content and directs their attention to individual life cycle characteristics
	• Families engage in conversations about what they see and how their observations relate to science
	• Naturalist asks clarifying questions regarding what learners have read and what they are observing on-site
In the woods at the Arboretum	• Learners collaboratively search for evidence of tree life cycle growth stages
	• Learners discuss and collect photograph evidence of individual life cycle stages of trees
	• Learners discuss and arrange their photos into collage depicting each stage in life cycle in order
	• Learners add text to identify individual stages to articulate their understandings and come to a consensus across group members

channel the learners' attention (Pea, 2004), so that they are engaged in conversations related to their own observations on-site with disciplinary concepts in science (Eberbach & Crowley, 2008; Huang et al., 2010). Without a foundation of disciplinary knowledge, it is difficult for novices to know what is relevant to attend in a complex setting (Land, 2000; Smith & Reiser 2005); consequently, in our design work, we employ prompts to assist learners to discern important features of the informal setting from the unimportant features. This level of learning included noticing bark texture and variation in leaf size and shape, and it allowed learners to understand what is the scientific relevance (Zimmerman & Land, 2014) for discerning the types of trees and stages of a tree in its life cycle.

In *Tree Investigators*, these prompts to support observations came from both the naturalist and app material, signifying our goals to develop distributed, synergistic scaffolds (Tabak, 2004). Typical prompts included suggestions that highlighted observations across various trees that taken together reveal more conceptual characteristics of trees' life cycles. In addition, rather than use mobile computers to trigger information about specific trees as solitary objects that were being observed, we designed materials and scaffolds to amplify observations *across* trees to illustrate ecological principles. In this way, the learners engaged in the *Tree Investigator* informal mobile learning environment to see how the ecological cycles were embedded within the gardens and forested areas of the Arboretum.

In addition to needing to discern the scientifically relevant from the irrelevant, another challenge facing the learners in the Arboretum is that the outdoor landscape is dynamically complex. The flora and fauna within the informal setting are constantly changing in response to the seasons, weather, growth variations, and animal migration patterns. Learning about tree life cycles in the fall, for instance, allows for discussions of evergreen versus deciduous trees, yet it constrains the observations that can be made outdoors compared to the spring, when deciduous trees may have flowers present. As such, we designed our mobile app materials to provide visualization of non-visible aspects of the place through technological augmentation (Rogers et al., 2004). It would be impossible to observe all four seasonal characteristics of trees in one visit to an informal site; instead, learners would need to return multiple times over an extended period to see that an oak tree has small budding leaves in spring, deep green lobed leaves in summer, vibrant yellow and red leaves in fall, and bare branches in the winter. Within our app, we incorporated photographs to illustrate the varying seasons, growth, and conditions of the trees at the Arboretum. For instance, one of the photographs that generated the most talk was one that showed learners three different images of a pine cone to illustrate what a cone looks like before, during, and after its seeds are released. By comparing the image on the app, the families could talk about the specimens on-site with each other and the naturalist, in a more conceptually sophisticated manner.

Use Mobile Computer Content and Prompts from the Naturalist to Scaffold Connections Between On-Site Observations and Scientific Concepts That Explain and Represent Them

While the second strategy simplifies the scientific information to allow learners to focus on what is important, the third strategy supports learners to connect their observation to relevant conceptual information. The third design guideline related to informal mobile learning environments that we incorporated into the *Tree Investigators II* design was to scaffold learners to make explicit connections between what they observe and the broader ecological concepts. One strategy we used to foster conceptual connections was the inclusion of a graphic organizer (Quintana et al., 2004). The learners began their educational program at the Arboretum by starting on an app page that served as a graphic organizer of the tree life cycle (Fig. 8.1). To support conceptual thinking about trees, we used the graphic organizer of the tree life cycle as the main organizational structure for all of the app material. This graphic organizer provided an implied structure to the content flow from seed to seedling to sapling to mature tree and to the seed and snag. This allowed learners to recognize how each step of the life cycle was connected to other steps as well as the whole life cycle.

In order to promote learning in such a way that would lead to a more flexible application of concepts, we also designed activities and mobile app materials to allow for application of concepts across various instances in the Arboretum. For example, learners investigated tree life cycle concepts while looking at two contrasting

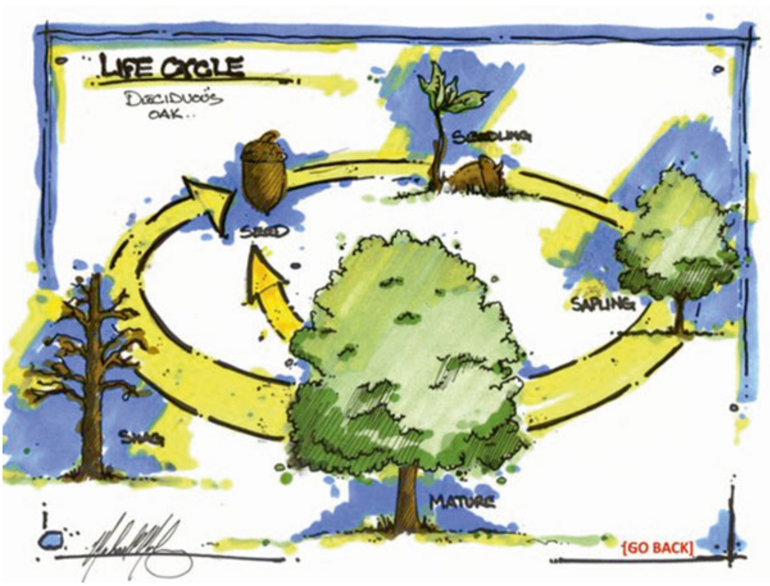

Fig. 8.1 *Tree Investigators II* graphical organizer that organized the concepts of informal mobile learning environment

tree types—an oak tree (broadleaf and deciduous) and a pine tree (needle leaf and conifer). This way, learners explored tree life cycle concepts across examples that looked different from each other at each life cycle stage (e.g., a pine tree grows from seeds within a pine cone and an oak tree grows from seeds within an acorn) but were related conceptually (e.g., both trees grow from seeds).

We also fostered this process of applying concepts to new instances by varying the complexity of the informal setting, by first observing an individual mature tree and then next going to a forested area that contained a variety of tree species and a variety of the same species within life cycle stages. To support the application of these ideas, we designed opportunities for the learners to receive contextualized expert guidance (Linn & Slotta, 2002) to encourage deliberate comparison and explanation with images (Liu et al., 2009) and with text and guiding questions (Yoon et al., 2012). This strategy was enacted via question prompts by the naturalist for learners to make comparisons between the images and text in the app and to the specimens in front of them in the gardens or woods.

Use Digital Photography Attributes of the Mobile Computer to Allow Learners to Articulate and Reflect on Their Observations and Disciplinary Concepts

Our work with open learning environment pedagogy (Land, Hannafin, & Oliver, 2013; Land et al., 2013) highlights the importance of creating learner-centered experiences, where learners construct technological artifacts that they personalize to represent their understanding. This literature suggests that it is important for learners to reflect on what they are learning, especially when they are engaging multiple investigations or resources (Land & Zembal-Saul, 2003).

We used these perspectives to enact the fourth design guideline for informal mobile learning environments by supporting learners to use the photographic capabilities of the iPads to capture and annotate learner-created collage artifacts (Fig. 8.2) that made their thinking visible (Land et al., 2013). Learners were asked to use the iPad to take photographs of five different phases of the tree cycle (seed, seedling, sapling, mature, and snag). By doing so, learners applied what they learned through guided interactions and discussed it within their family as they selected image for their own tree life cycle.

Support All Family Members, Not Just Parents, to Engage as Epistemic Agents

Finally, last design guideline for informal mobile learning environments is at the level of the selection of language complexity and the inclusion of multiple visual elements (instead of text, when applicable). This design guideline is meant to allow

Fig. 8.2 Example photo-collage artifact created by a participant in a Tree Investigators II study

all participants—regardless of age and reading ability—to engage as capable knowledge-building agents in the area of tree life cycle concepts. Prior work in informal learning settings (Crowley & Jacobs 2002; Zimmerman et al., 2008, 2010) has shown that children, not just parents, can have high levels of interest and expertise about the science topics explored together. Families also have been shown to engage in mutual knowledge building with various family members supporting each other (Palmquist & Crowley, 2007; Zimmerman, McClain, et al., 2013).

We built on these findings of shared epistemic agency through design choices that allowed both parents and children to have access to the scientific content. Specifically, we included realistic photographs that focus on key scientific features along with hand-drawn conceptual elements that created visualizations of the relationships between the ecological cycles' content and learners' observations of the Arboretum setting. When text coincided with the image, the research team limited the text to two to three short sentences. This ensured that materials were written at a third-grade reading level as measured by the Flesch–Kincaid score so that the upper elementary and middle-school children could read the information (third grade is between 8 and 9 years old in the USA).

Conclusion

Through the paper, we have presented design guidelines that can be implemented in designing an informal, outdoor learning environment. Five design principles were discussed: (1) Design a learning environment, not a stand-alone technology; (2) use mobile computer content and prompts from the naturalist to amplify observations to see the disciplinary aspects of an informal setting; (3) use mobile computer content and prompts from the naturalist to scaffold connections between on-site observations and scientific concepts that explain and represent them; (4) use digital photography attributes of the mobile computer to allow learners to articulate and reflect on their observations and disciplinary concepts; and (5) support all family members, not just the parents, to engage as epistemic agents. Our preliminary design-based research studies have provided initial support for these design considerations (Zimmerman, Land, et al., 2013, Zimmerman et al., 2014). Our future research and design efforts seek to gain more insights into how specific synergistic scaffolds—across components of the informal mobile learning environment—best support making scientific observations and explanations in outdoor learning settings.

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Chapter 9
Which Comes First, the Chicken or the Egg: Rebalancing the Focus of Design and Technology in Senior Secondary Schools in Botswana

Victor Ruele and Chinandu Mwendapole

Introduction

This paper is organised as follows: First we provide the background and context to the Design and Technology education in Botswana, the structure and content of the Botswana General Certificate of Secondary Education (BGCSE) D&T curriculum. In the discussion section, we analyse the content of BGCSE Design and Technology syllabus as it is currently offered in schools. Our analysis will focus on the proportion of the design content over the technological content. The issue of curriculum content is pertinent to on-going debates about how education systems should be used as driving forces for the production of the workforce for 'new' economies. Finally we conclude by providing our insights and recommendations in terms of how the current Design and Technology curriculum could be realigned to Botswana's vision of economic diversification. This paper is premised on the notion that in order to strengthen and consolidate national efforts towards building a strong skilled human resource base for the future, there is a need to determine the status and direction of technology education within the whole education system.

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Background and Context to the Design and Technology Education in Botswana

World trends such as globalisation and technological developments tend to influence curriculum development in many countries. For example, the widespread use of Information and Communications Technologies (ICT) in the world of work has inevitably necessitated its inclusion in the national curricular of many countries. The rationale countries share is that the forces of globalisation have made us one world and that technology is universal (Lewis, 2000). To respond to these global trends, in 2000 Botswana introduced a locally developed programme for senior secondary schools (17–19-year-olds) known as the BGCSE. This programme included a new Design and Technology (D&T) curriculum. Prior to this, schools had followed D&T through collaboration between the government of Botswana and the University of Cambridge Local Examinations Syndicate (UCLES, England). The new D&T curriculum was developed especially with a vision to enable Botswana 'to move away from the traditional agro-based economy to the more broadly based industrial economy the country which the country was aspiring for' (Revised National Policy on Education (RNPE), 1994). In Botswana, D&T education is taken by both male and female from junior (14–16-year-olds) to senior secondary school.

The Structure and Content of the BGCSE D&T Curriculum

Table 9.1 presents the structure and content of the BGCSE D&T curriculum. The curriculum is organised into six broad topic areas. Each content area has general and specific objectives. The objectives are the benchmarks against which students' performance will be measured. The prescriptive nature of the curriculum typifies a behaviourist model within which this curriculum is constructed.

Table 9.1 Botswana senior secondary school Design and Technology curriculum

Syllabus topic areas	Content areas
1. Health and safety	• Safety precautions and first aid
2. Materials	• Timber: manufactured boards; metals; plastics; optional materials; adhesives; abrasives; fixings; fittings and fixings
3. Communication	• Graphics; information technology (which includes desktop publishing and CAD/CAM)
4. Design	• Design process; marketing; promotion; costing and pricing
5. Technology	• Energy; structures; mechanisms; electronics and pneumatics
6. Tools and processes	• Measuring and marking out; chisels and chiselling; shears and shearing; forming; moulding and casting; turning and milling; joining and fabrication; holdings and assembling tools and finishing materials

As observed in Table 9.1, the curriculum is oversubscribed in materials, tools and processes. The design and ICT are undersubscribed. In view of the authors, the new D&T curriculum is simply a merger of the traditional crafts with some element of designing. The curriculum still retains its former craft, Design and Technology (CDT) status. According to Eggleston (1996), the CDT model originated from England where it was 'seen largely as prevocational training for the growing ranks of manual industrial and domestic workers' (p. 14). Eggleston noted that the CDT model tends to place emphasis on knowledge about materials and the skills required to transform them into fabricated objects (also see Atkinson 1990; de Vries, 1995; Rasinen, 2003). Eggleston noted further that learning activities typically involve making things based on prescribed designs. The CDT influence is not a surprising development as many D&T teachers in Botswana were trained in England and Australia at a time when those countries were still in transition from CDT to Design and Technology education (Ndaba, 1994). So it may be that when this curriculum was being developed, the teachers who themselves were products of the CDT model may have been influenced by philosophies and approaches followed in those countries. Unfortunately one of the challenges of adopting a 'foreign' curriculum is that a philosophy developed for one context cannot be transposed unchanged to meet a totally different need (Ndaba, 1994). This brings to question whether the BGCSE D&T curriculum has lived up to Botswana's vision as outlined in the RNPE (1994). In terms of the teaching and learning, teachers are required to teach all content areas as they are not trained to specialise in any particular content area. Likewise, students are required to study all the content areas as there is no provision for electives.

Compared to the National Curriculum of England or the New South Wales in Australia, where their Design and Technology curricula seem to be more broad-based having some strands or electives, the Botswana one seems to be very limiting as far as students' future career ambitions are concerned. One may be tempted to believe that the curriculum was designed to service a narrow scope of a manufacturing economy which departs from the country's vision and strategic position of moving more towards economic growth and diversification (RNPE, 1994). In view of the fact that Botswana has a very small manufacturing sector, the creation of creative arts strands such as jewellery design, leather works, graphic design, multimedia, textiles and ceramics within the current curriculum would be a great benefit to the country in terms of its vision for economic diversification.

Design Knowledge in Technology Education

Molwane and Mwendapole (2008) note that the concept and model of Design and Technology in Botswana school curriculum was initially adopted from the United Kingdom for senior secondary school level and subsequently rolled out to junior secondary school. The subject at the junior secondary level was offered as one of the core subjects and is intended to provide a vocational orientation of academic subjects related to the world of work and forms part of general education.

According to the authors' view, the body of design knowledge in the Design and Technology subject enables students to widen their learning and understanding scope of the domain that enhances design and making skills in constructing practical outcomes from theoretical knowledge. An example is whereby students are able to translate and interpret drawings and sketches in 2D or 3D forms and create 3D design projects. The authors argue that while students are engaged in the Design and Technology activities, they follow a design process, the product of which is a portfolio and a tangible end product or artefact.

The design processes outline series of stages and phases students should undertake in order to accomplish the desired solution to an identified need. In their view, the designing phase of the Design and Technology domain involves students composing a design context: theme or situation and/or design briefs through modelling solutions and them evaluating these. Furthermore, they write that through this process, the students generate concepts or ideas, conceive, visualise and image these concepts internally in the mind and ultimately translate these into sketches on paper or model them using a range of materials such as cards, paper, found materials and some resistant materials.

Molwane and Mwendapole (2008) feel that in the pursuit of technology education, students are first challenged to discover, create, solve problems and construct solutions by using a variety of tools, machines, computer systems, materials, processes and technological systems. Second, students are exposed to a number of learning experiences that focus on key aspects. Third, students learn how to design by engagement with a process of designing and gain knowledge about concepts and/or situations through the act of designing.

Analysis of the Design Content of the BGCSE D&T Syllabus

In the BGCSE D&T syllabus, design is covered under two main strands—communication and design. The communication strand details what is to be taught and how it should be taught. For example, in plane geometry, students are taught to draw using drawing boards and set squares. The main weakness with this approach is that the variety of communication skills are limited to technical drawing and information technology which precludes the fact that the communication of ideas requires a wide variety of graphical communication techniques and media. Design is organic by nature, and the use of drawing instruments tends to limit students' natural creative ability to explore and express their ideas. For example, doodling and sketching techniques assist in the visualisation or abstraction of ideas. These freehand techniques are important because ideas inspire sketches and sketches trigger ideas. The educational psychologist Kolb (1984) believed that learning is the process whereby knowledge is created through the transformation of experience. Kolb identified concrete learning and abstract learning as opposing yet complimentary and fundamental means for acquiring and acting on knowledge.

In Kolb's model, concrete learning occurs in immediate experiential contact in which there is direct engagement through heuristic manipulation and discovery, followed by reflective observation and judgement. Abstract learning on the other hand involves cognitive mental mechanisms utilising indirect representational cues and symbols in acts of conceptualisation, synthesis and experimentation. In his view, the interactive cycling of concrete and abstract modes forms the basic staging of learning and pedagogy. The conceptual phase of the design process is both a thinking and making activity. Leamnson (1999) observed that making is an activity that engages the whole individual learner by directly engaging them in manipulating materials while continually and simultaneously engaging the mind. Early drawings of ideas also encourage the student to review and refine their ideas. As the design process evolves, the 2D and 3D representation become more detailed.

By not exposing students to different methods of communicating ideas, you hinder their ability to do a number of things. First, you limit their ability to effectively conceptualise and communicate their ideas on paper or using other medium; in other words, you impede rather than promote their process of abstraction. Second, you reduce their confidence and enjoyment of drawing. Third, you limit their freedom of expression and understanding of the different ways of thinking which are applicable for designing.

Missing from the design strand is also any reference to the exploration of the techniques, issues and modes of thinking commonly used when designing. The conceptual or creative phase of the design process begins with process of abstraction, yet students are not offered any lessons on critical and creative thinking skills (brainstorming, mind map, analogies and scamper). Creativity is considered the process of generating new ideas or finding new solutions to existing problems. Thinking is considered the process of thought, and ideas are always the product of mental activity where the mind consciously conceives a thought.

Sparke (1994) suggests that design decisions are constantly being made everywhere whether by designers or consumers. In her view, all design decisions focus on the aesthetic of products whether, in the designer's case, defined as a creative resolution of the joint demands of technology, function and social symbolism case of the public, the fulfilment of the requirements of taste, practicality or social or economic needs. One of the most difficult skills for a design student to learn is the ability to develop a concept for a design, because concepts require a leap from written data or needs to communication of a design (Binggeli, 2007). The design concept phase represents the beginning of the innovative process, and as design concepts emerge, they are shaped by the individual touch or creative expression of the designer.

Discussion

Design is both a thinking and making process because it requires us to identify problems, make decisions on constraints and then engage in reflective thought to test for alternatives. Molwane and Mwendapole (2008) suggested that at junior secondary school, students are taught and nurtured on how to make decisions and choices of materials or processes appropriate for their products and taught how to discriminate between solutions to a need based on a number of design factors: design constraints, costs and other design requirements. Looking at the syllabus of the junior secondary school, the syllabus seems more biassed towards the making process. While making is exploratory, it is also inherently situated in thought. As Harrison (1978) observed, thinking is always a process of thought. In his view, there are two types of thinking processes, implicit and explicit. The implicit thinking process is based on issues such as judgement and choices. The explicit thinking process is based on experience, observation and reflective judgement. According to Binggeli (2007), concept generation is critical to the design process because it provides the designer with necessary tools to picture the qualities of the desired design through the use of words or images.

While creativity requires a certain baseline of intelligence, it also requires domain-relevant skills. Domain relevant skills include a minimum level of factual knowledge and technical proficiency (Nonaka and Teece, 2001). The importance of design as Freeman (1983) observed is that it is not only the domain of creativity where ideas are devised but also where coupling occurs, that is to say, where technical possibilities are connected with market needs. Similarly, Walsh, Roy, Bruce and Potter (1992) also support the idea that design covers a wide range of activities which all include the creative visualisation of concepts, plans and ideas and the production of those ideas, aimed at providing the instructions for making something which did not exist before. Given the potential value of design in the innovation process, we need to recognise that without a creative input, we have no innovation.

Design encompasses many functions: it is a creative, innovative, economic, technological, marketing and cultural process. When students are confronted with a design project, the students will be required to have some factual knowledge and technical proficiency of the domain-relevant skills such as technologies, materials, tools and processes. In their quest to solve a particular design problem, the students will inevitably explore and master a wide range of prescribed materials, processes and tools in their research and the making process. The fact remains, however, that the key core function of design is the ability to convert an idea into information from which a new product can be made. The different strands of the Design and Technology curriculum should be properly integrated to ensure that creativity, communication and innovation are at the forefront of students' learning experience.

Recommendations and Conclusions

The design concept phase provides a guide in establishing the approach to be taken and in determining how to carry out creativity. Design is fast becoming a key component of how countries, individuals and organisations compete on the global market. Kimbell and Perry (2001) suggest that the deliberate and actively interdisciplinary nature of Design and Technology places it at the vanguard of those preparing for employment in the knowledge economy. Though currently limited in its geographical extent, there is an emerging consensus that the knowledge economy is widening the use and value of knowledge or information while dependence on material resources is becoming less important. In the context of a knowledge economy, Kay (1999) argues that the raw material content of a product and its physical characteristics have become less significant in terms of their contribution to overall value. In his view, the competitive advantage in a knowledge economy is derived from the management of knowledge and the addition of this knowledge to what companies produce.

Design and Technology education within Botswana needs to address the complimentary role between making and thinking and the key role of ideas within the innovation process. In order to redress the balance between Design and Technology within junior certificate curriculum, the authors of this paper recommend the following:

- We need to ask ourselves the following questions: Is the prescriptive nature of our curriculum not going to confine the youth to a narrow labour market? Are these skills sufficient to prepare the youth for future career changes and lifestyles and employment? It is sustainable considering the ever-shifting global and domestic labour market demands? If it is within our means, it may be necessary to leapfrog the manufacturing economy and prepare students for the knowledge economy.
- We need to recognise that design is the activity in which ideas and needs are given physical form mutually as solution concepts and then as a specific configuration or arrangement of materials, elements and components. Creativity and innovation are generally recognised as vital to commercial success in the twenty-first century. In order for Botswana to achieve its vision and strategic position of moving more towards economic growth and diversification, the Design and Technology curriculum must engender creativity and innovation. Because new products, new services and new manufacturing processes, no less than artistic works or scientific advances have an idea as their origin.
- That there is a need for a curriculum audit that addresses the contribution of the different strands to the innovation process possibly with the end result of developing strategies that engenders creativity, innovation and technical proficiency.
- Curriculum development is reciprocal; therefore, the change agents and relevant stakeholders should be involved in designing and developing a vibrant and appropriate Design and Technology curriculum at junior certificate level.

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Chapter 10
Exploring Teacher Roles and Pupil Outcomes in Technology-Rich Early Literacy Learning

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Background: A Study About Teacher Roles

This study is concerned with three roles for teachers in enabling information and communications technology (ICT)-rich early literacy learning: executor-only, re-designer, and co-designer. The executor-only role involved teachers in implementing ready-to-use ICT-rich early literacy activities. The re-designer role and the co-designer role each involved teachers in designing activities before implementing them. In the re-designer role, teachers collaboratively adapted ready-to-use activities and materials for their current curriculum. In the co-designer role, teachers collaboratively designed completely new learning activities and materials for their classes. The executor-only role requires teachers to invest time and effort in implementation, and the re- and co-designer roles require teachers to invest their time and efforts in collaborative design as well as implementation.

The role differentiation is based on the premise that teachers' involvement in curriculum design can influence curriculum implementation and, in so doing,

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influence pupil learning outcomes. When the use of ICT is planned, structured, and integrated effectively by teachers, an ICT-rich learning environment can contribute to pupil's literacy attainment (Higgins, 2003). Participation by teachers in curriculum design activities, such as engaging in aligning a new curriculum unit with existing curriculum and classroom activities, can contribute to curriculum implementation (Penuel, Fishman, Yamaguchi, & Gallagher, 2007) and to improved student learning outcomes (Fishman, Marx, Best, & Tal, 2003). Also, teacher involvement in curriculum design can create a sense of co-ownership in teachers towards the curriculum (Fullan, 2003). The investments teachers are willing to make in implementing innovating curricula (e.g. as is the case with activities for ICT-rich learning) are particularly influenced by their perceptions concerning three elements of curriculum practicality: the effort required and the benefits gained, i.e. cost-benefit ratio; how well innovation is specified, i.e. instrumentality; and alignment with classroom needs, i.e. congruence (Doyle & Ponder, 1978). Also, teacher perceptions about teaching/learning, ICT, and subject matter can influence implementation of ICT-rich curricula (Niess, 2005; Tondeur, Valcke, & van Braak, 2008).

Several assumptions underlie the study about teacher roles in the design and implementation of ICT-rich learning activities. First, an active role in design of ICT-rich learning activities positively influences classroom implementation. Second, teacher perceptions about teaching/learning, ICT, and early literacy influence implementation of ICT-rich learning activities. Third, curriculum implementation influences pupil learning outcomes.

Teacher involvement in curriculum development can foster curriculum implementation (Carl, 2005; Fullan, 2003). Specifically, teachers participating in designing together curricular activities (e.g. opportunities for classroom activities) can contribute to improved classroom practice (Garet, Porter, Desimone, Birman, & Yoon, 2001). Yet such work can be conducted in many ways. Teacher involvement in curriculum design can take various forms, necessitating different tasks and effort while creating and using activities and materials. Different forms of teacher involvement in curriculum design can have a differential impact on teachers' sense of co-ownership, perceptions about the practicality of curriculum activities, and curriculum implementation and attainment. The problem underlying this study is the need for understanding various forms of teacher involvement in designing ICT-rich learning activities and how they contribute to implementation of ICT-rich learning and pupil learning outcomes. This study focuses on forms of active involvement in curriculum design (roles) and the question of whether a particular one is optimal for teachers and pupils.

Specific forms of active involvement during design are shaped by the aforementioned teacher roles (executor-only, re-designer, co-designer). These roles, together with teacher perceptions, are likely to influence how teachers integrate ICT-rich learning in their classrooms. In this study, teachers in each role used on- and off-computer activities for early literacy, called PictoPal. For this study, effectiveness of ICT-rich learning environment (ICT-rich learning activities PictoPal) is defined in terms of pupil learning outcomes. With the aim of discovering the comparative benefits and drawbacks of each role, the study examined teacher perceptions, classroom implementation, and pupil learning outcomes in and across each role. The research question guiding the study was:

> *Which teacher role (executor-only, re-designer, or co-designer) contributes most to the effectiveness of an ICT-rich learning environment for early literacy?*

The research question was addressed in four sub-studies. Three sub-studies focused on a particular teacher role (executor-only, re-designer, or co-designer), and one cross-case sub-study focused on the comparative differences across the three teacher roles. Taken together, this study examines the impact of teacher roles on implementation of ICT-rich activities and pupil learning outcomes in the context of early literacy learning.

Contextualizing the Study

Early Literacy Development of Young Children

The importance of early literacy has been long established by research and endorsed by experts. Literacy skills involve the ability to communicate by means of reading and writing (Verhoeven & Aarnoutse, 1999). Children need literacy skills to successfully participate in their educational careers and society. In the Netherlands, primary school education promotes literacy acquisition in children aged 4–12 years. During the first 2 years of Dutch primary education, 4–6-year-olds develop early literacy skills. Early literacy refers to development of oral language (speaking, listening), written language (reading and writing, often in combination with pictures and scribbling), and conceptual skills (Cooper, 1993). The Dutch reference framework identifies four language domains for primary education: (1) verbal language skills: conversation skills, listening, and speaking; (2) reading skills; (3) writing skills; and (4) concepts (Expertisecentrum Nederlands, 2010). Each of these language domains is represented in the national attainment targets for kindergarten literacy: (1) functional reading and writing, (2) functions of written language, (3) relationship between spoken and written language, (4) language awareness, (5) book orientation, (6) technical reading and writing, (7) reading comprehension and writing, (8) story concepts, and (9) alphabetical principle (phoneme-grapheme link).

The formulation of the attainment targets for literacy and language education aims to support teachers in developing their early literacy curricula (Verhoeven & Aarnoutse, 1999). This implies that early literacy curricula should address a broad array of early literacy skills. According to Justice and Pullen (2003), teachers should view early literacy as an integrated package of areas of skills and focus equally on written and oral behaviours in young children, including, for instance, understanding the function and form of print and the relationship between oral and written language. Over-emphasis on one aspect of early literacy skill can limit teachers' views of the broader picture (Elster, 2010). According to McKenney, Bradley, and Boschman (2012), a narrowed view about early literacy may lead to curricula which overemphasize pre-reading skills (e.g. letter-sound linkage and technical reading) and underemphasize writing abilities and conceptual development. According to Snow (2006), the essence of operating literately is not simply the operation of the various components but the process of constructing meaning; she argues that instruction should not focus on the components without linking them to the central purpose. From their observations of early literacy classroom practices, Neuman and Roskos (2005) suggest that generally young children are subjected to a narrow, limited curriculum, for instance, targeted to basic sounds and letter skills. Snow (2006) identified a concern that children at risk are likely to be provided pre-reading skill-focused instruction that fails to emphasize meaning, as a result of a limited view about early literacy. Justice and Pullen (2003) recommend early literacy activities that address both written language and phonological awareness, including meaningful opportunities for knowledge attainment as well as explicit exposure to key concepts. Also, Neuman and Roskos (2005) recommend a supportive learning environment with a wide variety of reading and writing resources that actively build language and conceptual knowledge and instruction that integrates meaningful learning with foundational skills.

Technology Integration

The potential of ICT applications to support early literacy development in children aged 4–6 has been demonstrated through prior research, for example, by storybooks on the computer, which combine multimedia and interactive additions that support aspects of literacy (De Jong & Bus, 2003). When integrated with other activities, ICT has the potential to support children in learning key concepts and the functions of language (McKenney & Voogt, 2009). Segers and Verhoeven (2005) found that language games can stimulate early literacy skills in children; however, because children engage in interacting with peers about their computer use, the authors suggested that the link between computer activities and classroom activities should be considered as a factor influencing pupil's early literacy learning outcomes. Experts agree that teachers should address early literacy in developmentally appropriate ways, integrating technology to support the meaningful learning (International Reading Association, 2009).

Technology integration refers to incorporating technology in meaningful and authentic ways into the curriculum and day-to-day practices to support early literacy development of young children (McManis & Gunnewig, 2012). Nowadays, technology is present in everyday lives of young children. For instance, youngsters now regularly observe someone produce an on-screen text to convey a message for a communicative purpose. Technology-integrated activities in early literacy development can prepare children for using technology as a communication tool, for instance, by writing with technology (Merchant, 2007). Niederhauser and Lindstrom (2006) found that technology-using kindergarten teachers perceive interactive activities with technology as a communication tool to yield good or successful implementation.

Primary schools have invested in applications of ICT, such as computers and educational software, for teachers and pupils to promote effectiveness of teaching and pupil learning outcomes (Higgins, 2003). Research shows that ICT integration into existing classroom practice by teachers is challenging (Turbill, 2001) and that teachers struggle to use computers in their classrooms effectively (Gimbert & Cristol, 2004; Merchant, 2007). According to Merchant (2007), little research answers teachers' questions on how to integrate ICT as a tool effectively. Technology-rich activities can be effective in kindergarten classes, only if teachers use technology in developmentally appropriate ways, offering pupils engagement that is fitting in terms of age, culture, and individual needs (Parette, Quesenberry, & Blum, 2010). While technology integration offers multiple opportunities to address a wide range of early literacy learning goals, doing so places high demands on teachers.

PictoPal

Through integrated computer and classroom activities, children can learn the functions of written language in meaningful ways. PictoPal refers to ICT-rich on- and off-computer activities for early literacy. PictoPal consists of eight on- and off-computer activities and focuses on supporting four national interim attainment target goals for early literacy: (1) functional reading and writing, (2) functions of written language, (3) relationship between spoken and written language, and (4) linguistic awareness. An example of a PictoPal on-computer activity is that children compose and print a list of ingredients using software featuring written and spoken words and pictograms. Off-computer children then engage in a play activity to 'buy' the ingredients listed on the printed page (e.g. in the store corner of the classroom) in order to cook a dinner (e.g. in the kitchen area of the classroom). Figure 10.1 shows an example of an on-and off-computer activity in which children engage in writing a recipe and then following it.

Fig. 10.1 On-computer activity: writing a recipe (*left*), off-computer activity: using the recipe to cook (*right*)

In using PictoPal, teachers focus on integrating activities to convey the purposes of language in a meaningful way and engage children in exploring the functions of written language themselves. In this way, teachers actively address interim goals concerning the functions of language. When teachers implement PictoPal on- and off-computer activities in integrated fashion, PictoPal can stimulate early literacy development in children and contribute to reaching the interim goals (McKenney & Voogt, 2009). Greater effects on pupil learning outcomes were found when teachers implemented PictoPal on-computer activities together with other activities than when teachers implemented PictoPal on-computer activities only (Verseput, 2008). The three teacher roles (executor-only, re-designer, co-designer) aim to support pupils' early literacy development by stimulating teachers in the integration of on- and off-computer learning activities.

Theoretical Framework

Teacher Involvement in Curriculum Design

Development of early literacy can be supported through technology-integrated curricula, yet the overall influence of technology on children's literacy development is determined by the teacher (Labbo & Reinking, 2003). It is the teachers who embrace, resist, or try-out technology as a tool to support teaching and learning. Also, to successfully implement ICT-rich activities, teachers need to understand how to use teaching strategies with technology and why technology is important to young children and also show ability to use the technology and apply it in the classroom (Parette et al., 2010).

In the present study, an active role of teachers in designing ICT-rich learning activities is assumed to positively influence classroom implementation. Successful curriculum implementation further implies teachers to be actively involved in collaborative curriculum development (Carl, 2009). This section discusses key issues related to engaging teachers in collaborative curriculum design.

First, active participation in collaborative development of learning activities and materials can foster understanding of the curriculum (Crow & Pounder, 2000) and create a sense of co-ownership amongst participants (Fullan, 2003). Teacher involvement in collaborative design of curriculum materials can foster implementation of technology-integrated curricula as well. Penuel, Fishman, et al. (2007) found that teacher engagement in planning for implementation was significant for promoting implementation. Teachers need to be informed enactors of ICT-integrated curricula in order to implement curricula successfully. Collaborative curriculum development by teachers should feature hands-on opportunities and examples of technology-integrated lessons to support teachers to successfully integrate technology (Keengwe & Onchwari, 2009). Collaboration in teams and subsequent continuous support in early stages of implementation could help teachers understand to effectively implement curriculum materials in the classrooms (Parette et al., 2010).

Second, co-ownership towards a new curriculum is considered an important factor for curriculum implementation because it seems to drive curriculum use and sustained curriculum change/reform (Fullan, 2011). According to Carl (2005, 2009), the teacher role as implementer of a curriculum, developed by curriculum specialists, is detrimental to the teacher experience of taking ownership of a curriculum. Through involvement in curriculum development, teachers may experience ownership of the developed curriculum (Carl, 2009; Fullan, 2003; Kirk & MacDonald, 2001). Teachers' commitment, which can be seen as an indicator of teachers' sense of ownership towards new curriculum, has been shown to significantly account for variance in the degree of curriculum use in the context of innovative curricula (Abrami, Poulsen, & Chambers, 2004).

Third, curriculum practicality is an important factor in determining if teachers will implement an innovation. Involvement in design could influence teacher perceptions of practicality of the design, which in turn could influence curriculum implementation. Curriculum practicality involves three aspects: (1) how well a curriculum is specified, (2) how congruent a curriculum is with classroom, and (3) the ratio of effort required to benefits gained (Doyle & Ponder, 1978). This stance has also been corroborated through recent studies. Teachers' perceptions of costs, successful implementation, and the value of a curriculum determine for a part the actual curriculum use (Abrami et al., 2004). Also, a fit with existing classroom practice can be of influence on effective implementation (Abrami et al., 2004). De Grove, Bourgonjon, and van Looy (2012) found that teacher perceptions of technology fitting the current curriculum are linked with teacher perceived intention to use technology. Teachers weigh off their investment in curriculum innovation in relation to the potential and actual benefits gained from it (Doyle & Ponder, 1978). When involving teachers in implementation of innovative curricula, teachers are often faced with considerations about how feasible a curriculum is to implement in their classrooms. To conclude, teacher involvement in curriculum design is assumed to be positively related to successful implementation of technology-integrated curriculum materials. In case of ICT-rich activities for early literacy, successful implementation refers to integration of on- and off-computer learning activities to support early literacy learning.

Teacher involvement during design could presumably be affected by teacher perceptions about their roles. Teachers who are able to adopt a particular role could be expected to perform well in that role. One's knowledge of the nature of a role in a team and the situation when a particular role should be adopted is related to team member performance (Mumford, van Iddekinge, Morgeson, & Campion, 2008). The following section addresses additional teacher perceptions that could influence design and implementation.

Teacher Perceptions Influence Implementation

Teacher perceptions about teaching/learning, ICT, and early literacy are assumed in this study to influence curriculum implementation. Teacher perceptions are defined in this study as perspectives, experiences, and personal feelings of teachers. Several studies showed that teachers' views on teaching/learning and ICT influence the way ICT-rich curricula are implemented (Niess, 2005; Tondeur et al., 2008). Positive teacher perceptions of technology's influence on student achievement and classroom activities relate positively to technology integration (Inan & Lowther, 2010). What teachers perceive as appropriate for early literacy development in children may affect early literacy instruction (Neuman & Roskos, 2005). In case of ICT-rich activities for early literacy, the views teachers hold about technology, teaching/learning, and the content of early literacy may affect how they implement technology-integrated activities for early literacy. It is plausible that teacher perceptions about teaching/learning, ICT, and early literacy also affect how ICT-integrated activities are designed. Consequently, designing activities can be positively or negatively shaped by perceptions teachers hold about teaching, learning, technology, and early literacy.

Implementation and Pupil Learning Outcomes

Pupil learning outcomes are commonly used as an indicator of effectiveness of a curriculum (Fishman et al., 2003). How teachers implement a curriculum influences pupil learning (Landry, Swank, Anthony, & Assel, 2011), and both the quantity of activities and the quality of implementation may explain pupil learning differences (Landry et al., 2011). The link between implementation of technology-integrated curricula and student learning outcomes is not always straightforward. Cheung and Slavin (2012) explored studies about implementation of ICT-rich literacy curricula and pupil learning outcomes. They reported that poor implementation ratings were related to no effects in pupil outcomes; studies with medium and high implementation ratings were related to significant positive effects on pupil outcomes. However, Cheung and Slavin (2012) caution against attributing poor effects on pupil outcomes to poor implementation, because authors of these studies would be likely to ascribe no effects to poor implementation.

In studies involving teachers in curriculum development, varying results have been found with regard to the effects of implementation on pupil learning outcomes. A study of Lowther, Inan, Ross, and Strahl (2012) showed no significant differences in achievement between students whose teachers were involved in a programme on how to use technology and implementation of technology integration and controls (teachers not involved). But, a study of Landry et al. (2011) involving teachers in implementation of a research-based curriculum accompanied with professional development activities showed improvement in children's early literacy skills. Also, a study of Block, Campbell, Ninon, Williams, and Helgert (2007) involving teachers in a programme on how to use technology found positive effects on pupil early literacy outcomes.

Based on these findings, the connection between curriculum implementation and pupil learning outcomes is not so straightforward. Apparently, a clear notion of what implementation entails is necessary to better understand the relationship. This study explores how teacher roles in design and implementation contribute to effectiveness of ICT-rich activities (pupil learning outcomes). For this study, effectiveness of PictoPal (the specific ICT-rich learning activities) is defined in terms of pupil learning outcomes. Effective implementation of ICT-rich activities and materials is thus viewed as a necessary condition for positively affecting pupils' early literacy learning outcomes, though it does not guarantee positive results.

Teacher Roles in Curriculum Design and Implementation

As previously mentioned, this study involves teachers in three different roles, executor-only, re-designer, and co-designer of PictoPal, and sets out to examine the effects of each role on the implementation of PictoPal and resulting pupil learning. In this section, each role is defined and justified.

The executor-only role involves teachers in implementing ready-made ICT-rich early literacy learning activities. The role of executor-only is a role teachers (most) commonly take, when they enact curricula designed by others (e.g. as in textbooks). Remillard (1999) showed that teachers engage in planning and fine-tuning activities according to the views teachers hold about teaching and learning in their classes. While not active in design, the role of executor-only does require that individual teachers engage in planning for implementation as well as actual implementation.

The re-designer role involves teams of teachers in a purposeful act of adjusting ICT-rich activities and materials, to align with (and/or replace) the current curriculum used in their classes. Also, the re-designer role involves teachers in subsequent implementation. Re-designing ICT-rich learning activities in a team allows for sharing understanding of what must be revised, based on what teachers view important and feasible in their classes. The re-designer role for teachers implies that participation in re-design is assumed to positively affect implementation. This is because the collaborative re-design could create teacher understanding and co-ownership while also enhancing teachers' perceptions about curriculum practicality and their role.

The co-designer role involves teams of teachers in designing and implementing ICT-rich activities for early literacy. According to Penuel, Roschelle, and Shechtman (2007), co-design engages teachers in considering how materials fit their actual classrooms. The role as co-designer enables teachers to reflect on classroom relevance and create opportunities for success (Kenny & McDaniel, 2011). In this role, teachers can explore new curriculum materials by creating technology-supported learning experiences for their pupils and planning for implementation together with their colleagues (Keengwe & Onchwari, 2009). Co-design engages teachers in formulating goals and decision-making (Penuel, Roschelle, et al., 2007). As with re-design, co-design can foster understanding, co-ownership in teachers, curriculum practicality perceptions, and explication of their role, all of which could support the actual use of the resulting materials. The main aim of this study is to demonstrate differential effects on curriculum implementation and on pupils' learning outcomes given varied roles during teacher involvement in designing ICT-rich materials and activities for early literacy.

The Research Approach

Teacher Roles and Learning Outcomes: Operational Definition

In this study, implementation of PictoPal refers to integrating a series of eight on- and off-computer activities (further referred to as PictoPal activities) in the classroom. The role in which a teacher engages in implementing a series of ready-made PictoPal activities is referred here to as executor-only role. In the re-designer role, a teacher is part of a team of teachers re-designing existing PictoPal activities to fit their current curriculum and engages in implementation of the re-designed activities. Co-designing engages teachers in collaborative design of new PictoPal activities, fitting their current curriculum as well as implementing the activities.

Pupil learning outcomes in this study refer to specific early literacy learning outcomes. Pupil learning outcomes indicate effectiveness of the PictoPal activities as implemented by teachers in three different roles.

Research Questions

The present study aimed to understand how each role influences implementation of PictoPal activities and subsequent pupil learning outcomes. In the long run, the findings from this study can help understand how teachers might ideally be supported in technology integration in kindergarten classes in general; and specifically, the findings will help to provide teachers with appropriate materials, opportunities, and support for the implementation of PictoPal. The main research question was: *Which teacher role (executor-only, re-designer, or co-designer) contributes most to the effectiveness of an ICT-rich learning environment for early literacy?*

The main research question encompasses the comparative benefits and drawbacks of the teacher roles for the effectiveness of ICT-rich learning activities in the context of PictoPal. Effectiveness of ICT-rich learning activities was defined in terms of pupil learning outcomes. To answer the main research question, four sub-studies were performed. In each of the first three studies, one teacher role was examined through teacher perceptions, integration of on- and off-computer activities, and pupil learning outcomes. The fourth sub-study focused on comparing the three teacher roles with respect to teacher perceptions, integration, and pupil learning to understand the value of each teacher role for the effectiveness of ICT-rich activities for early literacy.

The research questions of the four sub-studies were, respectively:

1. *How do teacher perceptions of teaching/learning, technology, and innovation impact integration of a technology-rich curriculum for emergent literacy, and in turn, how does teacher technology integration of the curriculum impact pupil learning?*
2. *What does teacher involvement in re-designing technology-integrated activities imply for implementation and learning outcomes?*

3. *When teachers are involved in co-designing technology-integrated activities, what does that imply for curriculum implementation and pupil learning outcomes?*
4. *Which teacher role (executor-only, re-designer, and co-designer) contributes most to the effectiveness of technology-rich learning activities for early literacy and why?*

Research Methodology

A case study approach, defined as empirical inquiry for investigating phenomena in real-life contexts (Yin, 2003), was applied in the four sub-studies. A case study approach was regarded as suitable for examining three different teacher roles in their actual classroom practice. Each teacher role was studied in a separate sub-study. In three sub-studies each focusing on a particular teacher role, a classroom with a teacher formed a separate case. In these sub-studies, a within-case analysis was used to represent each case separately, followed by a cross-case analysis to compare cases with regard to a common set of measures. A fourth sub-study was conducted to compare three teacher roles. In this sub-study, teachers with a particular teacher role were regarded as a case. A cross-case analysis was used to compare three different cases with each other on a common set of measures. Within each sub-study, mixed methods were used.

In the first three sub-studies, original data were collected; the fourth sub-study used purposefully sampled data from the first three sub-studies. Teachers were interviewed about their perceptions with regard to teaching/learning, ICT, early literacy, their role in design (second and third studies), ownership, and curriculum practicality. Also, teachers were interviewed about their team (second and third sub-studies). Integration was observed in each classroom of participating teachers. Pupil early literacy learning outcomes were examined before and after implementation of PictoPal activities. For examining teacher perceptions, a teacher formed the unit of analysis. A classroom with a teacher formed the unit of analysis for examining technology integration and pupil learning outcomes. And when examining teacher team perceptions (second and third sub-studies), a team formed the unit of analysis. The first stub-study (executor-only) had four cases. The second sub-study (re-designer) had five cases. The third sub-study (co-designer) had three cases.

In the fourth sub-study, a multiple case study was used (Yin, 2003) with three teacher roles (executor-only, re-designer, and co-designer) as separate cases. A cross-case analysis was employed to compare the three cases, which had previously been investigated in independent research studies (Miles & Huberman, 1994; Yin, 2003). The following criteria were used to assign subjects to one of the three cases: (1) no experience with design and implementation of PictoPal, (2) same timing of implementation, and (3) same types of implemented activities. A case (teacher role) formed the unit of analysis. The teacher roles as cases were compared on the following set of measures: teacher perceptions about their role, curriculum practicality, co-ownership, integration, and pupil learning. Data from the cases were analysed using data displays and by identifying similarities and differences across cases. Quantitative techniques were used to analyse integration data and pupil learning data across cases.

Findings

Sub-study 1: Teacher Role Executor-Only

The first sub-study aimed to better understand the factors that influence integration of ICT-rich activities and the potential connection between integration and pupil learning outcomes given the executor-only role. The sub-study examined how teachers provided with ready-to-use PictoPal materials and activities perceive teaching/learning, technology, and innovation in addition to how they integrate on- and off-computer activities. Also, pupil learning outcomes were examined in a quasi-experimental design in two junior and two senior kindergarten classrooms.

The findings revealed that a high extent of integration was linked to a developmental approach to teaching/learning (e.g. helping pupils to construct meaning); positive attitudes towards technology and PictoPal; teacher confidence about implementation; perceiving PictoPal being congruent with pupils' skills; and investment of effort in implementation. A medium extent of integration was linked to a facilitative approach to teaching/learning (e.g. providing children with the tasks to elicit autonomous activity) and investment of effort in implementation. A low extent of integration was linked to a facilitative approach to teaching/learning and concerns about technology. The experimental group significantly outperformed the control group, with medium effect size for the proportion of variance explained by PictoPal and a large effect size for the learning gain. Significant differences were revealed between the junior classes and one of the senior classes, with a medium effect size for the proportion of variance explained by class. In all four classes using PictoPal, large effect sizes were found for the learning gains.

The findings imply that a developmental approach to teaching and learning, positive perceptions about technology, and PictoPal are linked to a high extent of integration. However, they do not suggest that a significantly higher extent of on- and off-computer activities is linked to significantly higher pupil learning outcomes. Further details about this sub-study are available in Cviko, McKenney, and Voogt (2012).

Sub-study 2: Teacher Role Re-designer

The second sub-study aimed to gain a better understanding of what involvement of teachers in the re-design of ICT-rich activities implies for implementation and pupil learning. Two case studies were performed involving a total of six teachers in re-designing, whereby five of them implemented PictoPal in three junior and two senior kindergarten classrooms. The study examined teacher perceptions about collaborative re-design, their role, co-ownership, and curriculum practicality and integration of on- and off-computer activities. Pupil learning outcomes were studied in a quasi-experimental design.

Findings showed no difference in the extent of integration of on- and off-computer activities between the five teachers. Findings on pupil learning outcomes showed that the experimental groups significantly outperformed the control groups, with medium effect sizes for the proportion of variance explained by PictoPal. In the experimental groups, the effect sizes for the learning gains were large. Significant between-class differences in pupil learning outcomes were found with medium and large effect sizes for the amount of variance explained by class. Also, medium and large effect sizes were found for the learning gains in the five classrooms.

This study implies that the team members' similar extent of integration is linked to the teachers' positive perceptions about collaborative re-design; positive perceptions about practicality; perceiving the re-designer role as not a regular teacher practice; and a slight sense of co-ownership towards PictoPal. The extent of integration of on- and off-computer activities could not be linked straightforwardly to the significant between-class differences in pupil learning outcomes. Further details about this sub-study are available in Cviko, McKenney, and Voogt (2013).

Sub-study 3: Teacher Role Co-designer

The third sub-study aimed to gain a better understanding of what involvement of teachers in co-design implies for implementation and pupil learning. A case study was performed to investigate the co-designer role for teachers. Five teachers and two intern teachers were involved in two teams that collaboratively designed a new series of PictoPal activities. This study examined teacher perceptions about teaching/learning, technology, and early literacy; their co-design team, their own role, and their practicality; and co-ownership of PictoPal activities. Also, integration of on- and off-computer activities was examined in three classes, along with pupil learning outcomes. A quasi-experimental design was used to study pupil learning outcomes.

Findings showed no differences in the extent of integration of on- and off-computer activities between the three teachers. Findings on pupil learning outcomes showed a difference in outcomes between the experimental and the control groups. Pupils in the experimental group outperformed the pupils in the control group, with a small size for the proportion of variance explained by learning with PictoPal. The effect size for the learning gains in the experimental group was large. There was no significant difference in pupil learning outcomes between the three classes working with co-designed PictoPal. In each of the three classes working with PictoPal, the effect sizes were large for the learning gains.

Teachers involved in co-designing PictoPal activities seem to reach a similar extent of integration of PictoPal activities and similar pupil learning gains in their classes. This sub-study implies that a specific view about teaching/learning (i.e. developmental approach), positive perceptions about technology and curriculum practicality, and a sense of co-ownership can be linked to the similar extent of integration between teachers. Further details about this sub-study are available in Cviko, McKenney, and Voogt (2014a).

Sub-study 4: Cross-Case Study

The fourth sub-study aimed to provide insight into the value of the different teacher roles in designing ICT-rich activities. To investigate comparative benefits and drawbacks of the teacher roles, a cross-case study was performed. Ten participants were selected from the previous studies, with four teachers in the executor-only case, three teachers in the re-designer case, and three teachers in the re-designer case. The variables compared across cases were teacher perceptions about their role, curriculum practicality, and co-ownership; integration of on- and off-computer activities; and pupil learning outcomes.

Findings revealed that teachers in the co-designer and executor-only cases embraced their roles. Co-designer case teachers were more positive about the practicality of PictoPal activities than teachers in both the executor-only and the re-designer cases. Co-designer case teachers perceived a greater sense of co-ownership towards PictoPal than re-designer case teachers.

Significant differences in the extent of integration of on- and off-computer activities were found between the three cases, with a large effect size for the proportion of variance explained by case. The extent of integration was higher in the co-designer case than in the re-designer case. Also, integration was higher in the re-designer case than in the executor-only case. Both teacher role and time of 8 weeks of working with PictoPal were significant predictors for degree of integration.

Pupil learning outcomes were significantly higher in the three cases than in their respective control groups. Large effect sizes for the proportion of variance explained by PictoPal were found for both the executor-only case junior and senior pupil groups, a medium effect size was found for the re-designer case junior pupil group, and a small effect size was found for the co-designer case senior pupil group. In all the three cases, large effect sizes were found for the learning gains, measured as the difference between pre- and post-test.

This study implies that positive perceptions about teacher role, practicality, and co-ownership complement the highest extent of integration. Re-designer and co-designer roles appear to contribute more than the executor-only role to the integration of on- and off-computer activities. Since pupil learning outcomes were significantly enhanced in all cases, all teacher roles contributed to the effectiveness of ICT-rich learning. Further details about this sub-study are available in Cviko, McKenney, and Voogt (2014b).

Conclusion

This study set out to examine teacher roles (executor-only, re-designer, or co-designer) to answer the research question about which one contributes most to effectiveness of an ICT-rich learning environment for early literacy. Based on the four sub-studies about teacher roles, the following answer of the research question can be provided. Each teacher role (executor-only, re-designer, and co-designer) contributes significantly to the effectiveness of ICT-rich early literacy learning activities. Although pupil learning outcomes were presumed to be affected by how teachers in their respective roles integrate (ready-to-use, re-designed, and co-designed) ICT-rich learning activities, this study suggests that across teacher roles, pupil learning outcomes were not straightforwardly related to the extent of integration.

Given the findings of this study, several considerations are worth noting with regard to identifying which teacher role is best suited for the implementation and effectiveness of ICT-rich learning. Though the main research question relied upon pupil learning outcomes, it is not easy to give a straightforward answer. This study concluded that involvement of teachers in design enabled them to fully embrace the products and materials to be implemented. This sense of co-ownership is an important factor; in this study, it yielded high degrees of integration and willingness to extend implementation of PictoPal activities beyond the research context. From this viewpoint, it becomes clear that the co-designer role is best suited for the long-term feasibility of implementing ICT-rich learning activities, despite the smaller effect sizes found in pupil learning outcomes.

One may argue that the executor-only role is best suited for teachers who cannot easily adopt a role in design and who want to improve the pupil learning outcomes in the short term at the cost of ownership and thorough understanding of the curriculum activities. Although teachers in this study expressed that PictoPal can be suitable for children who are able to work with activities independently, the executor-only role may not be best suited for implementation in the long run, because teachers may not fully embrace the PictoPal activities. In other words, the executor-only role can be feasible for those children who are able to use PictoPal without guidance from the teacher. A combination of roles is also possible, whereby teachers design materials for those kindergartners, who require teacher guidance, and use ready-made activities for kindergarteners who can work with the materials independently. This combination is already in place in all of the schools who participated in this study that continued with PictoPal.

A surprising finding in this study was that teachers did not perceive the re-designer role to be a regular practice for teachers. Despite the fact that re-designing was new for these teachers, they viewed it as a learning experience, worth investing their time and effort. Teachers re-designed PictoPal activities to reach their goal of creating activities suited for both junior and senior pupil levels. Even though they did meet this goal (i.e. differentiated materials were realized and both junior and senior kindergartners exhibited significant learning gains), the teachers decided that PictoPal was best suited for those children who can use it without teacher guidance (typically, the more advanced learners). A possible explanation is that the teachers in the role of re-designer as well as teachers in the role of executor-only held a view that children should work and learn as much as possible independently, specifically with on-computer activities. It is possible that the tacit teaching goal and view of these teachers was stimulating independent learning of pupils in kindergarten classes (since these teachers came from the same school, which strongly supported independent learning). It is also possible that teachers felt this way for pragmatic reasons (e.g. that it not feasible to facilitate computer activities while other children in the class are doing different activities). A combination of these explanations seems likely.

Reflections on the Research Methodology

General Approach

Doing research in a kindergarten classroom can be complex, because of complications such as classroom scheduling, technical infrastructure, and teacher time and commitment. The complexity of doing research in practice presents challenges to the research design. For example, pupil populations in the classrooms of the teachers investigated can differ, making it problematic to compare the interventions. Experimental designs in practice contexts may not provide a coherent picture of factors influencing implementation of interventions and pupil learning, because it is impossible to hold certain variables constant (e.g. implementation and pupil classroom experiences), while manipulating others (e.g. teacher roles in design), in order to examine the effects of interventions.

In this study, a case study methodology was considered suitable to investigate what role is the best for a kindergarten teacher regarding technology-rich early literacy learning. Unlike other methods such as some experimental designs or surveys, case studies inherently take the context into consideration (Yin, 2003). A case study approach allowed in-depth investigation of each teacher role.

The findings and conclusions for the implementation and effectiveness of ICT-rich learning activities in the specific context of kindergarten classrooms through a case study can be helpful for extending research in this contexts. Specifically, a well-described case study provides sufficient information for readers to ascertain if and how research findings might be of value in similar contexts. Such information can also help researchers test how widely applicable new findings might be. For example, subsequent studies can investigate if certain predictions hold under a broader range of certain circumstances.

A case study approach allows for the execution of an ecologically valid study. The results of this study were highly relevant for kindergarten early literacy classrooms, because the study was undertaken under natural conditions. The quasi-experimental design used in this study shaped the possibility to examine early literacy outcomes of kindergarteners, making the case study findings more robust.

The Researcher's Role

The role of the researcher in these case studies is important to describe, because the researcher actively participated in the setting in which the study was undertaken and did not only gather data. The researcher in this study was a participant observer, but also facilitated teacher teams and supported them when needed. Researchers can influence study outcomes, because they are present and act in specific ways (e.g. in positive, supportive, and motivating ways) during the research. The researcher's presence may have prompted teachers to answer interview questions in socially desirable ways, or to teach differently when being observed, than they do in daily practice. This is known to be a potential disadvantage of participatory observation which, in this study, could have affected all sub-studies. To mitigate this, triangulation was used (not only observations but also group interviews with teachers) to study the implementation of PictoPal. The results of observations were evaluated together with teachers in each case study. In this way, opportunities were provided for participants to check if observations represented their actual classroom implementation.

Besides introducing bias that might affect the participants, researchers may also be subject to bias. In the process of data gathering, there is a potential danger that a researcher may interpret situations being observed or tested in a particular way, which might not necessarily have been observed as such by others. To minimize the threats related to the role of researcher for research validity and reliability, research assistants were engaged in data gathering and data entry, while for data analysis, critical friends were engaged in reviewing data tabulations and interpretations of data. Disagreements in interpretations between observers and reviewers were discussed until agreement about interpretation was reached. Member checks were undertaken, in which teachers reviewed the data from interviews during evaluations meetings featuring presentation of the research results and interpretations. In this way, teachers also had a role in validating data interpretations.

Reflections on Research Outcomes

The first basic assumption of this study was that involvement of teachers in curriculum design can contribute to curriculum implementation (Fullan, 2003). The second assumption was that teacher perceptions about teaching/learning, early literacy, and technology influence implementation (e.g. Tondeur, Hermans, van Braak, & Valcke, 2008). The third assumption was that curriculum implementation positively influences pupil learning outcomes (Cheung & Slavin, 2012). In this section we reflect on these assumptions, based on the study findings.

Teacher Involvement in Curriculum Design

The first assumption underpinning this study was that involvement of teachers in designing ICT-rich learning activities positively influences implementation of the activities. From this study, it can be concluded that teacher roles in design of ICT-rich learning activities positively influence classroom implementation of on- and off-computer activities. Specifically, the cross-case study revealed that teachers with active roles in design of ICT-rich learning activities (re-designer and co-designer) had a significantly higher extent of integration of on- and off-computer activities, compared to teachers not actively involved in design (executor-only). In line with Penuel, Roschelle, et al. (2007), this study demonstrated that teams of teachers designing activities can be fruitful for actual classroom implementation. The integration during classroom implementation, as demonstrated by teachers in the re-designer and co-designer roles, may have been more aligned with the intentions of the teachers themselves who re- or co-designed PictoPal than in the case of executor-only.

Explanations for these results may be provided by the findings on teacher perceptions about curriculum practicality and co-ownership. Involving teachers in design may induce teachers' commitment because of their input in the design of activities. They may feel valued in contributing their practical insights into the materials their pupils will learn with. This leads to co-ownership, which could motivate teachers to enact the on- and off-computer activities in an integrated manner. Practicality of PictoPal activities and co-ownership towards PictoPal were found to be present in the studies involving re-designers and co-designers. The findings are in line with other studies (De Grove et al., 2012; Wozney, Venkatesh, & Abrami, 2006) suggesting that teachers perceiving a curriculum to fit their current curriculum were likely to implement it successfully.

An active role in design may give teachers an opportunity to see the fit between the activities being designed and their current curriculum, which may contribute to a better understanding of how to implement the designed activities. Also, feeling co-owner of the designed activities may induce motivation and enthusiasm in teachers for implementing the activities, which may contribute to implementation.

Teacher Perceptions Influence Curriculum Implementation

The second assumption in this study was that teacher perceptions about teaching/learning, ICT, and early literacy influence the implementation of ICT-rich learning activities. Specifically, the nature of perceptions about teaching/learning and early literacy can either positively or negatively influence implementation of ICT-rich activities, whereas positive perceptions about technology positively influence implementation.

Based on this study, it can be concluded that a high extent of integration of on- and off-computer activities during implementation is related to a developmentally oriented view of teaching/learning and viewing early literacy as an important domain. The conclusion corroborates the findings of Kim, Kim, Lee, Spector, and DeMeester (2013), who showed that teacher perceptions about teaching and learning were related to their technology integration practices.

Based on this study, it can be concluded that positive perceptions of technology are related to a high extent of integration of on- and off-computer activities during implementation. The conclusion is in line with the study of Hermans, Tondeur, van Braak, and Valcke (2008) which showed that positive attitudes towards technology positively influence classroom implementation concerning technology integration. Engagement of teachers in meaningful experiences with technology integration could positively influence teacher attitudes towards technology integration in their classes. Ertmer and Ottenbreit-Letwich (2010) recommended an approach which emphasizes technology uses that directly align with teachers' existing beliefs. According to the authors, time, small steps, and teacher collaboration are needed for transforming teachers beliefs to be more open for technology integration.

Implementation and Pupil Outcomes

The third assumption in this study was that pupil learning outcomes are affected by how teachers implement a curriculum. In this study, the extent of integration of on- and off-computer activities was investigated as an indicator of classroom implementation. The study demonstrated that high degrees of integration could not be linked straightforwardly to high pupil learning outcomes. This finding does not corroborate to the finding of Cheung and Slavin (2012) who found that studies with high implementation ratings were associated with large effects on pupil learning. In this study, ICT-rich learning activities positively affected pupil learning outcomes. The study demonstrated that pupils showed significantly improved early literacy outcomes compared to their respective control groups. However, in this study, implementation of PictoPal was measured by *how* teachers integrated the on- and off-computer activities, whereas this study did not evaluate the quality of re- and co-designed PictoPal activities, such as the learning difficulty and the learning opportunities of the activities, indicating that there is more to implementation than the extent of integration.

In the executor-only study, significantly different pupil learning outcomes were found in classes of teachers integrating the ready-to-use on- and off-computer activities to significantly different degrees, with no link between higher extent of integration and higher pupil learning outcomes. This could mean that integration does not affect pupil learning outcomes. From the second and the third sub-study, no conclusions can be drawn with regard to how the extent of integration affects pupil learning outcomes. Specifically, teachers in the re-designer role did not differ in the extent of integration, whereas the pupil learning outcomes did differ between their classes. Teachers in the co-designer role did not differ in the extent of integration, and no differences were found in pupil learning outcomes between their classes.

The PictoPal materials produced in each case were extremely similar in structure, difficulty, and style. However, because the vocabulary and content of each set of materials produced did vary, it is possible that the extent of integration was less important than the variation in the content and quality of the PictoPal activities for influencing early literacy outcomes of pupils. The pupil learning outcome findings from the cross-case study support this. Specifically, when comparing senior pupil learning outcomes with their respective control groups, the proportion of variance attributable to learning with PictoPal activities was larger in the executor-only case than in the co-designer case. Yet, the small differences in the effect sizes between the executor-only and co-designer case may not weigh off the benefits of teachers developing a sense of co-ownership, as was the case when teachers had a co-designer role. In the long run, children may benefit more from co- and re-designed materials, because their teachers fully embrace them, and this positively affects implementation.

Recommendations

Based on this study, several recommendations are provided for further research concerning teacher roles in designing ICT-rich materials and learning activities. This study combined case studies in natural settings for studying how teachers design and implement technology-rich materials and activities for early literacy with a quasi-experimental design for investigating pupil learning. Further research could use this combined approach in other educational contexts, benefitting from the rigour of the quasi-experimental design and the ecological validity of the case study.

Although not deemed feasible within the scope of this study, future investigations could pay more explicit attention to the variation in quality of teacher-made curriculum materials as well as the resulting effects on pupil learning outcomes and integration of ICT-rich learning activities. Teacher-designed materials and activities could be reviewed by experts and compared to the ready-made PictoPal activities. If indeed the variety in quality does account for differences in pupil learning outcomes, then exploration into ways of mitigating this variety seems warranted. For example, perhaps language experts could collaborate with teachers during design.

Also, instead of mitigating variation in material content and quality, future research could remove it. For example, teachers in the role of executor-only could be assigned to implement the activities co-designed or re-designed by other teachers. In this way, the key variable of design participation could be changed while the materials are kept constant. The effects on both the extent of integration and pupil learning could be investigated.

Future studies could also explore teacher roles in longitudinal research to examine how these evolve over time and in different phases of their profession. For example, it is plausible that novice and veteran teachers may develop over time differently in their roles which could affect their technology integration. In this respect it could be helpful to know what kind of role likely suits teachers in different stages of their teaching.

With respect to measurement of pupil learning outcomes, future research incorporate differentiated tests, e.g. with difficulty levels for senior pupils and junior pupils. By including items with different difficulty levels, possible ceiling effects could be resolved. Also, when investigating learning outcomes, it should be kept in mind that the learning curve of junior pupils differs from the learning curve in the senior pupil population. For example, it is difficult for a pupil to improve on the post-test if the first time of measurement the pupil scored high. Yet, for pupils who score low on a pretest, it is easier to improve during intervention and score high on a post-test. To resolve this problem, future research should include weighted items in the test measuring learning outcomes in a pre-post design.

Based on this study, it can be recommended that schools wishing to support early literacy development in kindergarteners can benefit from engaging their teachers in collaborative design of ICT-rich activities. Of the various roles teachers may have, co-design may result in highest levels of ownership and therefore longer use of the activities. Co-design of materials and activities enables teachers to explore possibilities of how to connect technology with curricular themes and activities.

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Chapter 11
Innovating How We Teach Collaborative Design Through Studio-Based Pedagogy

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> The Instructional Design and Technology discipline needs to continually review the nature of the instructional design process and ensure our respective graduates and incoming professionals are prepared to effectively design quality instruction. (Sugar, Hoard, Brown, & Daniels, 2012, p. 228)

Over the past decade, a handful of researchers have studied the most important skills for becoming an effective instructional designer (Kenny, Zhang, Schwier, & Campbell, 2014; Lowenthal, Wilson, & Dunlap, 2010; Ritzhaupt, Martin, & Daniels, 2010; Sugar, Brown, Daniels, & Hoard, 2011; Sugar et al., 2012). While nearly all employers indicate the need for specific instructional design skills and knowledge (e.g., ADDIE, ID models), many of the most requested skills are neither technical nor theoretical, but instead include social skills such as creativity, teamwork, and communication. For example, collaboration was the second most requested skill of instructional design job postings in Sugar et al.'s (2012) findings, while communication skills was the third most requested ability. In a Delphi study of instructional designers in higher education, communication and social skills were the first and second most important skills, respectively (Sugar et al., 2011). In this chapter, we discuss how a studio-based approach to instruction may foster such skills.

A second problem often facing instructional design students is that they are rarely taught processes for developing greater creativity in their designs, despite this being a critical skill highly valued as a core competence in today's "innovation economy" (Sawyer, 2006). Smith and Ragan (2004), among others, recognized the need for creativity in instructional design work, arguing "Just as the design of the architect benefits from creativity and imagination, so do the designs of the instructional designer. There is a critical need for imagination and ingenuity in all

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instructional design activities" (p. 4). Speaking more broadly than just instructional design students, McWilliams and Dawson (2008) argued that

> All university graduates … will be performing work that is less focused on routine problem-solving and more focused on new social relationships, novel challenges and the synthesising of 'big picture' scenarios. It is unsurprising therefore that we find a broad consensus among employers about the qualities they are seeking in graduates, with "imagination/creativity" being top of the list. (p. 635)

In particular, higher education students are rarely given formal opportunities to learn how to engage in collaborative creativity, even though Sir Ken Robinson has noted that "most original thinking comes through collaboration and through the stimulation of other people's ideas" (Azzam, 2009, p. 25). Similarly, West (2014) argued that of "particular importance is the need to develop abilities to engage in collaborative creativity. Many of the current problems and challenges graduates will face in society and industry are too large to be faced alone" (p. 55).

One design approach that emphasizes creative ideation is design thinking—a strategy for approaching problems whose solutions are not readily apparent from the outset and that require the integration of knowledge from diverse fields. Design thinking requires designers to define a problem and creatively marry knowledge from different domains through multiple iterations until a viable solution emerges. It has been referenced as a preferred design process in fields such as engineering, architecture, industrial design, and others. Hokanson and Gibbons (2013) recently noted that design thinking has become increasingly widespread across the field of educational technology in its many forms.

In our department, we have been exploring ways to better respond to these two needs—teaching collaborative design thinking and preparing students with authentic experience and skills needed to become effective designers. Our solution has been to engage students in cross-disciplinary, studio-based experiences that encourage them to work in teams to solve the type of open-ended problems they are likely to encounter as practicing instructional designers. Studio-based approaches are becoming increasingly popular across instructional design programs (Boling & Smith, 2010; Cennamo & Brandt, 2012; Clinton & Rieber, 2010; Randall, Johnson, West, & Wiley, 2013). In this chapter we discuss our experiences developing two design studios, one within our department and one that is interdisciplinary across the university, and share the experiences of students, clients, and professors who have engaged students in this process at our university.

Studio-Based Pedagogy in Instructional Design

One example of creating a design-centered approach in instructional design in higher education was Orey and Rieber's series of "studio" courses at the University of Georgia (Orey, Rieber, King, & Matzko, 2000; Rieber, 2000). Rieber suggested that allowing students to work in a design-centered studio is a form of play in that it allows students to entertain and try out different ideas, much like a child might experiment with different configurations in a sandbox. Nelson (2003) suggested that design itself is a problem-solving process, one that all designers must master in order to learn their craft.

Rethinking the classroom as a design studio requires reorganizing the class physically as well as pedagogically. Orey et al. (2000) indicated that studio spaces must provide the materials and opportunities to allow students to prototype different designs and ideas. Reimer, Cennamo, and Douglas (2012) suggested a hybrid method wherein students work on project-based assignments and provide regular critiques of others' work. In fact, one of the tenets of a studio-based design approach appears to be its openness. This openness is encouraged through physical spaces as well as through regularly critiquing each others' work. In Reimer et al.'s hybrid approach, they recommend streamlining "lecture content…to allow more room for modeling, examples, and discussion" (p. 625). Openness through spaces, experimentation, and discussion is what provides the opportunity for students to learn to collaborate, create, and negotiate.

Researchers have identified a few key principles of studio-based pedagogy that help to accomplish these goals of helping students learn and acquire technical and collaboration skills, as well as disciplinary knowledge, in the context of participating in authentic design activities. In the following section, we briefly discuss some of these key principles.

Collaboration. Sawyer (2006) noted that "creativity is deeply social; the most important creative insights typically emerge from collaborative teams and creative circles" (p. 42). Collaboration is particularly important in instructional design. West and Hannafin (2011) studied an instructional design studio and, through an analysis of reflective design journals, interviews, and observations, looked for evidence of various keys to the successful creativity of the students. Collaboration in general and collaborative idea generation in particular were the two most commonly observed themes. In fact 75 % of the new ideas reported by the studio participants were generated through collaboration and discussion.

Collaborative environments prepare instructional designers to communicate with others by providing them with experiences wherein they interact with those from other disciplines. Most teams that include instructional designers also involve professionals trained in other fields, such as the graphic arts, development, and varied content areas. Similarly, Cennamo et al. (2011) found that a key habit in effective studios was that students "collaborate[d] with their peers to both give and receive assistance in obtaining their learning goals" (p. 24). Mamaykina, Candy, and Edmonds (2002) studied corporate and research teams and observed, "participants' success in reaching a common creative vision, brainstorming, exchanging creative ideas and evaluating them depends on the ability of the group to devise a shared language" (p. 97). This shared language can only be developed in the context of collaborative teamwork. Similarly, Gibbons and Rogers (2009) emphasized the importance of design languages for effective team-based design. Each team member brings knowledge of a specific domain to the group. Learning to communicate effectively with that group requires that instructional designers understand the language associated with each speciality area.

Interdisciplinary Perspectives. A key feature of any innovative group is the presence of diverse perspectives—something so critical that Justesen (2004) calls this "innoversity." West (2009) argued that "emphasizing this interdependence and strength in diversity can improve group divergent thinking processes" (p. 320). As an example, Egan (2005) interviewed team leaders from Fortune 500 companies who had been identified as successful in leading creative teams and found that employees with different characteristics and perspectives participating on the same team were key reasons for team success. Amabile (1998) also explained that "you must create mutually supportive groups with a diversity of perspectives and backgrounds. … [when you do] ideas often combine and combust in exciting and useful ways" (p. 82). Or in other words, "unique information and knowledge provided by dissimilar individuals may enable the employee to see new connections between concepts and issues and to approach problems from different directions" (Madjar, 2005, p. 191).

Higher education, unfortunately, has traditionally been a place of disciplinary silos where the diversity from interdisciplinary perspectives is rarely taken advantage of. However, Brandt et al. (2011) argued that studio-based teaching can—and must—break down these silos.

> The studio, as an academic entity must, by design, take into account the larger disciplinary community of practice and seek to provide a studio bridge, a sheltered practice community, where students can learn the norms, practices, and tools use of the larger professional community of practice. … instructors can act as not only facilitators, but can broker students' movement into professional practice. (p. 346)

Not all design studios in higher education take advantage of interdisciplinary teams. However, those that do break down these silos often seen tremendous success. One example is the BYU Center for Animation (CFA), a unique program codirected and co-owned by three colleges: engineering and technology, fine arts and communication, and physical and mathematical sciences. The CFA thrives in breaking down barriers between disciplines, both academic and the barriers between industry and academia (West, Williams, & Williams, 2013), and by combining these diverse disciplines together on a unified project, the CFA has become the most successful animation program in the world, winning 16 student "Emmy's" in 11 years (Crofts, 2014; Mooallem, 2013).

Failure. Creating a design-based experience for students is not always easy (Boling & Smith, 2014). Nelson (2003) noted that the ill-structured nature of design problems means that professors cannot fully plan the curriculum ahead of time. This ambiguity may lead students to "fail" on their projects. Yet, failure in itself should not be seen as a problem. Design studios ought to provide students a safe place to fail. Borrowing from Papert's debugging philosophy, design industry leaders such as David Kelly and James Adams promote an approach wherein learners iteratively test their ideas to approximate workable solutions (Burleson, 2005). The notion of debugging is important in education and one that might benefit learners greatly. Farmer (2014) claims it is an essential skill in programming. In a traditional approach to learning, a student might be led to believe the adage, “success breeds success.” Curiously, programmers expect to fail at some point in their coding. And, by doing so, they succeed. Success comes through dealing effectively with failure. Design-based experiences place students in a position to learn through failure.

One of the ways in which studio-based instruction has fostered learning through failure is through the collaborative offering of peer critiques. Rieber (2000) proposed the idea of “desk crits,” borrowed from architectural studios, wherein students view other students’ work in progress and offer recommendations for improvement. Cennamo et al. (2011) expected students to give and receive feedback on their designs and iteratively incorporate it throughout the process. The purpose of this was to help students “understand that design is an iterative process where tentative design decisions are made and then revised when additional information becomes available” (p. 24). Interestingly, West and Hannafin (2011) found that students not only learned from the critiques they received on their designs but also through the process of critiquing the designs of others. Thus, the goal in most studio-oriented approaches is not only to provide students with opportunities to collaborate on a project but to give and receive feedback to improve their processes.

In summary, studio-based approaches in higher education can provide students with authentic experiences that allow them to develop their design thinking through collaboration, creativity, and failure. Studio programs emphasize the iterative nature of the design process and enable students to learn to negotiate decisions through discussions that often involve interdisciplinary knowledge. In the remainder of this paper, we describe our own efforts to create two different studio-based experiences in higher education and the resulting successes and challenges.

A Tale of Two Studios

IP&T Studio

Currently, the IP&T studio consists of both introductory and advanced courses. Projects in the introductory course are relatively small and can be completed by a team of 3–4 people throughout 8–10 weeks. To provide students with adequate feedback, clients are local and available. While the professor acts as a facilitator throughout the process, practicing instructional designers from local companies act as mentors to each team, providing mid-term feedback on their current designs from a professional perspective. Additionally, students in the advanced course also provide feedback on the introductory course projects. In the advanced course, students work on a larger team for a more-involved project that will typically be adopted by the client soon following the completion of the course. At the end of the semester, students showcase their work in a poster-like presentation style where peers, mentors, clients, and loved ones are invited to view the final prototypes.

The IP&T studio approach at BYU has evolved over time from a project-based approach to teaching instructional design. Initially, students participated in several smaller design challenges, applying theoretical knowledge to authentic problems. While we noted that students were able to see the application of design principles to real-world problems, a small problem-based approach did not offer them the opportunity to develop fully the soft skills we have discussed as the hallmark of a studio-based approach that encourages design thinking. As Nelson (2003) noted, when problems are presented out of fully authentic contexts, "students come to see the content of courses as isolated stages of a process, not as integrated activities within a single process" (p. 40). Thus, we needed to adjust our approach to one wherein problems were more authentically embedded in real-world design.

In 2012 we changed the model to one in which students worked in small teams on a real project for a real client. Establishing a studio in this way has required finding the right projects, finding the right clients, and successfully managing client expectations. We discuss each of these briefly.

Finding the Right Project. The traditional semester is 14–16 weeks long. While this may seem sufficient to teach a particular topic, most authentic instructional design projects require much more than 14 weeks. Furthermore, in an introductory instructional design course, students necessarily need to spend time learning about instructional design theories and models. Thus, we have found that projects need to be of sufficient scope such that they can be accomplished in an 8–10-week time frame. This allows time at the beginning of the semester to introduce theories and models to students and then quickly asking students to apply that knowledge to the problem at hand. Students have completed projects for employee training and development, curriculum planning, software applications, and more. Thus, more important than the context of the project has been managing its scope.

Finding the Right Clients. Initially, the course instructors played the role of client for our students. We reasoned that acting as client, we would be able to provide the regular feedback that students would need to succeed as well as the insight that comes from prior experience as an instructional designer. However, acting as both a client and a project facilitator brings two important roles into conflict. Our goal of providing students an authentic experience was hampered by the fact that students would defer to the professor's judgment on design issues. Also, rather than learning to educate the client on a particular theory or model as rationale for a design decision, students assumed the professor was already familiar with that model. Finally, it is inauthentic to have a client present at all design meetings. Thus, we have found it important to utilize clients external to the class structure. Doing so has not only provided students with a more authentic experience, but we have noted that students are more motivated when the project is for a known entity. Typically, we choose clients from local nonprofit organizations who are local to the program. When the client has not been local (we have had clients from Africa and Hawaii), it can be difficult to arrange meeting times and to regularly contact the client for effective feedback.

Managing Client Expectations. Perhaps most important in a project-based studio approach is to help clients know what they will "get" out of the experience. Earlier, we mentioned the need to allow students to fail in a safe environment. Because of this, it is necessary to pick up projects that are relatively low stakes. However, the project must be important enough to the client that he or she is willing to give sufficient attention and resources. Successful design experiences in our studio tend to occur when the project is one wherein the client is excited about a project that would not have occurred without the help of the students and that has the possibility of actually being used when completed. Typically, we promise clients that students will work in teams to produce a prototype that can provide a template for further development of the project.

Creativity, Innovation, and Design Interdisciplinary Studio

In 2012, a group of interdisciplinary faculty created the Creativity, Innovation, and Design (CID) group. This group meets once a month to share ideas, discuss research partnerships, and give feedback on opportunities for promoting CID on campus. From this faculty group has come collaborative research, interdisciplinary courses, better communication of CID opportunities on campus, and a website (http://innovation.byu.edu) that connects students, faculty, and community partners interested in the areas of CID.

In 2013, this CID faculty group, in collaboration with already existing design centers on campus, began developing courses and projects that would bring together students and faculty from all over campus in developing creative projects that have social betterment goals. The Harold B. Lee Library joined the initiative as a valued partner because the library represented a neutral space not owned by any department and also because the library was exploring opportunities to better serve all kinds of student learning on campus. In Winter 2014, the library offered space for prototyping these interdisciplinary, design-oriented courses. The leadership team developing this initiative chose to adhere to the following key principles in developing this design studio:

1. Courses and projects in the studio needed to be interdisciplinary, preferably with faculty from separate departments and colleges co-teaching and with students from multiple departments participating.
2. The courses needed to be design focused, teaching a process for engaging in creative thinking and problem solving.
3. These courses needed to be taught differently than traditional university courses by emphasizing messy, project-oriented mentoring instead of presentation lecturing.
4. The courses needed to engage the library as a full partner, utilizing library resources and personnel, even possibly as co-teachers and course designers.

In Winter 2014, the first two courses were taught in this library studio. In one course, students from the English, visual arts, and advertising disciplines worked together to write, illustrate, and publish children's books, with the assistance of the education and juvenile literature librarian. In the second course, students from business, advertising, visual arts, and film collaborated with Martin Burt, founder of Fundación Paraguaya, to promote Burt's Poverty Stoplight program. This program creates statistical and visual representations of poverty in Paraguay (Fundacion Paraguaya: Poverty Stoplight, 2014). The data are used to identify how to best help families and can be shared with other nonprofit organizations. Students worked together to create a commercial and documentary for the organization. A small group of students also traveled to Paraguay to meet with Burt, conduct interviews, and collect film footage. An article describing this project can be accessed at http://innovation.byu.edu/students-get-word-out-fundaci%C3%B3n-paraguaya.

In Spring 2014, a third class was taught in this library studio where BYU students collaborated with the University of Maryland, NASA, and the Computer History Museum to develop and promote an alternate reality game (ARG) focused on teaching science principles to teenagers (see http://fallingdust.com). Advertising, visual arts, music, engineering, and computer science majors worked on this project during the Spring 2014 term (see https://www.youtube.com/watch?v=9mOUH1RWoeo for a brief video documentary of this project). Richard West, from our Instructional Psychology and Technology (IP&T) department, taught another course in Fall 2014 to help develop educational artifacts to be included in the game. In Fall 2014, four other courses were taught in this library studio, including an advanced instructional design course taught by Andy Gibbons of the IP&T department. These other courses explored design in business and religious contexts. In addition, a brief "Innovation Boot Camp" (see West, Tateishi, Wright, and Fonoimoana (2012)) was taught in Spring 2014 to students from across campus to introduce design thinking concepts in a one-day workshop.

Early Successes and Continuing Challenges

In the following section, we discuss themes related to the successes and challenges of these studio-based approaches. In terms of success, our studio-based experiences have led to greater collaboration, authenticity, and powerful mentoring opportunities. We have identified these themes through surveys, group and individual interviews, and class observations.

Collaboration

One of the hallmarks of a studio-based approach is the use of projects wherein students work together to solve authentic challenges. An IP&T student noted, "I loved that we were able to work in groups on a real project and that we weren't just doing busy work all the time." Perhaps more important than just working in groups was the opportunity to work across disciplines. CID students reported developing teamwork skills critical to the success of interdisciplinary work. An illustration student explained, "Design-wise I feel like I've been trained to work on a team because of this place, and I think that's one of the most valuable educational experiences I could have here." Many students felt that communication was central to working with this type of team. Students learned to listen more carefully and understand disparate vocabularies. An advertising student explained her experience that "in advertising … we have all been taught the same things, so we have the same vocabulary." However, in the CID courses, advertising students worked closely with engineering and art students who had different vocabularies. The advertising student explained, "It took us a while to get over the different viewpoints and vocabulary." Students found that when they were able to listen more carefully to each other, they benefited from the collaboration.

In addition to understanding their teammates, students learned to explain their own technical knowledge to others. Several engineering students described struggling to explain to their peers what technology "can and cannot do." For example, students were working on a "chat bot," a computer application designed to have a conversation with people. The engineering students collaborated with the students responsible for writing the script. The engineering students needed to explain the technical limitations of the program. This included teaching the writing students basic programming concepts.

CID Studio participants also gained project and team management skills. For many students, these courses were the only exposure they had to project management. Others learned management skills in their regular coursework but benefited from the practical application of these skills. An advertising and management student explained:

> For the first time, education seems a lot more relevant to me because it's the first time I'm actually leading … I was in a class where we talked about how to be a better manager, and all of a sudden what I was reading in the books related to actually how I could interact with people on a daily basis.

Direct experience applying teamwork and management skills gave students a head start on their careers. Several students believed their experiences in the CID Studio would help them "break the learning curve" when they entered their profession.

We do not mean to suggest that all collaboration in these authentic studio-based approaches is successful. Indeed, one of the greatest challenges we have faced is when collaboration breaks down. In one case, the failure of one team member to communicate with another led to multiple tear-filled meetings with the course instructor. Some students expressed frustration that their work is being judged the same as their uncommunicative team member and stated:

> I don't like the fact that I ended up doing most of the work, and my partner doing bad work, and having a bad credit for his lack of commitment and performance.

The entire project being judged the same presents a pedagogical conundrum. While team members may point fingers, the success of the project ultimately is judged as a single product rather than by its members. Some students have aptly noted that, in an actual job, their uncommunicative partner would likely be fired, but that option is not available to a course instructor. Thus studio-based approaches need to find a way to encourage students to participate fully as team members but to also recognize that an authentic project requires authentic accountability. One way we have addressed participation concerns is to require a participation grade and use it as a multiplier to the grade of the final project. If a student and his or her team feel that he or she gave 90–100 % effort on the project, then participation acts as a 1× multiplier for that project (or assignment). Anything less than that reduces that individual student's score.

The other shortcoming in collaboration has occurred between students and clients. Learning to manage client expectations is an important skill that can only be developed in authentic projects. Nonetheless, when a team fails to communicate with the client, it can lead to unmet expectations or disappointment. This disappointment and lack of communication with clients can occur in both directions. Clients who are not sufficiently invested in the project end up shortchanging students on opportunities to collaborate, while students who fail to communicate with clients poorly represent not only themselves but also our degree programs and the viability of studio-based approaches. This frustration was perhaps best communicated through the following post-course comment:

> We maintained contact, but quit trying to get every step approved because the red tape was extremely difficult to work with. I understand that the real world works that way … but in the real world, you are being paid and the clients are paying … so they don't want to waste your time. That was not the case in this project.

Perhaps one of the most important skills a student can learn in a studio-based approach is how to communicate with all those involved in the project. That means communicating with team members and negotiating with clients. As communication goes, so goes the project.

Authenticity

The opportunity to immediately apply research to authentic problems has helped students to appreciate, apply, and develop skills from their own disciplines more deeply. Students have repeatedly commented on their appreciation of this authenticity. A CID student majoring in English described:

> I feel like as an editor I learned things that I wouldn't have learned in my [editing class].
>
> I learned how to work with an author and see what she wants for her book and be able to help her capture her vision … You really get hands-on experience like you would get in an internship, hopefully.

IP&T students appreciated this authenticity in the opportunity to apply theory to practice, as evidenced by the following comments:

> [The course] provided a great, authentic context in which we could learn foundational principles of instructional design.
>
> The class wasn't about the game of how to get an A. It was presented in a way that got me involved in learning and growing. We actually did what we were learning about.

> I think it's brilliant to have us apply everything we do to an authentic situation that actually IS real life (instead of simulating real life), and gives us experience working with a client. (Fall, 2013)
>
> I loved working with an actual client. It really allowed the experience to transcend the traditional classroom experience.

This experience has been evidenced repeatedly across disciplines. Programming students learned new programming languages as well as how to apply their skills to different settings. Likewise, an art student told us, "I learned that a visual style for an expansive project like this one needs to be clearly decided with the audience in mind." It's highly likely that her professors in traditional courses had taught her this information and perhaps even stressed it. However, our experience has been such that, until a student experiences the need in an authentic setting, the principle or concept does not have a great deal of meaning. In our experience, authenticity reinforces theoretical and abstract principles often taught in foundational courses and provides a way for students to understand their importance while still in an educational setting.

In addition to building and reinforcing skills in their own disciplines, the interdisciplinary nature of CID courses exposed students to skills outside their disciplines. In particular, students gained specific skills needed to work effectively in collaborative projects. English students learned the basics of programming when they needed to write a script for the "chat bot," a computer application designed to have a conversation with people. Other students learned about the video making process and advertising briefs. By interacting with team members with diverse skills, student inadvertently began to practice or better understand the skills of their collaborators (an unintended consequence of this model).

While authentic experiences encourage the application and deepening of knowledge, we have found that there needs to be a basic level of knowledge and skills to begin with. Some students did not have the background knowledge and skills to be successful in a studio setting. This created challenges for both these students and the more advanced students. The less-experienced students needed more specific disciplinary guidance than the studio setting could support. Some also lacked the personal management skills needed to succeed in the low-structure environment. Advanced students struggled to trust others to complete high-quality, on-time work. Thus, it may be important to highlight that a studio experience should be directed to upper-level students who have already been trained in a specific discipline.

Mentoring

The importance of mentoring has emerged as a theme in both of studio environments described herein. In some cases, these are intentionally structured so that students have the opportunity to work with professionals or more advanced peers. In other cases, mentoring opportunities have arisen spontaneously out of the natural interactions that occur in the messy context of authentic projects.

In the IP&T courses, professional mentors, who are currently practicing instructional designers or professionals in the design field, have been asked to take the time to provide a review of students' materials or to come and talk to students about their take on a certain aspect of the design and project management process. When we first approached professional instructional designers about providing mentoring-type feedback on student projects, we assumed that only half would agree to the extra work given their own time constraints and busy schedules. To our surprise, not a single mentor that we contacted declined to help. In fact, they were thrilled that we reached out to connect the university with the "real world" of instructional design. As such, we have been able to allow students to get feedback from multiple professionals. One result of this experience has been a better networking of our students with professional colleagues, with the potential to hire students whose work they have witnessed. Another result has been that students have learned that design is not a science, and that different professionals offer different views on the same designs. Overall, though, mentors have expressed pleasant surprise both at students' professionalism and at the products they have created. One mentor, who acted as both a mid-term mentor and as a judge of student projects at the final showcase of the introductory course expressed his surprise at the quality of the final project. He stated:

> While judging the final projects of the instructional design class, I started asking the students about what other courses they had completed in the program to better inform my feedback. To my surprise, they hadn't taken many other courses or were taking them concurrently. I was confused because I thought they would have completed several more by this point in the program. That is when I realized that I was looking at projects from an introductory instructional design class … The relative sophistication of the designs and the attention paid to both theoretical considerations and practical needs exhibited a maturity of thought and craft that I would never have associated with an introductory class.

This type of feedback is especially validating, especially as it came from a mentor who is well regarded and influential within the field of practicing instructional designers.

Similarly, the CID Studio also involved a high level of mentoring. In this space, the instructors emphasized student ownership of the projects, with faculty serving more as consultants and mentors than as lecturers. In a survey given to students at the conclusion of their semester ($n = 94$), students mostly believed their instructors primarily played a mentoring/consulting role in the project (4.17 average rating, on a 1–5 scale). Indicating their instructors treated them "like adults," students frequently mentioned high levels of mentoring on their projects, even to the point that the class felt more like an apprenticeship. For example, the project manager of one project said instructors took her "under their wing" and that although she had worked closely with one of the primary instructors for more than a year, she has gotten to know him much better through the CID course.

In addition to instructors, students received mentoring from librarians who provided advice and expertise. One librarian involved in this studio explained, "I'm able to help [students] understand the inquiry process and how working together in a collaborative environment in this kind of inquiry process works, because that's fundamentally what I'm trained to do as a librarian." Beyond teaching inquiry processes, this librarian also taught the students writing skills and provided expertise on writing juvenile literature, which was the subject of their project. "The thing I like about her is she talked to the class as a whole and also worked with individual groups," one student said. "I know for our group, she helped a lot with the writing and the illustrating and kind of got us to grab a hold of an overall theme for our book."

For a different project creating an alternate reality game to teach scientific concepts to middle schoolers, the students received help from a librarian who was a former schoolteacher, former member of the state department of public health, and a science Ph.D. Another librarian with expertise at NASA, software engineering, and science also assisted. This mentoring provided student a much richer experience than they received in most other courses.

Conclusion

We have found these efforts to use more studio-based pedagogies at our university to be exciting and very beneficial to students' learning as well as our own professional development. However, these successes have not been without challenges. Most of these difficulties have stemmed from the difficulties of applying studio pedagogy within a university setting and are thus similar to challenges of studio programs at other universities (Boling & Smith, 2010; Brandt et al. 2011; Cennamo et al., 2011; Clinton & Rieber, 2010). As discussed above, there are often challenges when some students do not have the background knowledge and skills to be successful in a collaborative studio setting. Some also lacked the personal management skills needed to succeed in the low-structure environment.

A second challenge has been uneven workloads among the various disciplines in the CID Studio. For example, in the children's storybook class, the students responsible for writing and editing completed their portions of the project early in the semester, while the illustration students struggled to complete their work by the end of the course. In another CID course, programming students could not begin coding until design and content portions of the project were complete. This created too much downtime in the beginning of the semester followed by too little time to program at the end.

Many of the largest challenges facing the viability of the CID Studio are related to the restrictive nature of university structures that impede faculty, administrators, and students from engaging in learning that is atypical from the norm. For example, if courses are interdisciplinary, in which department are they listed? If multiple faculty teach the course, which is essential in interdisciplinary work, which faculty member gets the credit for faculty teaching load? Would teaching in this CID Studio in the library count toward tenure and promotion? Even though the projects produced in this studio have been significant in their ability to impact society, because they are not research papers, will faculty receive enough credit for promotion purposes to make it worth their time? And finally, if the CID Studio is truly interdisciplinary, which college on campus owns it, funds it, and makes decisions regarding its governance?

Also, for students, will the courses count toward a student's major degree when they are not in the student's home department? Finally, projects of this nature do not cleanly fit in the box of one-semester, three-credit hours. Instead, it is more typical to have an experience like the alternate reality game project, which began as an NSF-funded project Winter 2014, continued as an actual course during Spring 2014 and Fall 2014, and continued still through Winter 2015 until completion. This makes the project a difficult one to fit into university course credits, even though there is no doubt that the project is a tremendous learning experience for students.

Moving Forward

In an era with frequent calls for radical disruption of higher education, these issues should require us as higher education faculty and administrators to reconsider the viability of many of the traditional structures we have relied on in universities, such as semesters, credit hours, degrees housed in single disciplines, and knowledge-/lecture-dominated instruction. The alternative—more project-oriented, studio-based learning—is messy and difficult to manage, but potentially the best way to support the kind of learning our students need for the twenty-first century. These will also be the kind of on-campus learning experiences we expect students will demand in an educational market saturated with MOOCs, open educational resources and courseware, and online learning.

With institutional change difficult, and slow, how could we as an instructional design community move forward toward more studio-based pedagogies? Following are a few suggestions:

- Departments can begin by building small studios and integrating curriculum within the department into the studio. Alumni and professionals can be tapped as consultants and mentors in the process.
- While university-wide interdisciplinary collaboration is a powerful ideal, we have found that often we have to start small. For example, a collaboration between just two different departments can be beneficial and can demonstrate that a collaborative model can work.
- Engaging university partners helps to situate studios within a university's culture and goals. In the case of the CID Studio, partnering with the library has helped the library to meet its goals of better supporting teaching and learning while giving a shield of legitimacy to the studio's effort.
- Engaging university administrators can help them understand why studio-based pedagogies are important. For example, we led a group of leaders from various colleges on campus of a tour of the Stanford d.School as a way of helping them see another university-based studio in action. Additional tours are planned at other universities. Involving departmental and college leaders early on has helped our department studio to grow.

- These administrative leaders are also important for how they can offer a measure of "protection" for faculty exploring the messy nature of studio-based teaching, because our experience is that it is difficult to be successful the first semester, and setbacks should be expected.
- It is critical, we feel, to identify a space that the studio can own. Studio instructors need to have some flexibility within the space for moving furniture, leaving up sketches on whiteboards, and adapting the space to meet their needs. Ideally, it is beneficial to not have this space be isolated, so that proximity to other students, courses, instructors, and visitors can foster dialogue and creative improvisation.

Brown (2005) pointed out that "As the pace of change in the twenty-first century continues to increase, the world is becoming more interconnected and complex, and the knowledge economy is craving more intellectual property" (para. 1). In this type of society, we agree with Brown that "it is critical that we shift our focus from education to life-long learning" (para. 1). This may push our own competencies to the edge, but it will be worth it, as "It is at the edge that most innovation occurs" (Brown, para. 2).

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West, R. E., Tateishi, I., Wright, G. A., & Fonoimoana, M. (2012). Innovation 101: Promoting undergraduate innovation through a two-day boot camp. *Creativity Research Journal, 24*(2–3), 243–251.

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Part II
Leadership Profiles

Chapter 12
Introduction

Tonia A. Dousay

The purpose of this section is to profile individuals who have made significant contributions to the field of educational media and communication technology. Leaders profiled in the *Educational Media and Technology Yearbook* have typically held prominent offices, composed seminal works, and made significant contributions that influence the contemporary vision of the field. The people profiled in this section have often been directly responsible for mentoring individuals, who have themselves, become recognized for their own contributions to learning, design, and technology.

You are encouraged to nominate individuals to be featured in this section of the Yearbook. The editors of this Yearbook will carefully consider your nomination. Please direct comments, questions, and suggestions about the selection process to Tonia Dousay<tdousay@uwyo.edu> or Rob Branch<rbranch@uga.edu>.

This volume of the *Educational Media and Technology Yearbook* remembers a member of the community who mentored many past and current leaders of the field and recently passed away. The leader profiled this year is:

Jacquelyn “Jackie” Hill

The following people [listed alphabetically] were profiled in earlier volumes of the *Educational Media and Technology Yearbook*:

John C. Belland
Robert K. Branson
James W. Brown
Bob Casey

T.A. Dousay (✉)
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M. Orey, R.M. Branch (eds.), *Educational Media and Technology Yearbook*,
Educational Media and Technology Yearbook 39,
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Betty Collis
Robert E. De Kieffer
Robert M. Diamond
Walter Dick
Philip L. Doughty
Frank Dwyer
Donald P. Ely
James D. Finn
Robert Mills Gagné
Castelle (Cass) G. Gentry
Thomas F. Gilbert
Kent Gustafson
John Hedberg
Robert Heinich
Stanley A. Huffman
Harry Alleyn Johnson
David H. Jonassen
Roger Kaufman
Jerrold E. Kemp
Addie Kinsinger
David R. Krathwohl
Jean E. Lowrie
Wesley Joseph McJulien
M. David Merrill
Michael Molenda
David Michael Moore
Robert M. Morgan
Robert Morris
James Okey
Ronald Oliver
Tjeerd Plomp
Tillman (Tim) James Ragan
W. Michael Reed
Thomas C. Reeves
Rita C. Richey
Paul Saettler
Wilbur Schramm
Charles Francis Schuller
Don Carl Smellie
Glenn Snelbecker
Howard Sullivan
William Travers
Constance Dorothea Weinman
Paul Welliver
Paul Robert Wendt
Ronald Zemke.

Chapter 13
Remembering Jackie Hill

Tonia A. Dousay

Robert Harrel

Jacquelyn "Jackie" Hill (1932–2014) was well known for her kindness and warm spirit, welcoming and accepting everyone she met. Graduating from the University of Georgia in 1954 with a degree in English, Jackie eventually received her teacher certification in elementary education and library science from Georgia State University. Her early career took her to Clayton County (GA) Public Schools, Richmond (VA) Public Schools, and even the Chesterfield County (VA) Library. After receiving her M.Ed. in Education/Instructional Media from Virginia Commonwealth University in 1979, Jackie became the Director of the Learning

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M. Orey, R.M. Branch (eds.), *Educational Media and Technology Yearbook*,
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Resources Center and an Assistant Professor of Educational Media at Paine College. After more than 10 years at Paine, Jackie retired from academics in 1991 but began a new career in industry, transitioning into instructional development for companies such as U.S. Steel, Cleveland Building Trades, and American Greetings. Of course, her heart never left education, and Mrs. Hill eventually returned, finishing out her professional career as the media specialist at Evans High School in Augusta, Georgia. Throughout all of these positions, Jackie maintained a dedication to service and leadership.

A Life of Service and Leadership

It has been said that Mrs. Hill defined leadership and leadership defined her. During her career, Jackie was active at the state, regional, and national levels, serving in leadership roles with the Association for Educational Communications & Technology (AECT), Georgia Association for Instructional Technology (GAIT), and Southeastern Regional Media Leadership Council (SRMLC). Within GAIT, Jackie served on the board of directors, convention program committee, publications committee, nominations committee, and leadership development committee. Most notably, GAIT recognized Jackie's work with a Distinguished Service Award in 1985, and she later went on to serve as chair of the leadership development committee in 1986 followed by president of the organization in 1988. Hill was simultaneously active within AECT during this time, taking on roles with the volunteer committee, evaluation task force, leadership development committee, program planning task force, and membership committee. Jackie served as the AECT annual convention session chair an impressive eight times during 12 years and played a significant role with the Division of Educational Media Management. As if her professional commitments weren't enough, Jackie was always ready and willing to serve her schools and communities. Whether it was participating in the Ford Teacher/Scholar Program, volunteering as executive director of Friends of the PC Library, or serving as president of a local United States Junior Chamber (Jaycees) chapter, Mrs. Hill was happy to lend her time, expertise, and skills.

A Fulbright Visiting Lecturer to India and consultant on multiple grants, Jackie also contributed invaluable scholarly support to the field. Mrs. Hill's leadership in media management and instructional design during a time when educational technology was beginning rapid adoption and expansion is most evident in her many presentations and workshops, including annual faculty equipment training at Paine College and sessions on writing instructional objectives and integrating technology into the classroom. These latter examples served as a foundation for her work in India, where she provided scholarly expertise to the National Institute of Social Work and Social Science and several colleges and universities, including Anna University (Chennai), Baselius College (Kottayam), CMS College (Kottayam), Cochin University of Science and Technology (Kochi), College of

Engineering & Technology (Bhubaneswar), and Madras Christian College (Chennai). Jackie could have been considered an early adopter, possessing a vision and philosophy of media use and management well ahead of many others, and she applied this passion locally and around the world.

Given Hill's demonstrated commitment to service and devotion to the field, it should come as no surprise that she also found great satisfaction in developing intercultural relationships. Much of Jackie's career was spent at Paine College, a private historically black college located in Augusta, Georgia, and she took great pride in leveraging her experience by participating in a Title IV Innovative Program for Faculty Integration, mentoring students to improve retention and graduation rates, and preparing underrepresented students for graduate school. In 1989, the United Negro College Fund (UNCF) honored Mrs. Hill with their Meritorious Service Award. Even outside of the academic environment, Jackie loved working with and hosting international students. In fact, the Hill family hosted students from Canada, Italy, Australia, and Japan over the years.

Much of Jackie Hill's impact on the field of educational technology was informal. She was known for working tirelessly to build a sense of community, promote best practices, and celebrate scholarship. Aside from the many committees and organizations in which she participated, Jackie was always willing to volunteer and help whenever asked. One example of her unconventional approach to support includes leading the effort to create and sell a cookbook to benefit scholarships and awards for rising leaders and scholars of the field. Her nurturing nature and commitment to the field were recognized by AECT in 1987 and 1991 with certificates of appreciation and by the ECT Foundation at the 1998 AECT annual convention in St. Louis, where Jackie received the Diamond Mentor Award. Hill's legacy of leadership and mentoring is still visible today as evident by the quality of and emphasis on leadership development within the field of educational technology.

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Part III
Organizations and Associations in North America

Chapter 14
Introduction

Michael Orey

Part four includes annotated entries for associations and organizations, most of which are headquartered in North America, whose interests are in some manner significant to the fields of learning, design and technology, or library and information science. For the most part, these organizations consist of professionals in the field or agencies that offer services to the educational media community. In an effort to only list active organizations, I deleted all organizations that had not updated their information since 2012. Any readers are encouraged to contact the editors with names of unlisted media-related organizations for investigation and possible inclusion in the 2015 edition.

Information for this section was obtained through e-mail directing each organization to an individual web form through which the updated information could be submitted electronically into a database created by Michael Orey. Although the section editor made every effort to contact and follow up with organization representatives, responding to the annual request for an update was the responsibility of the organization representatives. The editing team would like to thank those respondents who helped assure the currency and accuracy of this section by responding to the request for an update. Figures quoted as dues refer to annual amounts unless stated otherwise. Where dues, membership, and meeting information are not applicable such information is omitted.

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Chapter 15
Worldwide List of Organizations in Learning, Design, Technology, Information, or Libraries

Michael Orey

This information will be used solely to construct a directory of relevant organizations and associations within the *2015 Educational Media & Technology Yearbook*. The data supplied here will **not** be intentionally shared or publicized in any other form. Thank you for your assistance.

Name of Organization or Association—Adaptech Research Network
Acronym—n/a
Address:
Dawson College, 3040 Sherbrooke St. West
Montreal, QC
H3Z 1A4
Canada
Phone Number—514-931-8731 #1546; **Fax Number**—514-931-3567 Attn: Catherine Fichten
Email Contact—catherine.fichten@mcgill.ca; **URL**—http://www.adaptech.org
Leaders—Catherine Fichten, Ph.D., Co-director; Jennison V. Asuncion, M.A., Co-Director; Maria Barile, M.S.W., co-director
Description—Based at Dawson College (Montreal), we are a Canada-wide, grant-funded team, conducting bilingual empirical research into the use of computer, learning, and adaptive technologies by postsecondary students with disabilities. One of our primary interests lies in issues around ensuring that newly emerging instructional technologies are accessible to learners with disabilities.
Membership—Our research team is composed of academics, practitioners, students, consumers, and others interested in the issues of access to technology by students with disabilities in higher education.

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Dues—n/a

Meetings—n/a

Publications—2014 Fichten, C.S., Nguyen, M.N., Amsel, R., Jorgensen, S., Budd, J., Jorgensen, M., Asuncion, J., & Barile, M. (online first). How well does the Theory of Planned Behavior predict graduation among college and university students with disabilities? Social Psychology of Education, doi: 10.1007/s11218-014-9272-8 2014 Swaine, B., Poldma, T., Labbé, D., Barile, M., Fichten, C., Havel, A., Kehayia, E., Mazer, B., McKinley, P., & Rochette, A. (2014). Exploring the facilitators and barriers to shopping mall use by persons with disabilities and strategies for improvements: Perspectives from persons with disabilities, rehabilitation professionals and shopkeepers. ALTER, European Journal of Disability Research, 8, 217–229. 2014 Fichten, C.S., Nguyen, M.N., King, L., Havel, A., Mimouni, Z., Barile, M., Budd, J., Jorgensen, S., Chauvin, A., & Gutberg, J. (2014). How well do they read? Brief English and French screening tools for college students. International Journal of Special Education, 29(1), 33–46. 2013 Barile, M., Fichten, C.S., Jorgensen, S. & Havel, A. (2013). Employment opportunities for graduates with disabilities: A step forward. Review of Disability Studies: An International Journal, 8(4), 46–56. 2013 Fichten, C. S., Nguyen, M. N., King, L., Barile, M., Havel, A., Mimouni, Z., Chauvin, A., Budd, J., Raymond, O., Juhel, J.-C., & Asuncion, J. (2013). Portrait de l'utilisation des TIC par les collégiens ayant des troubles d'apprentissage, les bons lecteurs et les très faibles lecteurs. Pédagogie collégiale, 26(4), 38–42. 2013 Fichten, C. S., Nguyen, M. N., King, L., Barile, M., Havel, A., Mimouni, Z., Chauvin, A., Budd, J., Raymond, O., Juhel, J.-C., & Asuncion, J. (2013). Information and communication technology profiles of college students with learning disabilities and adequate and very poor readers. Journal of Education and Learning, 2(1), 176–188. doi:10.5539/jel.v2n1p176

Name of Organization or Association—Agency for Instructional Technology

Acronym—AIT

Address:
8111 N Lee Paul Road
Bloomington, IN
47404
USA

Phone Number—(812)339-2203; **Fax Number**—(812)333-4218

Email Contact—info@ait.net; **URL**—http://www.ait.net

Leaders—Charles E. Wilson, Executive Director

Description—The Agency for Instructional Technology has been a leader in educational technology since 1962. A nonprofit organization, AIT is one of the largest providers of instructional TV programs in North America. AIT is also a leading developer of other educational media, including online instruction, CDs, videodiscs, and instructional software. AIT learning resources are used on 6 continents and reach nearly 34 million students in North America each year. AIT products have received many national and international honors, including an Emmy and Peabody award. Since 1970, AIT has developed 39 major curriculum packages through the consortium process it pioneered. American state and Canadian provincial agencies have cooperatively funded and widely used these learning resources. Funding for other product development comes from state, provincial, and local departments of education; federal and private institutions; corporations and private sponsors; and AITs own resources.

Membership—None.

Dues—None.

Meetings—No regular public meetings.

Publications—None.

Name of Organization or Association—American Association of Community Colleges

Acronym—AACC

Address:

One Dupont Circle, NW, Suite 410
Washington, DC
20036-1176
USA

Phone Number—(202)728-0200; **Fax Number**—(202)223-9390

Email Contact—twhissemore@aacc.nche.edu; **URL**—http://www.aacc.nche.edu

Leaders—Walter G. Bumphus, President and CEO

Description—AACC is a national organization representing the nations more than 1,195 community, junior, and technical colleges. Headquartered in Washington, DC, AACC serves as a national voice for the colleges and provides key services in the areas of advocacy, research, information, and leadership development. The nations community colleges serve more than 13 million students annually, almost half (46 %) of all US undergraduates.

Membership—1,100+ institutions

Dues—vary by category

Meetings—Annual Convention, April of each year; 2015: April 18–21, San Antonio, TX

Publications—Community College Journal (bi-mo.); Community College Daily (daily online); Annual Fact Sheet; various reports; and white papers.

Name of Organization or Association—American Association of School Librarians

Acronym—AASL

Address:

50 East Huron Street
Chicago, IL
60611-2795
USA

Phone Number—(312) 280-4382 or (800) 545-2433, ext. 4382; **Fax Number**—(312) 280-5276

Email Contact—aasl@ala.org; **URL**—http://www.ala.org/aasl

Leaders—Julie A. Walker, Executive Director

Description—A division of the American Library Association, the mission of the American Association of School Librarians is to advocate excellence, facilitate change, and develop leaders in the school library field

Membership—8,000

Dues—Personal membership in ALA (beginning FY 2009, first year, $65; second year, $98; third and subsequent years, $130) plus $50 for personal membership in AASL. Student, retired, organizational, and corporate memberships are available.

Meetings—National conference every 2 years; next national conference to be held in 2013.

Publications—School Library Research (electronic research journal at http://www.ala.org/aasl/SLR) Knowledge Quest (print journal and online companion at http://www.ala.org/aasl/kqweb) AASL Hotlinks (e-mail newsletter) Non-serial publications (http://www.ala.org/ala/aasl/aaslpubsandjournals/aaslpublications.cfm)

Name of Organization or Association—American Educational Research Association

Acronym—AERA

Address:

1430 K Street, NW, Suite 1200
Washington, DC
20005
USA

Phone Number—(202) 238-3200; **Fax Number**—(202) 238-3250

Email Contact—outreach@aera.net; **URL**—http://www.aera.net

Leaders—William Tierney, President of the Council, 2012–2013

Description—The American Educational Research Association (AERA) is the national interdisciplinary research association for approximately 25,000 scholars who undertake research in education. Founded in 1916, AERA aims to advance knowledge about education, to encourage scholarly inquiry related to education, and to promote the use of research to improve education and serve the public good. AERA members include educators and administrators; directors of research, testing, or evaluation in federal, state, and local agencies; counselors; evaluators; graduate students; and behavioral scientists. The broad range of disciplines represented includes education, psychology, statistics, sociology, history, economics, philosophy, anthropology, and political science. AERA has more than 160 Special Interest Groups, including Advanced Technologies for Learning, NAEP Studies, Classroom Assessment, and Fiscal Issues, Policy, and Education Finance.

Membership—25,000 Regular Members: Eligibility requires satisfactory evidence of active interest in educational research as well as professional training to at least the Master's degree level or equivalent. Graduate Student Members: Any graduate student may be granted graduate student member status with the endorsement of a voting member who is a faculty member at the students university. Graduate students who are employed full time are not eligible. Graduate student membership is limited to 5 years.

Dues—vary by category, ranging from $40 for graduate students to $150 for voting members, for 1 year. See AERA website for complete details: www.aera.net

Meetings—2013 Annual Meeting, April 27–May 1, San Francisco, California

Publications—Educational Researcher; American Educational Research Journal; Journal of Educational and Behavioral Statistics; Educational Evaluation and Policy Analysis; Review of Research in Education; Review of Educational Research. Books: Handbook of Research on Teaching, 2001. (revised, 4th edition) Black Education: A Transformative Research and Action Agenda for the New Century, 2005, Studying Teacher Education: The Report of the AERA Panel on Research and Teacher Education, 2006, Handbook of Education Policy Research, 2009, Estimating Causal Effects: Using Experimental and Observational Designs, Handbook of Complementary Methods in Education Research, 2006, Studying Diversity in Teacher Education, 2011, Research on Schools, Neighborhoods, and Communities, 2012, Standards for Educational and Psychological Testing (revised and expanded, 1999). Co-published by AERA, American Psychological Association, and the National Council on Measurement in Education

Name of Organization or Association—American Library Association

Acronym—ALA

Address:

50 E. Huron St.

Chicago, IL

60611

USA

Phone Number—(800) 545-2433; **Fax Number**—(312) 440-9374

Email Contact—library@ala.org; **URL**—http://www.ala.org

Leaders—Keith Michael Fiels, Exec. Dir.

Description—The ALA is the oldest and largest national library association. Its 56,000 members represent all types of libraries: state, public, school, and academic, as well as special libraries serving persons in government, commerce, the armed services, hospitals, prisons, and other institutions. The ALA is the chief advocate of achievement and maintenance of high-quality library information services through protection of the right to read, educating librarians, improving services, and making information widely accessible. See separate entries for the following affiliated and subordinate organizations: American Association of School Librarians, Association of Library Trustees, Advocates, Friends and Foundations, Association for Library Collections and Technical Services, Association for Library Service to Children, Association of College and Research

Libraries, Association of Specialized and Cooperative Library Agencies, Library Leadership and Management Association, Library and Information Technology Association, Public Library Association, Reference and User Services Association, Young Adult Library Services Association, and the Learning Round Table of ALA (formerly the Continuing Library Education Network and Exchange Round Table).

Membership—56,000 members at present; everyone who cares about libraries is allowed to join the American Library Association.

Dues—Professional rate: $66, first year; $100, second year; third year and renewing: $133 Library Support Staff: $47 Student members: $34 Retirees: $47 International librarians: $80 Trustees: $60 Associate members (those not in the library field): $60

Meetings—Annual Conference: June 25–30, 2015-San Francisco, CA; June 23–28, 2016-Orlando, FL//Midwinter Meeting: January 30–February 3, 2015-Chicago, IL; January 8–12, 2016-Boston, MA

Publications—American Libraries; Booklist; BooklistOnline.com; Choice; Choice Reviews Online; Guide to Reference; Library Technology Reports; Newsletter on Intellectual Freedom; RDA Toolkit

Name of Organization or Association—Association for Continuing Higher Education

Acronym—ACHE

Address:

OCCE Admin Bldg Rm 233, 1700 Asp Ave.

Norman, OK

73072

USA

Phone Number—800-807-2243; **Fax Number**—405-325-4888

Email Contact—admin@acheinc.org; **URL**—http://www.acheinc.org/

Leaders—James P. Pappas, Ph.D., Executive Vice President

Description—ACHE is an institution-based organization of colleges, universities, and individuals dedicated to the promotion of lifelong learning and excellence in continuing higher education. ACHE encourages professional networks, research, and exchange of information for its members and advocates continuing higher education as a means of enhancing and improving society.

Membership—Approximately 1,500 individuals in approximately 650 institutions. Membership is open to institutions of higher learning, professionals, and organizations whose major commitment is in the area of continuing education.

Dues—Institutional dues begin at $550 and are based on student FTE Organizational dues: $550 Professional dues: $90 Student dues: $25 Retiree dues: $25

Meetings—For a list of Annual and Regional Meetings, see http://www.acheinc.org

Publications—Journal of Continuing Higher Education (3/year); 5 min with ACHE (newsletter, 6/year); Proceedings (annual).

Name of Organization or Association—Association for Educational Communications and Technology

Acronym—AECT

Address:

320 West 8th Street Suite 101, Showers Business Plaza
Bloomington, IN
47404
USA

Phone Number—(812) 335-7675; **Fax Number**—(812) 335-7678

Email Contact—pharris@aect.org; **URL**—http://www.aect.org

Leaders—Phillip Harris, Executive Director; Ana Donaldson, Board President

Description—AECT is an international professional association concerned with the improvement of learning and instruction through media and technology. It serves as a central clearinghouse and communications center for its members, who include instructional technologists, library media specialists, religious educators, government media personnel, school administrators and specialists, and training media producers. AECT members also work in the armed forces, public libraries, museums, and other information agencies of many different kinds, including those related to the emerging fields of computer technology. Affiliated organizations include the International Visual Literacy Association (IVLA), Minorities in Media (MIM), New England Educational Media Association (NEEMA), SICET (the Society of International Chinese in Educational Technology), and KSET (the Korean Society for Educational Technology). The ECT Foundation is also related to AECT. Each of these affiliated organizations has its own listing in the Yearbook. AECT Divisions include: Instructional Design and Development, Information, Training, and Performance, Research and Theory, Systemic Change, Distance Learning, Media and Technology, Teacher Education, International, and Multimedia Productions.

Membership—2,500 members in good standing from K-12, college, and university and private sector/government training. Anyone interested can join. There are different memberships available for students, retirees, corporations, and international parties. We also have a new option for electronic membership for international affiliates.

Dues—125.00.00 standard membership discounts are available for students and retirees. Additional fees apply to corporate memberships.

Meetings—Annual Convention held each year at the end of October. Summer meeting held each year the third week in July

Publications—TechTrends (6/year, free with AECT membership; available by subscription through Springer at www.springeronline.com); Educational Technology Research and Development (6/year, $46 members; available by subscription through Springer at www.springeronline.com); Quarterly Review of Distance Education (q., $55 to AECT members); many books available on the AECT website for members.

Name of Organization or Association—Association for Library and Information Science Education
Acronym—ALISE
Address:
2150 N 107th St, Suite 205
Seattle, WA
98133
USA
Phone Number—206-209-5267; **Fax Number**—206-367-8777
Email Contact—office@alise.org; **URL**—http://www.alise.org
Leaders—Andrew Estep, Executive Director
Description—Seeks to advance education for library and information science and produces annual Library and Information Science Education Statistical Report. Open to professional schools offering graduate programs in library and information science; personal memberships open to educators employed in such institutions; other memberships available to interested individuals.
Membership—763 individuals, 69 institutions
Dues—Institutional, sliding scale, $350–$2,500 International $145.00 Full-Time Personal, $125.00 Part-Time/Retired $75.00 Student $60.00
Meetings—.
Publications—Journal of Education for Library and Information Science; ALISE Directory; Library and Information Science Education Statistical Report.

Name of Organization or Association—Association for Library Collections & Technical Services
Acronym—ALCTS
Address:
50 E. Huron St.
Chicago, IL
60611
USA
Phone Number—(312)280-5037; **Fax Number**—(312)280-5033
Email Contact—alcts@ala.org; **URL**—www.ala.org/alcts
Leaders—Charles Wilt, Executive Director
Description—A division of the American Library Association, ALCTS is dedicated to acquisition, identification, cataloging, classification, and preservation of library materials; the development and coordination of the country's library resources; and aspects of selection and evaluation involved in acquiring and developing library materials and resources. Sections include Acquisitions, Cataloging and Classification, Collection Management and Development, Preservation and Reformatting, and Serials.
Membership—3,700 Membership is open to anyone who has an interest in areas covered by ALCTS.
Dues—$65 plus membership in ALA

Meetings—Annual Conference; San Francisco June 25–30, 2015, Orlando June 23–28, 2016, Chicago June 22–27, 2017.

Publications—Library Resources & Technical Services (q.); ALCTS News (q.)

Name of Organization or Association—Association for Talent Development (formerly ASTD)

Acronym—ATD

Address:

1640 King St.
Alexandria, VA
22314
USA

Phone Number—(703)683-8100; **Fax Number**—(703)683-8103

Email Contact—customercare@td.org; **URL**—http://www.td.org

Leaders—Tony Bingham, President and CEO

Description—The Association for Talent Development (ATD), formerly ASTD, is the world's largest association dedicated to those who develop talent in organizations. These professionals help others achieve their full potential by improving their knowledge, skills, and abilities. ATD's members come from more than 120 countries and work in public and private organizations in every industry sector. To better meet the needs and represent the work of this dynamic profession, on May 6, 2014 the organization announced its new brand: the Association for Talent Development.

Membership—41,000 members in 126 countries

Dues—The Professional Membership ($229.00) is the foundation of ATD member benefits. Publications, newsletters, research reports, discounts, services, and much more are all designed to help you do your job better. There are also student memberships, joint chapter memberships, and a special rate for international members. Here's what you have to look forward to when you join: TD magazine—Monthly publication of ATD. Stay informed on trends, successful practices, case studies, and more. ATD LINKS—bimonthly newsletter for members. The Buzz—a weekly compilation of news about the talent development profession. Special Reports and Research—Research reports are published on topics that reflect important issues and trends in the industry. The State of the Industry report is published annually and analyzes spending, practices, and other important data related to talent development. Career Navigator Tool—find out where you are in your career and what you need to do to develop professionally. Membership Directory—Online directory and searchable by a variety of criteria. Access to the Membership Directory is for members only. Buyers Guide—A one-stop resource for information on hundreds of training suppliers and consultants.

Meetings—TechKnowledge Conference & Exposition: January 14–16, 2015, Las Vegas, NV; International Conference & Exposition, May 17–20, 2015, Orlando, FL

Publications—TD (Talent Development) Magazine; TD at Work; State of the Industry Report; ATD Press books; research reports.

Name of Organization or Association—Association of Specialized and Cooperative Library Agencies
Acronym—ASCLA
Address:
50 E. Huron St.
Chicago, IL
60611
USA
Phone Number—312-280-4395; **Fax Number**—(312)944-8085
Email Contact—ascla@ala.org; **URL**—http://www.ala.org/ascla
Leaders—Susan Hornung, Executive Director
Description—A division of the American Library Association, the Association of Specialized and Cooperative Library Agencies (ASCLA) enhances the effectiveness of library service by advocating for and providing high-quality networking, enrichment and educational opportunities for its diverse members, who represent state library agencies, libraries serving special populations, library cooperatives, and library consultants.
Membership—700
Dues—You must be a member of ALA to join ASCLA. See www.ala.org/membership for most current ALA dues rates. ASCLA individual membership: $52; organization membership: $60; State Library Agency dues: $500.
Meetings—ASCLA meets in conjunction with the American Library Association.
Publications—Interface, quarterly online newsletter; see website http://www.ala.org/ascla for list of other publications.

Name of Organization or Association—Canadian Library Association/Association canadienne des bibliothèques
Acronym—CLA
Address:
1150 Morrison Drive, Suite 400
Ottawa, ON
K2H 8S9
Canada
Phone Number—(613)232-9625; **Fax Number**—(613)563-9895
Email Contact—info@cla.ca; **URL**—http://www.cla.ca
Leaders—Valoree McKay, Executive Director, Linda Sawden Harris, Manager Financial Services;
Description—Our Mission The Canadian Library Association/Association canadienne des bibliothèques is the national voice for Canadas library communities. As members, we: •champion library values and the value of libraries •influence public policy impacting libraries •inspire and support member learning •collaborate to strengthen the library community

Membership—The CLA membership consists of a diverse group of individuals and organizations involved or interested in library or information sciences. A large proportion of CLA Members work in college, university, public, special (corporate, nonprofit, and government), and school libraries. Others sit on the boards of public libraries, work for companies that provide goods and services to libraries, or are students in graduate level or community college programs. Membership categories of the Canadian Library Association include: Personal, Institutional, Corporate, Associate Total membership at August 7, 2014 was 1,400

Dues—$25–$5,000

Meetings—CLA 2015 National Conference and Trade Show—Ottawa Convention Centre, Ottawa ON, Canada, June 3–6, 2015

Publications—Feliciter Online Magazine—6× year

Name of Organization or Association—Computer-Assisted Language Instruction Consortium

Acronym—CALICO

Address:

214 Centennial Hall, Texas State University, 601 University Dr.
San Marcos, TX
78666
USA

Phone Number—(512)245-1417; **Fax Number**—(512)245-9089

Email Contact—info@calico.org; **URL**—http://calico.org

Leaders—Esther Horn, Manager

Description—CALICO is devoted to the dissemination of information on the application of technology to language teaching and language learning.

Membership—1,000 members from the United States and 20 foreign countries. Anyone interested in the development and use of technology in the teaching/learning of foreign languages are invited to join. Members usually come from language teaching fields such as higher education, K-12 education, and even government entities such as the armed services where language learning and teaching are of utmost importance.

Dues—$65 annual/individual

Meetings—2014, University of Ohio, 2015, University of Colorado; 2016, Michigan State University

Publications—CALICO Journal Online (three issues per year), CALICO Monograph Series (Monograph IX, 2010: Web 2.0 topics; Monograph V, second edition 2011: teaching languages with technology topics; Monograph X, 2012: teaching writing with technology topics).

Name of Organization or Association—Consortium of College and University Media Centers

Acronym—CCUMC

Address:
306 N. Union Street
Bloomington, IN
47405
USA
Phone Number—(812)855-6049; **Fax Number**—(812)855-2103
Email Contact—ccumc@ccumc.org; **URL**—www.ccumc.org
Leaders—Aileen Scales, Executive Director
Description—CCUMC is a professional group whose mission is to provide leadership and a forum for information exchange to the providers of media content, academic technology, and support for quality teaching and learning at institutions of higher education. Fosters cooperative media/instructional technology-related support in higher education institutions and companies providing related products. Gathers and disseminates information on improved procedures and new developments in instructional technology and media center management.
Membership—825 individuals at 325 institutions/corporations: Institutional Memberships—Individuals within an institution of higher education who are associated with the support to instruction and presentation technologies in a media center and/or technology support service. Corporate Memberships—Individuals within a corporation, firm, foundation, or other commercial or philanthropic enterprise whose business or activity is in support of the purposes and objectives of CCUMC. Associate Memberships—Individuals not eligible for an Institutional or Corporate membership; from a public library, religious, governmental, or other organizations not otherwise eligible for other categories of membership. Student Memberships—Any student in an institution of higher education who is not eligible for an institutional membership.
Dues—Institutional or Corporate Membership: $325 for 1–2 persons, $545 for 3–4 persons, $795 for 5–6 persons, $130 each additional person beyond 6 Associate Membership: $325 per person Student Membership: $55 per person
Meetings—2014 Conference, Portland, Oregon (October 15–19, 2014)
Publications—Leader (newsletter—three issues annually)

Name of Organization or Association—Culture, Learning, and Technology (a Division of the Association for Educational Communications & Technology)
Acronym—AECT-CLT
Address:
304 Dekalb Pike
Blue Bell, PA
19422
USA
Phone Number—(215) 461-1124; **Fax Number**—(215) 619-7172
Email Contact—cdickson@mc3.edu; **URL**—http://aect.site-ym.com/
Leaders—Camille Dickson-Deane, President (2013–2015); Peggy Lumpkin, President Elect (2013–2015)

Description—MISSION STATEMENT: Culture, Learning, and Technology's purpose is to encourage the effective utilization of educational media in the teaching learning process; provide leadership opportunities in advancing the use of technology as an integral part of the learning process; provide a vehicle through which minorities might influence the utilization of media in institutions; develop an information exchange network common to minorities in media; study, evaluate, and refine the educational technology process as it relates to the education of minorities and to encourage and improve the production of effective materials for the education of minorities.

Membership—Dr. Wesley Joseph McJulien founded Minorities In Media (MIM) around the late 1970s. In the April 1987 issue of Tech Trends, the article Black Contributors to Educational Technology chronicles the history of MIM. John W. Green and Wesley J. McJulien write: "In 1975, a group of Black technologists met in Dallas in an effort to band together and provide more opportunities for Blacks in the Association for Educational Communications and Technology. One of the assignments was to find the Black person who was the outstanding author in the field of educational technology and invite him to speak at the 1977 meeting of BUDDIES (an organization now called Minorities In Media). Dr. Greene was selected and his presentation, 'The Role of Blacks in Instructional Technology,' stressed that Black must participate in all areas of AECT and especially in research (p. 18)" This history is the foundation of who we are today as an organization. We celebrate our past and continue to spearhead our future. As we move forward, we recognize that societal norms have evolved to include other "minorities" and as such we have expanded our vision to include more areas. These areas are categorized under the cultural umbrella which describes the traditional views such as race, gender, ethnicity, and religion but also expands towards a more internationalized view of individualized differences. Membership is open to professionals and academics whose interests align with CLTs mission.

Dues—$75, student; $125–$170 professional

Meetings—Annual meetings held during the Association for Educational Communications & Technology conference—www.aect.org.

Publications—Minorities in Media Website: http://aectmim.webs.com/ Facebook Group: www.facebook.com/groups/302061629822972/ Clark, K. (2012). E-Learning and underserved students. In J.A. Banks (Ed.), Encyclopedia of Diversity in Education. Newbury Park, CA: Sage Publications. Clark, K., Brandt, J., Hopkins, R., & Wilhelm, J. (2009). Making games after-school: Participatory game design in non-formal learning environments. Educational Technology, Nov–Dec, pp. 40–44. Eugene, W. & Clark, K. (2012). E-Learning, Engineering and Learners of African Descent: A Needs Analysis. Journal of STEM Education: Innovations and Research, 13(2), 45–57. Eugene, W. and Clark, K. (2009). The Role of Identity and Culture on Website Design. Multicultural Education & Technology Journal, 3(4), pp. 256–265. Igoche, D. A., & Branch, R. (2009). Incorporating cultural values into the ADDIE approach to instructional design. Educational Technology, 49(6), 4–8. Joseph,

R. & Clark, K. (Eds.) (2009). Culturally relevant technology-based learning environments [Special Issue]. Educational Technology, Nov–Dec Joseph, R. (2009). Closing the Achievement Gap with Culturally Relevant Technology-based Learning Environments. Educational Technology 49(6), pp. 45–47. Joseph, R. & Clark, K. (2009). Introduction to Special Issue on Culturally Relevant Technology-Based Learning Environments. Educational Technology 49(6), pp. 3–4. Thomas, M., Mitchell, M. & Joseph, R. (2002). The third dimension of ADDIE: A cultural embrace. Tech Trends, 46(2), pp. 40–45. Young, P. A. (2011). The significance of the Culture Based Model in designing culturally-aware tutoring systems. AI & Society. 26(1), 35–47. Young, P. A. (2009). Instructional design frameworks and intercultural models. Hershey, PA: IGI Global/Information Science Publishing.

Name of Organization or Association—Education Development Center, Inc.
Acronym—EDC
Address:
43 Foundry Avenue
Waltham, MA
02453-8313
USA
Phone Number—(617)969-7100; **Fax Number**—(617)969-5979
Email Contact—emarshall@edc.org; **URL**—http://www.edc.org
Leaders—Dr. Luther S. Luedtke, President and CEO
Description—EDC is a global nonprofit organization that designs, delivers, and evaluates innovative programs to address some of the world's most urgent challenges in education, health, and economic opportunity. Working with public sector and private partners, we harness the power of people and systems to improve education, health promotion and care, workforce preparation, communications technologies, and civic engagement. EDC conducts 250 projects in 23 countries around the world.
Membership—Not applicable
Dues—Not applicable
Meetings—Not applicable
Publications—(1) Annual Report (2) EDC Update, monthly e-newsletter (3) Detailed website with vast archive of publications, technical reports, and evaluation studies.

Name of Organization or Association—Education Northwest (formerly Northwest Regional Educational Laboratory)
Acronym—n/a
Address:
101 SW Main St., Suite 500
Portland, OR
97204
USA

Phone Number—(503)275-9500; **Fax Number**—503-275-0448
Email Contact—info@educationnorthwest.org; **URL**—http://educationnorthwest.org
Leaders—Steve Fleischman, CEO
Description—Chartered in the Pacific Northwest in 1966 as Northwest Regional Educational Laboratory, Education Northwest now conducts more than 200 projects annually, working with schools, districts, and communities across the country on comprehensive, research-based solutions to the challenges they face. At Education Northwest, we are dedicated to and passionate about learning. Through our work, we strive to create vibrant learning environments where all youth and adults can succeed. Everything we do is evidence based, giving us a solid foundation upon which we stand with confidence. We work with teachers, administrators, policymakers, and communities to identify needs, evaluate programs, and develop new solutions. The breadth of our work—ranging from training teachers, to developing curriculum, to restructuring schools, to evaluating programs—allows us to take a comprehensive look at education and to bring wide-ranging expertise and creativity to our clients' challenges. Our approach is highly customized to meet the needs of our clients, and our staff members take great pride in working closely with customers in the field to design the right approach for each situation. We are proud of our 40-year track record, but we don't rest on our laurels—instead, we strive constantly to identify and address emerging needs and trends in teaching and learning
Membership—921 organizations
Dues—None
Meetings—Annual meeting of membership
Publications—None

Name of Organization or Association—Educational Communications, Inc., Environmental, Media and Cultural Projects of
Acronym—
Address:
PO Box 351419
Los Angeles, CA
90035
USA
Phone Number—(310)559-9160; **Fax Number**—(310)559-9160
Email Contact—ECNP@aol.com; **URL**—www.ecoprojects.org
Leaders—Nancy Pearlman, Executive Director and Executive Producer
Description—Educational Communications is dedicated to enhancing the quality of life on this planet and provides radio and television programs about the environment and cultural documentaries. Serves as a clearinghouse on ecological issues through the Ecology Center of Southern California. Programming is available on 75 stations in 25 states and the Internet. These include: ECONEWS television series and ENVIRONMENTAL DIRECTIONS radio series. Provides ethnic folk dance performances through Earth Cultures. Assists

groups in third-world countries through Humanity and the Planet, especially "Wells for Burkina Faso" and "Environmental Education in Kenya." Services provided include ethnic folk dance performances, a speaker's bureau, award-winning public service announcements, radio and television documentaries, volunteer and intern opportunities, and input into the decision-making process. Its mission is to educate the public about both the problems and the solutions in the environment. Other projects include Project Ecotourism, Environmental Resources Library, and more

Membership—$20.00 for yearly subscription to the Compendium Newsletter

Dues—$20 for regular. All donations accepted

Meetings—as needed

Publications—Compendium Newsletter (bimonthly newsletter) "Culturally Speaking" Newsletter on website Environmental Directions radio audio cassettes, (1,900 produced to date) ECONEWS and ECO-TRAVEL television series (over 600 shows in the catalog available on DVD)

Name of Organization or Association—ENC Learning Inc.

Acronym—ENC

Address:

1585 Central Ave. Ste C-5 #293

Summerville, SC

29485

USA

Phone Number—614-378-4567; **Fax Number**—(843) 832-2063

Email Contact—info@goenc.com; **URL**—www.goenc.com

Leaders—Dr. Len Simutis, Director

Description—ENC provides K-12 teachers and other educators with a central source of information on mathematics and science curriculum materials, particularly those that support education reform. Among ENCs products and services is ENC Focus, a free online magazine on topics of interest to math and science educators. Users include K-12 teachers, other educators, policymakers, and parents.

Membership—ENC is a subscription-based online resource for K-12 educators. Subscriptions are available for schools, school districts, college and universities, and individuals. Information for subscribers is available at www.goenc.com/subscribe

Dues—None

Meetings—None

Publications—ENC Focus is available as an online publication in two formats: ENC Focus on K-12 Mathematics, and ENC Focus on K-12 Science. Each is accessible via www.goenc.com/focus

Name of Organization or Association—Instructional Technology Council

Acronym—ITC

Address:
426 C Street, NE
Washington, DC
20002-5839
USA
Phone Number—(202)293-3110; **Fax Number**—(202)293-3110
Email Contact—cmullins@itcnetwork.org; **URL**—http://www.itcnetwork.org
Leaders—Christine Mullins, Executive Director
Description—An affiliated council of the American Association of Community Colleges established in 1977, the Instructional Technology Council (ITC) is a leader in advancing distance education. ITCs mission is to provide exceptional leadership and professional development in higher education to its network of eLearning practitioners by advocating, collaborating, researching, and sharing exemplary, innovative practices and potential in educational technologies. ITC tracks federal legislation that will affect distance learning, conducts annual professional development meetings, supports research, and provides a forum for members to share expertise and materials. ITC members receive a subscription to the ITC News and ITC Listserv with information on what's happening in distance education, participation in ITC's professional development Webinar series, distance learning grants information, updates on distance learning legislation, discounts to attend the annual eLearning Conference which features more than 80 workshops and seminars.
Membership—ITC members include single institutions and multicampus districts; regional and statewide systems of community, technical and 2-year colleges; for-profit organizations; 4-year institutions; and, nonprofit organizations that are interested or involved in instructional telecommunications.
Dues—ITC offers institutional memberships and corporate sponsorship opportunities. The institutional membership rate is $495 per year. Institutional memberships are available to single or district community, technical, or 2-year colleges; 4-year institutions, or nonprofit organizations. A designated contact is the voting representative and distributes the member benefits across his or her institution. Corporate sponsorship packages are available from $2,500 to $10,000.
Meetings—Annual eLearning Conference
Publications—ITC Newsletter—Quarterly Trends in eLearning: Tracking the Impact of eLearning at Community Colleges Quality Enhancing Practices in Distance Education: Vol. 2 Student Services; Quality Enhancing Practices in Distance Education: Vol. 1 Teaching and Learning; New Connections: A Guide to Distance Education (2nd ed.); New Connections: A College President's Guide to Distance Education; Digital Video: A Handbook for Educators; Faculty Compensation and Support Issues in Distance Education; ITC News (monthly publication/newsletter); ITC Listserv.

Name of Organization or Association—International Association for Language Learning Technology
Acronym—IALLT

Address:
Information Technology Services, Concordia College
Moorhead, MN
56562
USA
Phone Number—(218) 299-3464; **Fax Number**—(218) 299-3246
Email Contact—business@iallt.org; **URL**—http://iallt.org
Leaders—Harold Hendricks, President; Kristy Britt, Treasurer
Description—IALLT is a professional organization whose members provide leadership in the development, integration, evaluation, and management of instructional technology for the teaching and learning of language, literature, and culture.
Membership—400 members Membership/Subscription Categories. *Educational Member: for people working in an academic setting such as a school, college, or university. These members have voting rights. *Full-time Student Member: for full-time students interested in membership. Requires a signature of a voting member to verify student status. These members have voting rights. *Commercial Member: for those working for corporations interested in language learning and technology. This category includes, for example, language laboratory vendors, software, and textbook companies. *Library Subscriber: receive our journals for placement in libraries.
Dues—1 year: $50, voting member; $25, student; $200 commercial. 2 year: $90, voting member; $380 commercial.
Meetings—Biennial IALLT conferences treat the entire range of topics related to technology in language learning as well as management and planning. IALLT also sponsors sessions at conferences of organizations with related interests, including CALICO and ACTFL.
Publications—IALLT Journal of Language Learning Technologies (two times annually); materials for language lab management and design, language teaching, and technology. Visit our website for details. http://iallt.org

Name of Organization or Association—Lister Hill National Center for Biomedical Communications
Acronym—LHNCBC
Address:
US National Library of Medicine, 8600 Rockville Pike
Bethesda, MD
20894
USA
Phone Number—(301)496-4441; **Fax Number**—(301)402-0118
Email Contact—lhcques@lhc.nlm.nih.gov; **URL**—http://lhncbc.nlm.nih.gov/
Leaders—Clement J. McDonald, M.D., Director, ClemMcDonald@mail.nih.gov
Description—The Lister Hill National Center for Biomedical Communications is an intramural research and development division of the US National Library of Medicine (NLM). The Center conducts and supports research and development in the dissemi-

nation of high-quality imagery, medical language processing, high-speed access to biomedical information, intelligent database systems development, multimedia visualization, knowledge management, data mining, and machine-assisted indexing.

Membership—None

Dues—None

Meetings—None

Publications—Fact sheet (and helpful links to other publications) at: http://www.nlm.nih.gov/pubs/factsheets/lister_hill.html Fellowship and PostDoctoral opportunities are ongoing: http://lhncbc.nlm.nih.gov/medical-informatics-training-program

Name of Organization or Association—McREL International

Acronym—McREL

Address:

4601 DTC Blvd., Suite 500
Denver, CO
80237
USA

Phone Number—800-858-6830; **Fax Number**—(303)337-3005

Email Contact—info@mcrel.org; **URL**—http://www.mcrel.org

Leaders—Dr. Timothy Waters, CEO

Description—McREL International is a nonprofit, nonpartisan organization devoted to improving education through applied research, development, and service to teachers and leaders across the US, Canada, the Pacific Region, Australia, and other parts of the world. McREL produces research-based publications, products, and professional development services to promote the best instructional practices in the classroom and the best leadership practices at school and district levels. McREL also provides clients with expertise in academic standards, school and system improvement approaches, use of classroom technology, teacher and leader coaching, and STEM education improvement. McREL manages the North Central Comprehensive Center, serving the states of Nebraska, North Dakota, South Dakota, and Wyoming. The center, which is funded by the U.S. Department of Education, provides training and technical assistance to state education agencies in implementing and administering federal education programs. McREL also manages the Pacific Regional Education Lab, connecting educators in Hawaii, American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, the Federated States of Micronesia, the Republic of the Marshall Islands, and the Republic of Palau with research on teacher effectiveness, family and community engagement, college and career readiness, and more. McREL conducts research and serves as external evaluators for a variety of local, state, and federal programs at both the K-12 and higher education levels, and also supports public education and outreach for several NASA projects.

Membership—not a membership organization

Dues—no dues

Meetings—NA

Publications—Changing Schools (journal, three issues per year), eNews (monthly electronic newsletter), plus numerous technical reports and other publications. Check website for current listings.

Name of Organization or Association—Media Communications Association—International
Acronym—MCA-I
Address:
PO Box 5135
Madison, WI
53705-0135
USA
Phone Number—Use Contact Form; **Fax Number**—Please Ask
Email Contact—info@mca-i.org; **URL**—http://www.mca-i.org
Leaders—Lois Weiland and Connie Terwilliger, Co-Executive Director
Description—Formerly the International Television Association. Founded in 1968, MCA-I's mission is to provide media communications professionals opportunities for networking, forums for education and resources for information. MCA-I also offers business services, such as low-cost insurance, buying programs to reduce operating costs. MCA-I also confers the highly acclaimed MCA-I Media Festival awarding the Golden Reel. Visit MCA-I's website for full details.
Membership—Individual, student, and corporate members. Membership programs also are available to vendors for relationship and business development.
Dues—$80, individual. See website for complete dues schedule.
Meetings—Various Partnerships with Association Conferences
Publications—MCA-I eNews (Monthly), LeaderLinks (Monthly), Find a Pro Directory (online), Facebook, LinkedIn, YouTube, Twitter, Google+

Name of Organization or Association—Medical Library Association
Acronym—MLA
Address:
65 E. Wacker Pl., Ste. 1900
Chicago, IL
60601-7246
USA
Phone Number—(312)419-9094; **Fax Number**—(312)419-8950
Email Contact—info@mlahq.org; **URL**—https://www.mlanet.org/
Leaders—Carla J. Funk, M.L.S., M.B.A., CAE, Executive Director
Description—MLA, a nonprofit, educational organization, comprises health sciences information professionals with 3,800 members worldwide. Through its programs and services, MLA provides lifelong educational opportunities, supports a knowledgebase of health information research, and works with a global network of partners to promote the importance of quality information for improved health to the health care community and the public.

Membership—Membership categories: Regular Lower Salary/Regular Membership Institutional Membership International Membership Affiliate Membership Student Membership

Dues—$120/$195, regular lower salary/regular; $130, introductory; $295–$695, institutional, based on total library expenditures, including salaries, but excluding grants and contracts; $130, international; $120, affiliate; $50, student

Meetings—National annual meeting held every May; most chapter meetings are held in the fall.

Publications—MLA News (newsletter, 10/year); Journal of the Medical Library Association (quarterly scholarly publication.); MLA DocKit series, collections of representative, unedited library documents from a variety of institutions that illustrate the range of approaches to health sciences library management topics); MLA BibKits, selective, annotated bibliographies of discrete subject areas in the health sciences literature; standards; surveys; and co-published monographs. Books co-publishers: Rowman & Littlefield; ALA Editions

Name of Organization or Association—National Aeronautics and Space Administration

Acronym—NASA

Address:

NASA Headquarters, 300 E Street SW
Washington, DC
20546
USA

Phone Number—(202)358-0103; **Fax Number**—(202)358-3048

Email Contact—education@nasa.gov; **URL**—http://www.nasa.gov/education

Leaders—Leland Melvin, Assistant Administrator for Education

Description—NASA's journeys into air and space have deepened humankind's understanding of the universe, advanced technology breakthroughs, enhanced air travel safety and security, and expanded the frontiers of scientific research. These accomplishments share a common genesis: education. As the United States begins the second century of flight, the Nation must maintain its commitment to excellence in science, technology, engineering, and mathematics education to ensure that the next generation of Americans can accept the full measure of their roles and responsibilities in shaping the future. NASA will continue the Agency's tradition of investing in the Nation's education programs and supporting the country's educators who play a key role in preparing, inspiring, exciting, encouraging, and nurturing the young minds of today who will be the workforce of tomorrow. In 2012 and beyond, NASA will continue to pursue three major education goals:—Strengthening NASA and the Nations future workforce—Attracting and retaining students in science, technology, engineering and mathematics, or STEM, disciplines—Engaging Americans in NASAs mission Learn More @ http://www.nasa.gov/education

Membership—n/a

Dues—n/a

Meetings—n/a

Publications—Publications and Products can be searched and downloaded from the following URL—http://search.nasa.gov/search/edFilterSearch.jsp?empty=true

Name of Organization or Association—National Association of Media and Technology Centers

Acronym—NAMTC

Address:

NAMTC, 7105 First Ave. SW
Cedar Rapids, IA
52405
USA

Phone Number—319 654 0608; **Fax Number**—319 654 0609

Email Contact—bettyge@mchsi.com; **URL**—www.namtc.org

Leaders—Betty Gorsegner Ehlinger, Executive Director

Description—NAMTC is committed to promoting leadership among its membership through networking, advocacy, and support activities that will enhance the equitable access to media, technology, and information services to educational communities. Membership is open to regional, K-12, and higher education media centers which serve K-12 students as well as commercial media and technology centers.

Membership—Institutional and corporate members numbering approximately 200.

Dues—$150 institutions; $360 corporations

Meetings—A national Leadership Summit is held in the winter.

Publications—Electronic NAMTC Newsletter is published five times per academic year.

Name of Organization or Association—National Council of Teachers of English

Acronym—NCTE

Address:

1111 W. Kenyon Rd.
Urbana, IL
61801-1096
USA

Phone Number—(217)328-3870; **Fax Number**—(217)328-0977

Email Contact—public_info@ncte.org; **URL**—http://www.ncte.org

Leaders—Kent Williamson, NCTE Executive Director

Description—The National Council of Teachers of English, with 35,000 individual and institutional members worldwide, is dedicated to improving the teaching and learning of English and the language arts at all levels of education. Among its position statements and publications related to educational media and technology are "Code of Best Practices in Fair Use for Media Literacy Education," "The NCTE Definition of 21st Century Literacies," and "Position Statement on Teaching, Learning, and Assessing Writing in Digital Environments."

Membership—NCTE members include elementary, middle, and high school teachers; supervisors of English programs; college and university faculty; teacher educators; local and state agency English specialists; and professionals in related fields.

Dues—Membership in NCTE is $50 a year; subscriptions to its journals is in addition to the membership fee.

Meetings—http://www.ncte.org/annual/ 104th NCTE Annual Convention, Nov 20–23, Washington, DC; 105th NCTE Annual Convention, Nov 19–22, Minneapolis, MN

Publications—NCTE publishes about 10 books a year. Visit http://www.ncte.org/books and http://www.ncte.org/store. NCTEs journals include Language Arts Voices from the Middle English Journal College English College Composition and Communication English Education Research in the Teaching of English Teaching English in the 2-Year College Talking Points English Leadership Quarterly The Council Chronicle (included in NCTE membership) Journal information is available at http://www.ncte.org/journals/

Name of Organization or Association—National EBS Association
Acronym—NEBSA
Address:
PO Box 121475
Clermont, FL
34712-1475
USA
Phone Number—(407) 401-4630; **Fax Number**—(321) 406-0520
Email Contact—execdirector@nebsa.org; **URL**—https://nebsa.org
Leaders—Lynn Rejniak, Chair, Bd. of Dirs.; Don MacCullough, Exec. Dir.

Description—Established in 1978, NEBSA is a nonprofit, professional organization of Educational Broadband Service (EBS) licensees, applicants, and others interested in EBS broadcasting. EBS is a very high frequency television broadcast service that is used to broadcast distance learning classes, two-way Internet service, wireless, and data services to schools and other locations where education can take place. The goals of the association are to gather and exchange information about EBS, gather data on utilization of EBS, act as a conduit for those seeking EBS information, and assist migration from video broadcast to wireless, broadband Internet services using EBS channels. The NEBSA represents EBS interests to the FCC, technical consultants, and equipment manufacturers. The association uses its website and Listserv list to provide information to its members in areas such as technology, programming content, FCC regulations, excess capacity leasing and license, and application data.

Membership—The current membership consists of Educational Institutions and nonprofit organizations that hold licenses issued by the Federal Communications Commission for Educational Broadband Service (EBS). We also have members that have an interest in EBS and members such as manufacturers of EBS-related equipment and Law firms that represent Licensees.

Dues—We have two main types of memberships: Voting memberships for EBS licensees only, and non-voting memberships for other educational institutions and sponsors. See the website http://www.nebsa.org for details.

Meetings—Annual Member Conference, April 2nd–5th, 2013 New Orleans, LA

Publications—http://www.nebsa.org

Name of Organization or Association—National Endowment for the Humanities

Acronym—NEH

Address:

Division of Public Programs, Americas Media Makers Program, 400 7th Street, SW
Washington, DC
20506
USA

Phone Number—(202)606-8269; **Fax Number**—(202)606-8557

Email Contact—publicpgms@neh.gov; **URL**—http://www.neh.gov

Leaders—Karen Mittelman, Director, Division of Public Programs

Description—The NEH is an independent federal grant-making agency that supports research, educational, and public programs grounded in the disciplines of the humanities. The Division of Public Programs Media Projects supports film and radio programs in the humanities for public audiences, including children and adults. All programs in the Division of Public Program support various technologies, specifically websites both as stand alone projects and as extensions of larger projects such as museum exhibitions. The Division of Public Programs has a second film grant program. The Bridging Cultures through Film: International Topics program supports documentary films that examine international and transnational themes in the humanities. These projects are meant to spark Americans' engagement with the broader world by exploring one or more countries and cultures outside of the United States. Proposed documentaries must be analytical and deeply grounded in humanities scholarship. Beginning in 2014, the Division of Public Programs created a new grant category. Digital Projects for the Public grants support projects that are largely created for digital platforms. While these projects can take many forms, shapes, and sizes, you should apply to this program primarily to create digital projects or the digital components of a larger project. NEH is a national funding agency, so these projects should demonstrate the potential to attract a broad, general audience. Projects can have specific targeted audiences (including K-12 students), but they should also strive to cultivate a more inclusive audience.

Membership—Nonprofit institutions and organizations including public television and radio stations.

Dues—not applicable

Meetings—not applicable

Publications—Visit the website (http://www.neh.gov) for application forms and guidelines as well as the Media Log, a cumulative listing of projects funded through the Media Program.

Name of Organization or Association—National Federation of Community Broadcasters
Acronym—NFCB
Address:
1970 Broadway, Ste. 1000
Oakland, CA
94612
USA
Phone Number—510 451-8200; **Fax Number**—510 451-8208
Email Contact—ginnyz@nfcb.org; **URL**—http://www.nfcb.org.
Leaders—Maxie C Jackson III, President and CEO
Description—NFCB represents noncommercial, community-based radio stations in public policy development at the national level and provides a wide range of practical services, including technical assistance.
Membership—250. Noncommercial community radio stations, related organizations, and individuals.
Dues—range from $200 to $4,000 for participant and associate members
Meetings—Annual Community Radio Conference; 2010 St. Paul; 2011 San Francisco; 2012 Houston; 2013 San Francisco
Publications—Public Radio Legal Handbook; Digital AudioCraft; Guide to Underwriting

Name of Organization or Association—National Freedom of Information Coalition
Acronym—NFOIC
Address:
101 Reynolds Journalism Institute, Missouri School of Journalism
Columbia, MO
65211-0012
USA
Phone Number—573.882.4856; **Fax Number**—573.884.6204
Email Contact—buntingk@missouri.edu; **URL**—http://www.nfoic.org/
Leaders—Kenneth F. Bunting, Executive Director
Description—The National Freedom of Information Coalition is a national membership organization devoted to protecting the publics right to oversee its government. NFOIC's goals include helping start-up FOI organizations, strengthening existing FOI organizations, and developing FOI programs and publications appropriate to the membership.
Membership—The NFOIC offers active memberships to freestanding nonprofit state or regional Freedom of Information Coalitions, academic centers and First Amendment Centers, and associated memberships to individuals and entities supporting NFOIC's mission. Membership information is available at http://www.nfoic.org. Achieving and maintaining active membership in all 50 states is the primary goal of NFOIC.

Dues—Membership categories and levels of support are described on the NFOIC website.
Meetings—The National Freedom of Information Coalition host an annual meeting and a spring conference.
Publications—The FOI Advocate, a blog on FOI, FOIA, and open government matters. Various other audits and white papers.

Name of Organization or Association—National Gallery of Art
Acronym—NGA
Address:
Department of Education Resources, 2000B South Club Drive
Landover, MD
20785
USA
Phone Number—(202)842-6269; **Fax Number**—(202)842-6935
Email Contact—EdResources@nga.gov; **URL**—https://learningresources.nga.gov:7008/vwebv/searchBasic
Leaders—Leo J. Kasun, Head, Department of Education Resources
Description—This department of NGA is responsible for the production and distribution of 120+ educational audiovisual programs, including interactive technologies. Materials available (all loaned free to individuals, schools, colleges and universities, community organizations, and noncommercial television stations) range from DVDs, CD-Roms, and teaching packets with either image CD-ROMs. All DVD programs are closed captioned A free catalog describing all programs is available upon request. We can also provide multiple copies for in-services or large meetings or conferences. Many of these programs are available for long-term loan.
Membership—Our free-loan lending program resembles that of a library and because we are a federally funded institution we do not have a membership system. Last year, we lent programs directly to over one million borrowers. Our programs are available to anyone who requests them which ranges from individuals to institutions.
Dues—None
Meetings—None
Publications—Extension Programs Catalog

Name of Organization or Association—National Telemedia Council Inc.
Acronym—NTC
Address:
1922 University Ave.
Madison, WI
53726
USA
Phone Number—(608)218-1182; **Fax Number**—None
Email Contact—NTelemedia@aol.com; **URL**—http://www.nationaltelemedia-council.org, and www.journalofmedialiteracy.org

Leaders—Karen Ambrosh, President; Marieli Rowe, Exec. Dir, Rev. Stephen Umhoefer, Treasurer; Kate Vannoy, Secretary, Dr. Martin Rayala, Past President, (plus nine Board Members).

Description—The National Telemedia Council is a national, nonprofit professional organization that has been promoting a media wise society for over six decades. Embracing a positive, nonjudgmental philosophy that values education, evaluation, and reflective judgment, NTC has a long history of a broad array of initiatives that have included annual conferences, workshops, major and innovative interactive forums, local, national, and international events for diverse participants (including children); and its major ongoing award, the "Jessie McCanse Award for Individual, Long-Term Contribution to the Field of Media Literacy." NTC's ongoing current activities continue to include its major publication, The Journal of Media Literacy, published two times per year (and a part of the organization since its inception in 1953 and earlier); the development of its archival website; and interactive collaborations to advance the field such as the "media literacy cafes" in connection with issues of the Journal of Media Literacy.

Membership—Member/subscribers to the Journal of Media Literacy, currently over 500, including individuals, organizations, schools, and University libraries across the Globe including Asia, Australia, Europe, North and South America. Our membership is open to all those interested in media literacy.

Dues—Individuals: $40, basic $60, contributing $100, patron Organizations/ Library: $60 Corporate sponsorship: $500 (Additional Postage for Overseas: Canada or Mexico, add $20.00. All other outside North America, add $25.00)

Meetings—NTC held its 60th Anniversary conference in November 2013. Planning is underway for the next 4 years to include a major archival project

Publications—The Journal of Media Literacy

Name of Organization or Association—Native American Public Telecommunications, Inc.

Acronym—NAPT

Address:
1800 North 33rd Street
Lincoln, NE
68503
USA

Phone Number—(402) 472-3522; **Fax Number**—(402) 472-8675

Email Contact—native@unl.edu; **URL**—http://www.nativetelecom.org

Leaders—Shirley K. Sneve, Executive Director

Description—Native American Public Telecommunications, Inc. (NAPT), a nonprofit 501(c)(3) which receives major funding from the Corporation for Public Broadcasting, shares Native stories with the world through support of the creation, promotion, and distribution of Native media. Founded in 1977, through various media—Public Television, Public Radio, and the Internet—NAPT brings awareness of Indian and Alaska Native issues. NAPT operates VisionMaker, the premier source for quality Native American educational and home videos. All aspects of our programs encourage the involvement of young people to learn more about careers in the media—to be the next generation of storytellers. NAPT is located at the University of Nebraska-Lincoln. NAPT offers student employment, internships, and fellowships. Reaching the general public and the global market is the ultimate goal for the dissemination of Native-produced media.

Membership—No Membership

Dues—None

Meetings—None

Publications—VisionMaker E-Newsletter NAPT General E-Newsletter Producer E-Newsletter Educational Catalog Annual Report Post Viewer Discussion Guides Educational Guides

Name of Organization or Association—New York Festivals

Acronym—NYF

Address:

260 West 39th Street, 10th Floor
New York, NY
10018
USA

Phone Number—212-643-4800; **Fax Number**—212-643-0170

Email Contact—info@newyorkfestivals.com; **URL**—http://www.newyorkfestivals.com

Leaders—Rose Anderson, Executive Director

Description—The New York Festivals® International Television & Film Awards recognize the "Worlds Best TV & Films™" in all forms of news, sports, documentary, entertainment programming including telenovelas, webisodes, music videos, business theater, event venue productions, corporate films, feature films, infomercials, promotion spots, openings, and IDs. Now entering its 56th year, the total number of entries continues to grow, now representing over 40 different countries, making the NYF™ Television & Film Awards one of the most well known and widely respected competitions on the globe. The 2013 TV & Film Awards ceremony for The Worlds Best TV & Films will be held in conjunction with The NAB Show in Las Vegas in early April. Eligibility year runs from September 1, 2011 through the final deadline. For more information and fees, plus a full list of categories and the rules and regulations, please visit www.newyorkfestivals.com.

Membership—No membership feature. The competition is open to any broadcast and non-broadcast programming including online media production.

Dues—n/a

Meetings—n/a

Publications—Winners are posted on our website at www.newyorkfestivals.com

Name of Organization or Association—Pacific Film Archive

Acronym—PFA

Address:

University of California, Berkeley Art Museum and Pacific Film Archive, 2625 Durant Ave.
Berkeley, CA
94720-2250
USA

Phone Number—(510)642-1437 (library); (510)642-1412 (general); **Fax Number**—(510)642-4889

Email Contact—NLG@berkeley.edu; **URL**—http://www.bampfa.berkeley.edu

Leaders—Susan Oxtoby, Senior Curator of Film; Nancy Goldman, Head, PFA Library and Film Study Center

Description—Sponsors the exhibition, study, and preservation of classic, international, documentary, animated, and avant-garde films. Provides on-site research screenings of films in its collection of over 10,000 titles. Provides access to its collections of books, periodicals, stills, and posters (all materials are noncirculating). Offers BAM/PFA members and University of California, Berkeley, affiliates reference and research services to locate film and video distributors, credits, stock footage, etc. Library hours are 1 P.M.–5 P.M. Mon.–Thurs. Research screenings are by appointment only and must be scheduled at least 2 weeks in advance; other collections are available for consultation on a drop-in basis during Library hours.

Membership—Membership is through our parent organization, the UC Berkeley Art Museum and Pacific Film Archive, and is open to anyone. The BAM/PFA currently has over 3,000 members. Members receive free admission to the Museum; reduced-price tickets to films showing at PFA; access to the PFA Library & Film Study Center; and many other benefits. Applications and more information is available at http://www.bampfa.berkeley.edu/join/

Dues—$50 individuals and nonprofit departments of institutions.

Meetings—none

Publications—BAM/PFA Calendar (6/year).

Name of Organization or Association—Pacific Resources for Education and Learning

Acronym—PREL

Address:
900 Fort Street Mall, Suite 1300
Honolulu, HI
96813
USA

Phone Number—(808) 441-1300; **Fax Number**—(808) 441-1385

Email Contact—askprel@prel.org; **URL**—http://www.prel.org/

Leaders—Sharon Nelson-Barber, Ed.D., President and Chief Executive Officer

Description—Pacific Resources for Education and Learning (PREL) is an independent, nonprofit 501(c)(3) corporation that serves the educational community in the US-affiliated Pacific islands, the continental United States, and countries throughout the world. PREL bridges the gap between research, theory, and practice in education and works collaboratively to provide services that range from curriculum development to assessment and evaluation. PREL serves the Pacific educational community with quality programs and products developed to promote educational excellence. We work throughout school systems, from classroom to administration, and collaborate routinely with governments, communities, and businesses. Above all, we specialize in multicultural and multilingual environments. From direct instruction to professional development to creation of quality educational materials, PREL is committed to ensuring that all students, regardless of circumstance or geographic location, have an equal opportunity to develop a strong academic foundation. PREL brings together in the Center for Information, Communications, and Technology (CICT) an experienced cadre of specialists in website development and design, educational technology, distance and online learning, multimedia production, interactive software development, writing and editing, graphics, and print production. By combining tested pedagogy with leading edge technology, PREL can create learning materials encompassing a wide variety of subject matter and delivery methods. PREL partners with researchers, schools, evaluators, publishers, and leaders in the learning technology industry to develop state-of-the-art learning tools and technology solutions. There are vast disparities across the Pacific when it comes to school resources, technology access, and bandwidth. PREL's goal is to work effectively in any type of setting in which an application is needed. With routine travel and a staff presence throughout the northern Pacific, PREL has resolved to reach underserved communities, determine their needs, and meet their requirements with the appropriate delivery and dissemination methods. Multimedia, Software, and Website conception, design, and delivery have become critical components of many learning programs. Our projects include development of teacher and student resources and resource kits, learning games, software solutions, and complex interactive database design. Distance Learning Content and Delivery extend educational resources to audiences and individuals outside the classroom setting. Distance options both enhance and exponentially increase learning opportunities. The CICT is a premier provider of distance education, integrating curriculum, and technology. High-Quality Publications are a PREL hallmark. PREL produces and distributes numerous high-quality publications for educators, including its research compendium, Research into Practice; Pacific Educator magazine; educational books and videos; and briefs and reports on research findings and current topics of interest.

Membership—PREL serves teachers and departments and ministries of education in American Samoa, Commonwealth of the Northern Mariana Islands, Federated States of Micronesia (Chuuk, Kosrae, Pohnpei, and Yap) Guam, Hawaii, the Republic of the Marshall Islands, and the Republic of Palau. In addition, we work with the educational community on the continental United States and countries throughout the world. We are not a membership organization. We are grant funded with grants from the United States Departments of Education, Labor, Health and Human Services, and other federal funding agencies such as the Institute of Museum and Library Services and the National Endowment for the Arts. In addition, we have projects in partnership with regional educational institutions. Internationally we have worked with the International Labor Organization and the World Health Organization and are currently working with Save the Children on a US AID project in the Philippines.

Dues—n/a

Meetings—PREL supports the annual Pacific Educational Conference (PEC), held each July.

Publications—Publications are listed on the PREL website at http://ppo.prel.org/. Most are available in both PDF and HTML format. Some recent publications are described below: Focus on Professional Development, A (Research-Based Practices in Early Reading Series) A Focus on Professional Development is the fourth in the Research-Based Practices in Early Reading Series published by the Regional Educational Laboratory (REL) at Pacific Resources for Education and Learning (PREL). Because reading proficiency is fundamental to student achievement across all subjects and grades, the preparation of the teachers and administrators who are responsible for providing early reading instruction is of special importance. This booklet examines what research tells us about professional development and about the role that effective professional development plays in improving both teacher performance and student achievement. http://www.prel.org/products/re_/prodevelopment.pdf (902K) Look and See: Using the Visual Environment as Access to Literacy (Research Brief), this paper describes how the visual environment—what we see when we look—can be used to develop both visual and verbal literacy, including aesthetic appreciation, comprehension, and vocabulary. http://www.prel.org/products/re_/look_see.pdf (1M) Measuring the Effectiveness of Professional Development in Early Literacy: Lessons Learned (Research Brief) This Research Brief focuses on the methodology used to measure professional development (PD) effectiveness. It examines the needs that generated this research, what PREL did to meet those needs, and lessons that have been learned as a result. In particular, it discusses the development of a new instrument designed to measure the quality of PD as it is being delivered. http://www.prel.org/products/re_/effect_of_pd.pdf (730K) Pacific Early Literacy Resource Kit CD-ROM (Early Literacy Learning Resources) The Pacific Early Literacy Resource Kit was developed from PRELs research-based work performed with early literacy teachers in US-affiliated Pacific islands. The contents of the Resource Kit represent information, products, and processes we found beneficial as we worked to support literacy teachers in their efforts to improve student literacy achievement. http://www.prel.org/toolkit/index.htm Research Into Practice 2006 (PREL Compendium) This 86-page volume of PRELs annual research compendium brings together articles detailing research conducted during 2005 by PREL. The six articles in this issue focus on putting research findings to work to improve education. http://www.prel.org/products/pr_/compendium06/tableofcontents.asp

Name of Organization or Association—Research for Better Schools, Inc.

Acronym—RBS

Address:

112 North Broad Street
Philadelphia, PA
19102-1510
USA
Phone Number—(215)568-6150; **Fax Number**—(215)568-7260
Email Contact—info@rbs.org; **URL**—http://www.rbs.org/
Leaders—Keith M. Kershner Executive Director
Description—Research for Better Schools is a nonprofit education organization that has been providing services to teachers, administrators, and policy makers since 1966. Our mission is to help students achieve high learning standards by supporting improvement efforts in schools and other education environments. The staff are dedicated to and well experienced in providing the array of services that schools, districts, and states need to help their students reach proficient or higher learning standards: (1) technical assistance in improvement efforts; (2) professional development that is required for the successful implementation of more effective curricula, technologies, or instruction; (3) application of research in the design of specific improvement efforts; (4) evaluation of improvement efforts; (5) curriculum implementation and assessment; and (6) effective communication with all members of the school community. RBS has worked with a wide range of clients over the years, representing all levels of the education system, as well as business and community groups.
Membership—There is no membership in Research for Better Schools.
Dues—n/a
Meetings—n/a
Publications—RBS publishes a variety of books and other products designed for educators to use for schools improvement. The catalog for RBS Publications is online (visit our homepage at http://www.rbs.org).

Name of Organization or Association—SEDL
Acronym—SEDL
Address:
4700 Mueller Blvd.
Austin, TX
78723
USA
Phone Number—(512) 476-6861; **Fax Number**—(512) 476-2286
Email Contact—info@sedl.org; **URL**—www.sedl.org
Leaders—Dr. Wesley A. Hoover, President and CEO
Description—SEDL is a nonprofit education research, development, and dissemination organization based in Austin, Texas. Improving teaching and learning has been at the heart of SEDLs work since 1966. SEDL is committed to the belief that improvement of the educational system to meet the needs of all children requires a strong research base that is tightly linked to practice. SEDL partners with educators, administrators, parents, and policymakers to conduct research and development projects that result in strategies and resources to

improve teaching and learning. SEDL also helps partners and clients bridge the gap between research and practice with professional development, technical assistance, and information services tailored to meet their needs. These dissemination activities help SEDLs partners interpret and apply research findings based on their individual contexts and experiences. SEDL operates the Regional Educational Laboratory Southwest (REL Southwest), the Southeast Comprehensive Center (SECC) and the Texas Comprehensive Center (TXCC). One of ten national RELs funded by the Institute for Education Sciences, REL Southwest facilitates six research alliances composed of researchers, practitioners, and those with policy interests to share information and conduct collaborative work around high-priority problems of policy or practice. REL Southwest assists the states of Arkansas, Louisiana, New Mexico, Oklahoma, and Texas in using data and research evidence to address high-priority education needs in the region. REL Southwest maintains a website at http://relsouthwest.sedl.org SECC works closely with the state education agencies in Alabama, Georgia, Mississippi, North Carolina, and South Carolina to support efforts to implement, scale up, and sustain initiatives statewide and to lead and support districts and schools in improving student outcomes. Partners in this project include the American Institute for Research and RMC Research. SECC maintains a website at www.secc.org TXCC works closely with the Texas Education Agency (TEA) to support efforts to implement, scale up, and sustain initiatives statewide and to lead and support districts and schools in improving student outcomes. RMC Research is a partner in this project. TXCC maintains a website at www.txcc.org The Regional Educational Laboratory Southeast (REL Southeast) is located at Florida State University in partnership with SEDL, Instructional Research Group, and RMC Research Corporation. The REL Southeast serves the states of Alabama, Florida, Georgia, Mississippi, North Carolina, and South Carolina and hosts a website at rel-se.fcrr.org SEDL, in partnership with Virginia Commonwealth University, operates the Knowledge Translation for Employment Research (KTER) Center to improve employment outcomes for people with disabilities by promoting the use of relevant, high-quality research to improve support services. The KTER Center develops and implements dissemination, training, and technical assistance activities and provides detailed information about projects and resources at www.kter.org/ SEDL operates the Knowledge Translation for Disability and Rehabilitation Research (KTDRR) Center that applies knowledge translation to promote the use of relevant, high-quality disability and rehabilitation research among grantees of the National Institute on Disability and Rehabilitation Research (NIDRR), including those serving as Knowledge Translation Centers. KTDRR hosts a website at www.ktdrr.org/ SEDL conducts research and dissemination activities to improve services and quality of life for the increasing numbers of Americans with autism spectrum disorders. Through the Center for High-Performing Schools (CHPS), SEDL partners with schools and districts to improve teaching and learning and to produce lasting changes in organizational cultures. CHPS maintains a website at http://

highperformingschools.sedl.org The National Center for Family and Community Connections with Schools, housed at SEDL, provides research-based information and resources to strengthen connections among schools, families, and communities in ways that support student achievement and success. Resources include toolkits, webinars, an online research database, research syntheses, and briefs that are available at http://www.sedl.org/connections

Membership—Not applicable.

Dues—Not applicable.

Meetings—Not applicable

Publications—Newsletters, videos, webcasts, and other relevant presentations and documents are available for free general distribution in print and online on the SEDL website at www.sedl.org Topic-specific publications related to afterschool programs, assessment, disability research, early childhood, English language learners, family and community, improving school performance, knowledge translation, mathematics, reading, Response to Intervention (RtI), and technology in the classroom are available at http://www.sedl.org/pubs on the SEDL website.

Name of Organization or Association—Society of Photo Technologists

Acronym—SPT

Address:

11112 S. Spotted Rd.
Cheney, WA
99004
USA

Phone Number—800-624-9621 or (509)624-9621; **Fax Number**—(509)624-5320

Email Contact—cc5@earthlink.net; **URL**—http://www.spt.info/

Leaders—Chuck Bertone, Executive Director

Description—An organization of photographic equipment repair technicians, which improves and maintains communications between manufacturers and repair shops and technicians. We publish Repair Journals, Newsletters, Parts & Service Directory, and Industry Newsletters. We also sponsor SPTNET (a technical email group), Remanufactured parts and residence workshops. Currently our biggest thrust is into Service Adjustment Software, currently featuring Canon models.

Membership—1,000 shops and manufactures world wide, eligible people, or businesses are any who are involved full or part-time in the camera repair field.

Dues—$125.00–$370. Membership depends on the size/volume of the business. Most one man shops are Class A/$195 dues. Those not involved full time in the field is $125.00/Associate Class.

Meetings—SPT Journal; SPT Parts and Services Directory; SPT Newsletter; SPT Manuals—Training and Manufacturer's Tours.

Publications—Journals and Newsletters

Name of Organization or Association—The NETWORK, Inc.

Acronym—NETWORK
Address:
23 NE Morgan St.
Portland, OR
97211-2342
USA
Phone Number—800-877-5400, 503-265-8293; **Fax Number**—503-336-1014
Email Contact—davidc@thenetworkinc.org; **URL**—www.thenetworkinc.org
Leaders—David Crandall, President
Description—A nonprofit research and service organization providing training, research and evaluation, technical assistance, and materials for a fee to schools, educational organizations, and private sector firms with educational interests. The NETWORK has been helping professionals manage and learn about change since 1969. Our Leadership Skills series of computer-based simulations extends the widely used board game versions of Making Change (tm) and Systems Thinking/Systems Changing(tm) with the addition of Improving Student Success: Teachers, Schools, and Parents to offer educators a range of proven professional development tools. Networking for Learning, originally developed for the British Department for Education and Skills, offers a contemporary leadership development resource for educators exploring the challenges of complex collaborations involving multiple organizations. Development of web-based versions is currently underway.
Membership—none required
Dues—no dues, fee for service
Meetings—call
Publications—Making Change: A Simulation Game [board and computer versions]; Systems Thinking/Systems Changing: A Simulation Game [board and computer versions]; Improving Student Success: Teachers, Schools, and Parents [computer-based simulation]; Systemic Thinking: Solving Complex Problems; Benchmarking: A Guide for Educators; Networking for Learning; Check Yourself into College: A quick and easy guide for high school students.

Name of Organization or Association—Young Adult Library Services Association
Acronym—YALSA
Address:
50 E. Huron St.
Chicago, IL
60611
USA
Phone Number—(312)280-4390; **Fax Number**—(312)280-5276
Email Contact—yalsa@ala.org; **URL**—http://www.ala.org/yalsa
Leaders—Beth Yoke, Executive Director
Description—A division of the American Library Association (ALA), the Young Adult Library Services Association (YALSA) is a national association of librarians, library workers, and advocates whose mission is to expand and strengthen

library services for teens, aged 12–18. Through its member-driven advocacy, research, and professional development initiatives, YALSA builds the capacity of libraries and librarians to engage, serve, and empower teens. What We Do YALSA brings together key stakeholders from the areas of libraries, education, research, out of school time, youth development and more to develop and deliver resources to libraries that expand their capacity to support teen learning and enrichment and to foster healthy communities. Advocate by participating in events like National Library Legislative Day and implementing District Days initiatives for libraries to participate in, YALSA works at a national level to inform and engage policy makers and elected officials about the important role libraries and librarians play in preparing teens to become engaged, productive citizens. Research Through efforts such as its Research Agenda and Journal for Research on Libraries and Young Adults, YALSA promotes and disseminates relevant research. Train in order to ensure that librarians and library workers have the skills needed to engage, educate, and support teens, YALSA offers a wealth of continuing education activities, including e-learning and a biennial symposium. Through grant funding YALSA is developing digital badges that will provide a new way for librarians and library workers to gain skills and demonstrate their expertise to employers. Build Capacity YALSA provides over $150,000 per year to libraries through grants to help libraries do things like offer summer reading programs, hire teen interns, and increase their digital media offerings. YALSA scholarships and stipends support librarians and library workers seeking to further their education or gain leadership skills. Read our 2012 report on Helping Libraries Meet the Needs of Diverse Teens.

Membership—5,500. YALSA members may be young adult librarians, school librarians, library directors, graduate students, educators, publishers, or anyone for whom library service to young adults is important.

Dues—$50; $20 students; $20 retirees (in addition to ALA membership)

Meetings—Two ALA conferences yearly, Midwinter (January), and Annual (June); one annual Young Adult Literature Symposium (beginning in 2008)

Publications—Young Adult Library Services, a quarterly print journal YAttitudes, a quarterly electronic newsletter for members only

Part IV
Graduate Programs

Chapter 16
Introduction

Michael Orey

Part V includes annotated entries for graduate programs that offer degrees in the fields of learning, design and technology or library and information science. In an effort to only list active organizations, I deleted all programs that had not updated their information since 2012. All readers are encouraged to contact the institutions that are not listed for investigation and possible inclusion in the 2015 edition.

Information for this section was obtained through e-mail directing each program to an individual web form through which the updated information could be submitted electronically into a database created by Michael Orey. Although the section editor made every effort to contact and follow up with program representatives, responding to the annual request for an update was the responsibility of the program representatives. The editing team would like to thank those respondents who helped assure the currency and accuracy of this section by responding to the request for an update. In this year's edition, I asked for some data on numbers of graduates, number of faculty, and amount of grants and contracts. These data were used as self-report top 20 lists in the preface to this book. Readers should be aware that these data are only as accurate as the person who filled the form for their program.

M. Orey (✉)
Learning, Design, and Technology Program, The University of Georgia, Athens, GA, USA
e-mail: mikeorey@uga.edu

M. Orey, R.M. Branch (eds.), *Educational Media and Technology Yearbook*,
Educational Media and Technology Yearbook 39,
DOI 10.1007/978-3-319-14188-6_16

Chapter 17
Worldwide List of Graduate Programs in Learning, Design, Technology, Information, or Libraries

Michael Orey

This information will be used solely to construct a directory of relevant organizations and associations within the *2015 Educational Media & Technology Yearbook*. The data supplied here will **not** be intentionally shared or publicized in any other form. Thank you for your assistance.

Name of institution—Athabasca University
Name of department or program—Centre for Distance Education
Address:
1 University Drive
Athabasca, AB
T9S 3A3
Canada
Phone number—1-780-675-6426 **Fax number**—1-780-675-6170
Email contact—martic@athabascau.ca **URL**—cde.athabascau.ca
Contact person—Marti Cleveland-Innes
Specializations—Doctor of Education in Distance Education Master of Education in Distance Education Post-Baccalaureate Diploma in Distance Education Technology Post-Baccalaureate Diploma in Instructional Design Post-Baccalaureate Certificate in Instructional Design Post-Baccalaureate Certificate in Technology-Based Learning.
Features—Doctor of Education in Distance Education Master of Education in Distance Education Post-Baccalaureate Diploma in Distance Education Technology Post-Baccalaureate Diploma in Instructional Design Post-Baccalaureate Certificate in Instructional Design Post-Baccalaureate Certificate in Technology-Based Learning.

M. Orey (✉)
Learning, Design, and Technology Program, The University of Georgia, Athens, GA, USA
e-mail: mikeorey@uga.edu

M. Orey, R.M. Branch (eds.), *Educational Media and Technology Yearbook*,
Educational Media and Technology Yearbook 39,
DOI 10.1007/978-3-319-14188-6_17

Admission requirements—Doctorate of Education in Distance Education Admission requirements for the doctoral program includes both academic and experiential elements.

- Completion of a Master's degree, preferably with a thesis or research project, in a relevant field or area of study (e.g., education or distance education, psychology or educational psychology, instructional technology, adult education, curriculum and instruction, and the like) from a recognized university, normally with a GPA of at least 3.7 or 85 % (Graduate Grading Policy);
- Significant experience in open or distance learning, which demonstrates that the student is capable of studying at a distance, and of completing high-quality original research with distance supervision only. Master of Education in Distance Education Applicants to the MDE program must hold a baccalaureate degree from a recognized post-secondary education institution. If the potential applicant does not have a degree, but believes his or her education and experience is equivalent to an undergraduate degree, then it is the responsibility of the applicant to put forward this position in writing as part of the application process. Post-Baccalaureate Diploma in Distance Education Technology Applicants to the program must hold a baccalaureate degree from a recognized post-secondary education institution. If the potential applicant does not have a degree, but believes that his or her education and experience is equivalent to an undergraduate degree, then it is the responsibility of the applicant to put forward this position in writing as part of the application process. Post-Baccalaureate Diploma in Instructional Design Applicants to the program must hold a baccalaureate degree from a recognized post-secondary education institution. If the potential applicant does not have a degree, but believes that his or her education and experience is equivalent to an undergraduate degree, then it is the responsibility of the applicant to put forward this position in writing as part of the application process. Post-Baccalaureate Certificate in Instructional Design Applicants to the program must hold a baccalaureate degree from a recognized post-secondary education institution. If the potential applicant does not have a degree, but believes that his or her education and experience is equivalent to an undergraduate degree, then it is the responsibility of the applicant to put forward this position in writing as part of the application process.

Degree requirements—Doctor of Education in Distance Education the Doctor of Education in Distance Education program will address the needs of a wide range of practitioners, scholars, and researchers who operate in the distance education arena. The doctorate will provide critical direction as distance education evolves and expands. The primary goal of the doctoral program is to provide students with a complete and rigorous preparation to assume senior responsibilities for planning, teaching, directing, designing, implementing, evaluating, researching, and managing distance education programs. Master of Education in Distance Education Athabasca University Master of Education in Distance Education program is designed to provide a common base of skills, knowledge, and values regarding distance education and training, independent of any special area of interest. Post-Baccalaureate Diploma in Distance Education Technology

Athabasca University Post-Baccalaureate Diploma in Distance Education Technology is a focused, 18-credit (six courses) program designed to provide a solid grounding in the current principles and practices of technology use in distance education and training. The program structure and course content emphasize the concepts and skills required of practitioners who are employed as instructors, teachers, trainers, decision makers, planners, managers, and administrators in distance education or "virtual" programs. The emphasis of the program is on the user of technology for the preparation, delivery, and management of instruction. Post-Baccalaureate Diploma in Instructional Design the Post-Baccalaureate Diploma in Instructional Design is an 18-credit program comprising six courses. For those who wish to pursue instructional design as a profession, this Diploma program provides more depth and breadth than the certificate. Post-Baccalaureate Certificate in Instructional Design the Post-Baccalaureate Certificate in Instructional Design is a 9-credit program comprises three courses. For those wanting to enhance their instructional design expertise, the Certificate program is an expedient way to obtain the appropriate skills and knowledge.

Number of full-time faculty—10; **Number of other faculty**—19

Degrees awarded in 2012–13 academic year—Masters: 38; **Ph.D.:** 3; **Other:** 10

Grant monies awarded in 2012–13 academic year—185,000

Name of institution—University of Calgary

Name of department or program—Office of Graduate Programs, Faculty of Education

Address:

Education Tower 114, 2500 University Drive NW, University of Calgary

Calgary, AB

T2N 1N4

Canada

Phone number—1-403-220-5675 **Fax number**—1-403-282-3005

Email contact—jvlock@ucalgary.ca **URL**—http://ucalgary.ca/gpe/

Contact person—Dr. Jennifer Lock

Specializations—In a knowledge-based economy, the Ph.D., EDD, M.A., and M. Ed. programs in the Educational Technology specialization in Educational Research at the University of Calgary have proven valuable to public and private sector researchers, post-secondary faculty, school teachers and school leaders, military/industrial trainers, health educators, instructional designers, managers, and leaders. A spectrum of entrepreneurs and educational experts have successfully completed our graduate programs in educational technology and are using their research, knowledge and competencies in schools, in higher education and a range of corporate and private workplaces today. Our graduates have careers as practitioners and scholars in the top government, industry, K-12 and higher education institutions as professors, education and training leaders, teachers, and instructors—worldwide. Your academic and professional career growth is possible through our innovative, student-centered programs and supervision processes in this growing, vibrant area. Degree programs can be completed on campus, in blended formats or completely online.

Features—The Educational Technology Specialization is interdisciplinary and is addressed to at least two audiences: (a) Post-secondary teachers and leaders, and school leaders and classroom teachers who are interested in the study and practice of educational technology to facilitate learning or who are interested in technology leadership positions or who are interested in academic careers in higher education; (b) Those who are interested in instructional design and development in settings both within and outside elementary/secondary/tertiary schools, e.g., instructional developers and faculty developers in colleges, institutes of technology and universities, military/industrial trainers, health educators, and private training consultants. Graduate students in the educational technology specialization have the opportunity to investigate a broad spectrum of knowledge building, participatory cultures, instructional design, and development theories and practices as they apply to current and emergent technologies and to explore new directions in instructional design and development and evaluation as they emerge in the literature and in practice.

Admission requirements—The Master of Education (M.Ed.) is a course-based professional degree. The M.Ed. program is available in online formats. Admission requirements normally include a completed 4-year Bachelor's degree and a 3.0 GPA. The Master of Arts (M.A.) is a thesis-based degree with a residency requirement that is intended to prepare students for further research. Admission requirements normally include a completed 4-year Bachelor's degree and a 3.3 GPA. The Doctor of Education (Ed.D.) is a thesis-based degree intended to prepare scholars of the profession for careers in leadership and teaching. The EDD program is available in the online format. Admission requirements normally include a completed Master's degree and a 3.5 GPA. The Doctor of Philosophy (Ph.D.) is a thesis-based degree with a residency requirement intended to prepare scholars of the discipline for careers in research and teaching. The Ph.D. program is available for full-time, on-campus engagement in apprenticeship. Admission requirements normally include a completed Master's thesis and a 3.5 GPA.

Degree requirements—Program requirements for the Master of Education (M.Ed.) program are completion of a minimum of six full-course equivalents (12 half-courses). In Educational Technology, Master of education students complete 7 half-courses in the specialization of educational technology and 5 half-courses in educational research methodology and action research. The Master of Education cohort-based degree consists of a total of 36 credits (12 half-courses). Graduate students are required to complete their courses in a prescribed sequence. Students are expected to complete all program requirements within 2 years. Program requirements for the Master of Arts (M.A.) thesis program include: (a) two 600 level half-courses in research methods; (b) a non-credit research seminar; (c) 6 half-courses from the Technology Specialization consisting of the following: EDER 679.31 and EDER 671; 4 half-courses selected from the Technology course offering; and any additional courses as determined by the supervisor in consultation with the student; (d) A Master's thesis and an oral examination on the thesis. The Education Doctorate (EDD) in Educational Technology is a

3-year cohort-based program consisting of: (a) Course work, (b) Candidacy examination, (c) Dissertation year 1—is designed primarily to develop students' competencies as "critical consumers of educational research" and skills to conduct practitioner-inquiry. As outlined within the program to which the student has applied, first year students must complete: (a) two half-courses in research: EDER 701.06, and either EDER 701.07 or EDER 701.08 (b) two half-courses in the students specialization area year 2—is designed to engage students in an in-depth analysis of an identified problem of practice through diverse academic disciplines (e.g., leadership, adult learning). Specialization course work exposes students to context-specific best practices and cutting edge research and emphasizes the application of theory and research to practice within collaboratories of practice. As outlined within the program to which the student has applied, students must complete: (a) two half-courses in the students specialization area, (b) two specialization collaboratories of practice half-courses, (c) comprehensive candidacy examination year 3—is designed to support students in synthesizing their year 2 inquiry projects into a dissertation. Students work collaboratively with faculty and practitioners from their field to complete a dissertation that addresses a contemporary issue in education. As outlined within the program to which the student has applied, students must complete: (a) Dissertation Seminar I, (b) Dissertation Seminar II, (c) Doctoral Dissertation Program requirements for the on-campus Doctor of Philosophy (Ph.D.) program include: (a) Three 600- or 700-level half-courses in research methods (specific courses are listed from which students select in conjunction with supervisor); (b) In addition, Ph.D. students in the Educational Technology specialization are required to complete EDER 771 and two half-courses at the 700 level in technology; (c) Candidacy examination; (d) Dissertation.

Number of full-time faculty—6; **Number of other faculty**—72

Degrees awarded in 2012–13 academic year—Masters: 250; **Ph.D.:** 15; **Other:** 15

Grant monies awarded in 2012–13 academic year—20,000,000

Name of institution—University of British Columbia

Name of department or program—Master of Educational Technology degree program

Address:

1304-2125 Main Mall

Vancouver, BC

V6T 1Z4

Canada

Phone number—1-888-492-1122 **Fax number**—1-604-822-2015

Email contact—info@met.ubc.ca **URL**—http://met.ubc.ca

Contact person—David Roy

Specializations—This innovative online program provides an excellent environment in which to learn the techniques of instructional design including the development and management of programs for international and intercultural populations. Attracting students from more than 30 countries, the program provides a unique opportunity to learn and collaborate with professionals and colleagues from around the world. The MET curriculum is designed for K-12 teachers, college and university faculty, course designers, adult and industry educators.

Features—MET fully online graduate degree. MET Graduate Certificate in Technology-Based Distributed Learning. MET Graduate Certificate in Technology-Based Learning for Schools.

Admission requirements—Please see website.

Degree requirements—Masters Program: 10 courses Graduate Certificates: 5 courses

Number of full-time faculty—9; **Number of other faculty**—8

Degrees awarded in 2012–13 academic year—Masters: 74; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—University of New Brunswick

Name of department or program—Faculty of Education

Address:
PO Box 4400
Fredericton, NB
E3B 5A3
Canada

Phone number—506-452-6125 **Fax number**—506-453-3569

Email contact—erose@unb.ca **URL**—http://www.unbf.ca/education/

Contact person—Dr. Ellen Rose

Specializations—Courses offered include Introduction to Instructional Design, Designing Constructivist Learning Environments, Needs Assessment, Designing Instructional Materials, Instructional Design for Online Learning, and Educational Technology: Key Issues and Trends. In addition, students are allowed to take other courses in the Faculty of Education or other applicable areas.

Features—Students can choose the course, project, or thesis stream. UNBs M.Ed. in Instructional Design is very flexible, allowing students to customize their own learning experiences in order to meet their particular learning outcomes. While this is not an online program, most of the Instructional Design courses, and many other relevant courses in the Faculty of Education, are available online.

Admission requirements—Applicants must have an undergraduate degree in Education or a relevant field, a grade point average of at least 3.0 (B, or its equivalent), and at least 1 year of teaching or related professional experience. Applicants whose first language is not English must submit evidence of their proficiency in the use of the English language. The minimum proficiency levels accepted by the Faculty of Education are scores of 650 on the TOEFL (280 computer-based) and 5.5 on the TWE.

Degree requirements—Course route: ten 3-credit hour courses Project route: eight 3-credit hour courses and one project/report Thesis route: five 3-credit hour

courses and one thesis required courses: Introduction to Instructional Design and Introduction to Research in Education.
Number of full-time faculty—1; **Number of other faculty**—2
Degrees awarded in 2012–13 academic year—Masters: 5; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—University of Saskatchewan
Name of department or program—Educational Technology and Design
Address:
28 Campus Drive, College of Education
Saskatoon, SK
S7N 0X1
Canada
Phone number—306-966-7558 **Fax number**—306-966-7658
Email contact—jay.wilson@usask.ca **URL**—http://www.etad.ca
Contact person—Dr. Jay R. Wilson
Specializations—We offer a general educational technology degree, but with a particular emphasis on instructional design in all course work.
Features—Almost all of our courses are delivered in flexible formats. Courses can be taken completely online or blended with classroom experiences. A few courses are only offered face-to-face, but an entire program can be taken online. Many of our courses emphasize authentic learning options, where students work on projects with clients.
Admission requirements—A professional Bachelor's degree or the equivalent of a 4-year Bachelor of Arts. Normally, we require a minimum of 1 year of practical experience in education or a related field. An average of 70 % in your most recent 60 credit units of university course work.
Degree requirements—M.Ed. (course-based) students need to complete 30 credit units of graduate level course work for the degree. M.Ed. (project) students require 24 credit units of graduate level course work and the project seminar (ETAD 992.6) supervised by a faculty member in the program. M.Ed. (thesis) students need to complete 21 units of graduate level course work and a thesis supervised by a faculty member in the program and a committee.
Number of full-time faculty—3; **Number of other faculty**—3
Degrees awarded in 2012–13 academic year—Masters: 17; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—200,000

Name of institution—The University of Hong Kong
Name of department or program—Faculty of Education
Address:
Pokfulam Road
Hong Kong, x
x
China
Phone number—852 2859-1903 **Fax number**—852 2517 0075
Email contact—mite@hku.hk **URL**—http://web.edu.hku.hk/programme/mite/

Contact person—Dr. Timothy Hew
Specializations—The Master of Science in Information Technology in Education [M.Sc. (ITE)] program offers the following three specialist strands: E-leadership–E-learning–Learning technology design.
Features—The program aims to provide—an investigation into Web2.0, mobile learning, and other emerging learning and teaching technology applications—an opportunity to apply technology in learning and teaching—an opportunity to work in technology-rich learning environment—an exploration of the cultural, administrative theoretical, and practical implications of technology in education—an introduction to research in technology for education—an opportunity for those wishing to develop leadership capabilities in the use of technology in education.
Admission requirements—Applicants should normally hold a recognized Bachelor's Degree with honors or qualifications of equivalent standard. Applicants may be required to sit for a qualifying examination.
Degree requirements—To complete the following modules in 1 year full-time study or no more than 4 years of part-time studies—3 core modules—3 modules from a specialist strand plus either of the following:

- Independent project and 3 elective modules; or
- Dissertation and 1 elective module

Number of full-time faculty—20; **Number of other faculty**—90
Degrees awarded in 2012–13 academic year—**Masters:** 0; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—Andong National University
Name of department or program—Department of Educational Technology, College of Education
Address:
1375 Kyungdong St. (Songchun-dong)
Andong, Kyungbuk
760-749
Korea
Phone number—+82-54-820-5580, 5585 **Fax number**—+82-54-820-7653
Email contact—ycyang@andong.ac.kr **URL**—http://home.andong.ac.kr/edutech/
Contact person—Dr. Yong-Chil Yang
Specializations—Instruction Systems Design and e-HRD major for Masters Degree Educational Technology major for Ph.D.
Features:

- Only Department supported by Ministry of Education in Korea
- B.A., M.A., and Ph.D. programs are offered
- Established in 1996
- Inexpensive tuition and living expenses
- Small class size
- Edutech, ANU Edutech, Educational Technology

Admission requirements—English or Korean language
Degree requirements—B.A. degree for M.A. degree in Education for Ph.D.
Number of full-time faculty—5; **Number of other faculty**—10
Degrees awarded in 2012–13 academic year—**Masters:** 10; **Ph.D.:** 2; **Other:** 18
Grant monies awarded in 2012–13 academic year—35,000

Name of institution—Universiti Sains Malaysia
Name of department or program—Centre for Instructional Technology and Multimedia
Address:
Centre for Instructional Tech and Multimedia, Universiti Sains Malaysia
Minden, Pg
11800
Malaysia
Phone number—604-6533222 **Fax number**—604-6576749
Email contact—marimuthu@usm.my **URL**—http://www.ptpm.usm.my
Contact person—Mr. Marimuthu P Ratnam
Specializations—Instructional Design Web/Internet Instruction and Learning Educational Training/Resource Management Instructional and Training Technology/Evaluation Instructional System Development Design and Development of Multimedia/Video/Training materials Constructivism in Instructional Technology E-Learning Systems, Learning Management Systems Digital Audio and Video Production Mobile Learning Persuasive Technology in Instructional Design.
Features—(1) Masters in Instructional Multimedia (course work mode)—entering its ninth academic year 2012–2013—Full-time—1–2 years, Part-time—2–4 years. (2) Master of Arts—Instructional Technology (Research mode) (3) Ph.D.—Instructional Technology (Research mode) Consultancy services on the application of educational/Instructional Design technology in teaching and learning Training and Diffusion, Continuing Education in support of Life Long Learning Academic Support Services—services to support research, teaching, and learning activities and centers within the University.
Admission requirements—Bachelors and Masters degree from accredited institution or relevant work experience
Degree requirements—Part-time/Full-time
Number of full-time faculty—12; **Number of other faculty**—0
Degrees awarded in 2012–13 academic year—**Masters:** 19; **Ph.D.:** 4; **Other:** 0
Grant monies awarded in 2012–13 academic year—100,000

Name of institution—Anton Chekhov Taganrog Institute
Name of department or program—Media Education (Social Pedagogic Faculty)
Address:
Iniciativnaya, 48
Taganrog,
347936
Russia

Phone number—(8634)601753 **Fax number**—(8634)605397
Email contact—1954alex@mail.ru **URL**—http://www.tgpi.ru
Contact person—Prof. Dr. Alexander Fedorov
Specializations—Media Education, Media Literacy, Media Competence
Features—no
Admission requirements—Various per year, please see http://www.tgpi.ru
Degree requirements—admission after high school (for B.A.) and B.A. or M.A. for Ph.D. level
Number of full-time faculty—10; **Number of other faculty**—20
Degrees awarded in 2012–13 academic year—**Masters:** 0; **Ph.D.:** 1; **Other:** 25
Grant monies awarded in 2012–13 academic year—60,000

Name of institution—Keimyung University
Name of department or program—Department of Education
Address:
1095 Dalgubeldaro
Dalseogu, Daegu
704-701
South Korea
Phone number—82-53-580-5962
Email contact—weom@kmu.ac.kr
Contact person—Wooyong Eom
Specializations—x
Features—x
Admission requirements—For foreigners, should have above 3 class of TOPIK
Degree requirements—Above Bachelors degree for Masters, Masters degree for doctoral
Number of full-time faculty—8; **Number of other faculty**—2
Degrees awarded in 2012–13 academic year—**Masters:** 5; **Ph.D.:** 1; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—University of Geneva
Name of department or program—TECFA—Master of Science in Learning and Teaching Technologies
Address:
Bat. Pignon, 40 bd du Pont d'Arve
Geneva, GE
1205
Switzerland
Phone number—41 22 379 93 75 **Fax number**—41 22 379 93 79
Email contact—Mireille.Betrancourt@unige.ch **URL**—http://tecfa.unige.ch/maltt/
Contact person—Prof. Dr. Mireille Bétrancourt
Specializations—Basics in information and communication technologies Design of computer-supported learning technology Mediated Communication and e-learning User-centered design and ergonomics Research methods in educational

technologies Blended education (face-to-face sessions alternately with tutored distance periods, with a ratio of 1 week F2F for 5 weeks at a distance) 120 ECTS, 2-year program Learning approach: mostly project based, with authentic project design and collaborative work French language.

Features—Information at: http://tecfa.unige.ch/maltt/ Collaborative encyclopedia (with student participation) about educational technologies and related models, concepts, and technology: http://edutechwiki.unige.ch/en/Main_Page.

Admission requirements—Applicants should qualify to be admitted in Masters program at the University of Geneva and be fluent in French. For more information, see http://tecfa.unige.ch/maltt/futurs—etudiants/admission/.

Degree requirements—Bachelors degree training or experience in training, education, or psychology.

Number of full-time faculty—4; **Number of other faculty**—1

Degrees awarded in 2012–13 academic year—**Masters:** 8; **Ph.D.:** 2; **Other:** 6

Grant monies awarded in 2012–13 academic year—600,000

Name of institution—Utrecht University

Name of department or program—Educational Sciences

Address:

Heidelberglaan 1

Utrecht, xx

3581RW

The Netherlands

Phone number—+31302534931 **Fax number**—+31302534300

Email contact—p.p.m.leseman@uu.nl **URL**—http://www.uu.nl/NL/Informatie/master/edsci/Pages/study.aspx

Contact person—Paul Leseman Ph.D.

Specializations—The 2-year (120 EC) program concentrates on the theory, use, and effects of innovative teaching and learning arrangements aimed at meaningful, enjoyable learning through the application of different theories, paradigms, and media. Research projects use both experimental design-based and longitudinal approaches and combine qualitative and quantitative analyses of interaction processes and learning products in different teaching and/or learning environments.

Features—The program combines high-level course work with hands-on research skill and competence development. Students take courses on various theories of learning, instruction, and teaching, and are trained in advanced research techniques and statistical methods to study the design and effectiveness of innovative teaching and learning arrangements. Research seminars help students develop their academic skills. Participation in a senior faculty members' research project introduces each student to "hands-on" research. Throughout the program, various electronic learning environments are used to support students in their collaborative study assignments and to allow them to experiment with these innovative learning and instruction tools. The program offers a systematic theoretical and empirical analysis of educational phenomena and problems. It emphasizes three goals. Helping students develop: (1) A strong foundation in research and in theories of learning, instruction, and teaching; (2) Competence in conducting high-quality educational research; (3) Capacities and skills to apply basic knowledge and specific research methods from various domains to the study of learning in interaction in education. The program concludes with writing a Master's thesis in the form of a draft research article for international publication.

Admission requirements—Applicants should hold a B.A. or B.Sc. in one of the relevant social or behavioral sciences (such as education, psychology, cognitive science, informatics, artificial intelligence) or in a domain relevant to teaching in schools (e.g., math, science, linguistics, history). It is required of applicants to have successfully completed several undergraduate courses on statistics in order to have a basic knowledge of multivariate analysis at the beginning of their first semester. There is a summer school for students who do not meet this requirement. Students meeting the above criteria who have a GPA of at least 2.85 (Dutch equivalent: 7.0) are encouraged to apply for admission. Students will be selected on the basis of their Grade Point Average (GPA), an essay on their motivation and their recommendations; in some cases, an intake interview will also be conducted. All courses are taught in English; therefore, all students are required to provide proof of their English language proficiency. Examples of accepted minimum English language test scores: TOEFL paper: 580 TOEFL computer: 237 TOEFL Internet: 93.

Degree requirements—Completion of all courses and thesis
Number of full-time faculty—12; **Number of other faculty**—7
Degrees awarded in 2012–13 academic year—**Masters:** 100; **Ph.D.:** 5; **Other:** 0
Grant Monies awarded in 2012–13 academic year—150,000

Name of institution—Middle East Technical University
Name of department or program—Computer Education & Instructional Technology
Address:
Inonu Bulvari
Ankara, Cankaya
06800
Turkey
Phone number—+90-3122104193 **Fax number**—+90-3122107986
Email contact—myozden@metu.edu.tr **URL**—http://www.ceit.metu.edu.tr
Contact person—M. Yasar OZDEN
Specializations—Computer education, instructional technology
Features—x
Admission requirements—x
Degree requirements—x
Number of full-time faculty—20; **Number of other faculty**—40
Degrees awarded in 2012–13 academic year—**Masters:** 5; **Ph.D.:** 10; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—Hacettepe University
Name of department or program—Computer Education and Instructional Technology
Address:
Faculty of Education, Hacettepe University, Beytepe
Ankara, Turkey
06800
Turkey
Phone number—+90-312-2977176 **Fax number**—0
Email contact—kocak@hacettepe.edu.tr **URL**—http://www.ebit.hacettepe.edu.tr/
Contact person—Yasemin Koçak Usluel
Specializations—The CEIT department has been established in 1998. Innovations and improvements in technology have changed so many things in people's life. There have been huge improvements in terms of diffusion of information. Computers continue to make an ever increasing impact on all aspects of education from primary school to university and in the growing areas of open and distance learning. In addition, the knowledge and skills related to computers have become essential for everybody in the information age. However, at all levels in society there is a huge need for qualified personnel equipped with the skills that help them to be successful in their personal and professional life. The department aims to train students (prospective teachers) who would teach computer courses in K-12 institutions. It also provides individuals with professional skills in the development, organization, and application of resources for the solution of instructional problems within schools.
Features—The department has M.S. and Ph.D. programs. The research areas are: Learning objects and ontologies, diffusion of innovation, technology integration into education, computerized testing, e-learning environments, design, development and assessment of online learning environments, mobile learning.
Admission requirements—B.S. in education or computer-related fields
Degree requirements—B.S.
Number of full-time faculty—10; **Number of other faculty**—15
Degrees awarded in 2012–13 academic year—**Masters:** 2; **Ph.D.:** 6; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—Anadolu University
Name of department or program—Computer Education and Instructional Technology
Address:
Faculty of Education
Eskisehir, x
26470
Turkey
Phone number—00902223350580/3519 **Fax number**—00902223350579
Email contact—fodabasi@anadolu.edu.tr **URL**—https://academy.anadolu.edu.tr/display.asp?kod=0&acc=fodabasi

Contact person—Prof. Dr. H. Ferhan Odabasi

Specializations—The basic aim of the department is to equip students, with up-to-date knowledge about computer and other information technologies, required for K-12 computer teachers. Graduated students of the department can be employed in public or private schools of The Ministry of National Education, as teachers, instructional technologists, or academicians in the universities. The department offers Bachelors, Masters, and Doctorate programs. Both department staff and students collaborate with international schools in terms of teaching and research through exchange programs. Some of the themes, having been studied by academic staff of the department, are: computer-assisted instruction, computer-assisted language instruction, educational technology, computer use in education and school systems, effects of technology on individuals, computer anxiety, industrial design, using Internet in education, instructional design, instructional software design, statistics, professional development, ICT action competence, technology integration into education, technology integration into special education, safe Internet use, cyber-bullying, digital storytelling, and mobile learning.

Features—Computer Education and Instructional Technologies Department has two computer labs. Technical properties of the computers in both of the labs are up to date. In addition, students can use the main library which is around 100 m to department building. Students may reach many books and journals about computers and instructional technologies and have access to various data bases and electronic journals. There is a non-smoking cafeteria for students in the faculty building where they can find snacks, sandwiches, hot and cold drinks. There is also a small room for the smokers. There is a main student cafeteria for students on the campus. There are also fast food restaurants on the campus.

Admission requirements—High School Diploma plus required scores from the Student Selection Examination administered by Student Selection and Placement Centre and successful completion of qualification examinations. For foreign students, High School Diploma plus required scores from the Foreign Student Examination and successful completion of qualification examinations. Associate Degree plus placement by Student Selection and Placement Centre according to the score obtained in the Student Selection Examination and the students preferences. In addition, may apply to Masters or doctorate programs in any field or proficiency in fine arts programs. May apply to Bachelors degree completion programs in related fields of study in Distance Education System.

Degree requirements—For Bachelors degree, students are selected by Student Selection and Placement Center according to the students? Scores in the Student Selection Exam. About 50 students are admitted to the department each year. The duration of the program is 4 years. Students must pass all courses and obtain a minimum GPA (Grade Point Average) of 2.00 before they can graduate. The official language of instruction is Turkish. Students who want to learn English can attend a 1-year English preparatory school before taking the department courses. The students are required to take courses and prepare and defend a thesis based on their research. It takes approximately 2 years to complete the Master's degree. The doctorate degree requires course work and research. The students will conduct original research and prepare a dissertation, then make an oral defense of their completed research. Students require about 4 years beyond the Master's degree to complete a doctorate program.

Number of full-time faculty—10; **Number of other faculty**—16

Degrees awarded in 2012–13 academic year—Masters: 0; **Ph.D.:** 4; **Other:** 0

Grant monies awarded in 2012–13 academic year—131,550

Name of institution—The University of Arizona

Name of department or program—University of Arizona South, Educational Technology Program

Address:

Science & Technology Park 9040 S Rita Road, Suite 2260

Tucson, AZ

85747

United States

Phone number—520-626-9381 **Fax number**—520-626-1794

Email contact—bcozkan@email.arizona.edu **URL**—http://edtech.arizona.edu/content/welcome

Contact person—Dr. Betul Özkan-Czerkawski

Specializations—Ph.D. Minor in Educational Technology; Master of Science in Educational Technology; Graduate Certificate in Instructional Design and Technology; Master of Arts in Second Language Learning and Educational Technology; Undergraduate Minor in Educational Technology.

Features—Fully online

Admission requirements—Satisfy the admission standards of the UA Graduate College and the Educational Technology Program, including: A completed Bachelor's degree (in the last 60 credit hours) or Master's program from an accredited institution with an overall Grade Point Average (GPA) of 3.0 on a 4.0 scale; A completed application form, along with copies of all undergraduate and graduate transcripts and payment of Graduate College application fees; Three letters of recommendation dated within 6 months of the date of application and written by professionals who are in a position to address the applicants ability to succeed at the graduate level; A completed student information form that includes a brief statement of long-range professional goals and a 500-word summary on a topic relating to educational technology. Ph.D. Minor Admission Requirements: Ph.D. Minor: Minimum Credit Hours: 9 Core Courses: Only the Ph.D. students at the University of Arizona can minor in Educational Technology and take any course listed for the M.S. in Educational Technology Program. However, students should contact the Program Director first to set up their Plan of Study before taking any courses. More information is at: http://edtech.arizona.edu/content/phd-minor Graduate Certificate in Instructional Design and Technology Admission Requirements: A Bachelor's degree from an accredited institution with an overall Grade Point Average (GPA) of 2.0 on a 4.0 scale; A completed application form, along with copies of undergraduate transcripts and payment of Graduate College application fees; One letter of recommendation dated within 6 months of the date of application and written by professionals who are in a position to address the applicants ability to succeed at the graduate level.

Degree requirements—M.S. in Educational Technology: The Master's degree program of study is developed in consultation with a faculty advisor and requires a minimum of 36 units of graduate courses, with at least 24 of these units taken in Educational Technology. The choices within the program of study are based on professional aspirations, scholastic needs, and personal preferences. For completion, the Master's degree program requires development of a best-works portfolio. Ph.D. Minor: This program requires minimum of nine credit/units. Graduate Certificate in Instructional Design and Technology: This program requires 15 credit/units. Undergraduate Minor in Educational Technology: The minor program of study is developed in consultation with an academic advisor and requires a minimum of 18 units of undergraduate courses.

Number of full-time faculty—2; **Number of other faculty**—6

Degrees awarded in 2012–13 academic year—Masters: 20; **Ph.D.:** 0; **Other:** 6

Grant monies awarded in 2012–13 academic year—0

Name of institution—The Ohio State University

Name of department or program—Educational Technology

Address:

29 W. Woodruff Dr.

Columbus, OH

43210

United States

Phone number—(614) 292-2461 **Fax number**—614) 292-8052

Email contact—voithofer.2@osu.edu **URL**—http://ehe.osu.edu/educational-studies/educational-technology/

Contact person—Rick Voithofer

Specializations—The Educational Technology program offers both M.A. and Ph.D. degrees, in addition to a Computer/Technology Endorsement. This interdisciplinary educational technology program focuses on intersections of learning and technology in formal and informal educational settings and in society at large. Some of the settings addressed in the program include K-12 environments, distance education, e-learning, online education, higher education, urban education, corporate and non-profit organizations, non-governmental organizations (NGOs), and community-based organizations and programs. Students in the program are exposed to a variety of technologies and media including educational multimedia, computer-based instruction, pod/video casts, online learning environments, mobile technologies, blogs and wikis, MOOCs, educational games, video, and electronic portfolios. Areas of focus studied by faculty and students include:

- Educational technology, digital divides, and diverse populations
- Computer-supported collaborative learning
- Education and globalization
- Online educational research

- Artificial intelligence in education
- Education Policy and Technology
- Visual Culture and Visual Media
- Multiliteracies, learning, and technology
- Games and simulations
- Technology, virtuality, and student identities. Students in this area integrate theoretical and practical studies of technologies and media through pedagogical, social, cultural, economic, psychological, historical and political inquiry and critique, in addition to the production of educational technologies.

Features—See: http://go.osu.edu/jKv
Admission requirements—Please see: http://ehe.osu.edu/educational-studies/prospective-students/
Degree requirements—M.A.: http://ehe.osu.edu/downloads/academics/program-sheets/educational-technology-specialization-in-educational-studies-ma.pdf Ph.D.: http://ehe.osu.edu/downloads/academics/program-sheets/educational-technology-specialization-in-educational-studies-phd.pdf
Number of full-time faculty—2; **Number of other faculty**—8
Degrees awarded in 2012–13 academic year—Masters: 10; **Ph.D.:** 2; **Other:** 20
Grant monies awarded in 2012–13 academic year—1,200,000

Name of institution—Widener University
Name of department or program—Instructional Technology
Address:
One University Place
Media, PA
19013
United States
Phone number—610-499-4256
Email contact—kabowes@Widener.Edu **URL**—http;//www.educator.widener.edu
Contact person—Dr. Kathleen A. Bowes
Specializations—Instructional Technology, Educational Leadership
Features—Wideners Instructional Technology program has three branches: (1) Master of Education in Instructional Technology; (2) Instructional Technology Specialist Certification (PA non-teaching certificate); (3) Doctor of School Administration with an Instructional Technology Tract Most courses are hybrids.
Admission requirements—3.0 undergraduate, MATs three letters of recommendation, writing sample
Degree requirements—undergraduate degree
Number of full-time faculty—1; **Number of other faculty**—4
Degrees awarded in 2012–13 academic year—Masters: 0; **Ph.D.:** 0; **Other:** 2
Grant monies awarded in 2012–13 academic year—150,000

Name of institution—University of Central Arkansas
Name of department or program—Leadership Studies

Address:
201 Donaghey
Conway, AR
72035
USA

Phone number—(501)450-5430 **Fax number**—(501)852-2826
Email contact—steph@uca.edu **URL**—http://www.coe.uca.edu/
Contact person—Stephanie Huffman, Program Director of the Library Media and Information Technologies Program.
Specializations—M.S. in Library Media and Information Technologies is a School Library Media program.
Features—Facebook page.
Admission requirements—Minimum of a 2.7 undergraduate GPA. Candidates should submit official transcripts, GRE scores, and a copy of their teaching certificate.
Degree requirements—36 semester hours, practicum (for School Library Media), and a professional portfolio.
Number of full-time faculty—4; **Number of other faculty**—2
Degrees awarded in 2012–13 academic year—**Masters:** 40; **Ph.D.:** 0; **Other:** 20
Grant monies awarded in 2012–13 academic year—0

Name of institution—Arizona State University; Educational Technology programs
Name of department or program—Division of Educational Leadership and Innovation; Mary Lou Fulton Teachers College
Address:
Box 871811
Tempe, AZ
85287-1811
USA

Phone number—480-965-3225; (480) 965-4963 **Fax number**—480-965-9035
Email contact—robin.boyle@asu.edu; savenye@asu.edu **URL**—http://education.asu.edu/programs
Contact person—Ms. Robin Boyle, Academic and Application Advisor; Dr. Wilhelmina (Willi) Savenye, Professor and Program Leader
Specializations—The Educational Technology programs at Arizona State University offer Graduate Certificates in Instructional and Performance Improvement and in K-12 Online Teaching, an M.Ed. degree and a Ph.D. degree. Programs focus on the design, development, and evaluation of instructional systems and educational technology applications to support learning. (Educational Technology is now a specialization in a new Ph.D. degree: Learning, Literacies, and Technologies, as of 2013.)
Features—The programs offer courses in a variety of areas such as instructional design technology, media development, technology integration, performance improvement, evaluation, and distance education. The doctoral program emphasizes research using educational technology in applied settings.

Admission requirements—Requirements for admission to the M.Ed. program include a 4-year undergraduate GPA of 3.0 or above and a score of either 500 or above on verbal section of the GRE or a scaled score of 400 on the MAT. (The GRE may be waived for applicants who have either 3 years of teaching or instructional design work experience.) A score of 550 or above on the paper-based TOEFL (or 213 on the computer-based test or 80 Internet-based test) is also required for students who do not speak English as their first language. The new Ph.D. degree program in Learning, Literacies, and Technologies requires that students first have earned a Master's degree in a related field. The ASU Graduate College website includes more detailed requirements.

Degree requirements—The Graduate Certificate programs require just 15 credit hours, with a mix of required and elective courses. The M.Ed. degree requires completion of a minimum of 30 credit hours including 18 credit hours of required course work and a minimum of 12 credit hours of electives. M.Ed. students complete an Applied Project as their culminating experience. Ph.D. students must fulfill a residence requirement and are required to be continuously enrolled in the program. Students also take a comprehensive examination and are given considerable support in order to help them develop research skills and publications enroute to their dissertation.

Number of full-time faculty—6; **Number of other faculty**—12

Degrees awarded in 2012–13 academic year—Masters: 10; **Ph.D.:** 5; **Other:** 5

Grant monies awarded in 2012–13 academic year—2,000,000

Name of institution—California State University at East Bay

Name of department or program—Educational Technology Leadership

Address:

25800 Carlos Bee Blvd.

Hayward, CA

94542

USA

Phone number—510-885-2509 **Fax number**—510-8854632

Email contact—bijan.gillani@csueastbay.edu **URL**—http://edtech.csueastbay.edu

Contact person—Dr. Bijan Gillani

Specializations—Advances in the field of technology and the explosive growth of the Internet in recent years have revolutionized the way instruction is delivered to students. In parallel with these technological advances, the field of Learning Sciences has made phenomenal contributions to how people learn. For the most part, the advances in these two fields (technology and learning sciences) have gone their separate ways. A synergy of these two fields would enable educators and instructional designers to design and develop more effective educational materials to be transmitted over the Internet. To provide a solution for this synergy, we the Institute of Learning Sciences and Technology focuses on providing a systematic and more intelligent approach to the design of e-learning environments by applying the research findings in the field of Learning Sciences to the design and development of technological environments.

Features—How do people learn? What are learning theories? What are the instructional principles that we can derive from learning theories? How can we apply these instructional principles to the design of meaningful learning with existing and emerging technology? How do we make these principles accessible to faculty who wish to use technology more effectively? How do we develop pedagogically sound learning environments that prepare students to pursue meaningful lifework that has local and global contribution?
Admission requirements—A completed University Graduate Application (Online Only) Two official copies of each transcript (Mail to the Enrollment Office) Statement of residency (Mail to the Department) A Department Application Form (Mail to the Department) Two letter of recommendations (Mail to the Department. GPA 3.0.
Degree requirements—(1) Completion of required 24 units of Core Courses. (2) Completion of 16 units of Elective Courses. (3) Completion of Masters Degree Project or Thesis Project. (4) Completion of graduate check list (Online and Forms).
Number of full-time faculty—3; **Number of other faculty**—3
Degrees awarded in 2012–13 academic year—**Masters:** 25; **Ph.D.:** 0; **Other:** 25
Grant monies awarded in 2012–13 academic year—90,000

Name of institution—California State University-San Bernardino
Name of department or program—Dept. of Educational Leadership and Technology
Address:
5500 University Parkway
San Bernardino, CA
92407
USA
Phone number—(909)537-5692 **Fax number**—(909)537-7040
Email contact—aleh@csusb.edu **URL**—http://etec.csusb.edu
Contact person—Dr. Amy Leh
Specializations—Technology integration, online instruction, instructional design, STEM education
Features—Preparing educators in K-12, corporate, and higher education
Admission requirements—Bachelors degree, 3.0 GPA, completion of university writing requirement
Degree requirements—48 units passing a comprehensive examination; 3.0 GPA; grades of “B” or better in all courses.
Number of full-time faculty—3; **Number of other faculty**—1
Degrees awarded in 2012–13 academic year—**Masters:** 9; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—90,000

Name of institution—San Diego State University
Name of department or program—Learning Design and Technology
Address:
5500 Campanile Dr.

San Diego, CA
92182-4561
USA
Phone number—(619)594-6718 **Fax number**—(619)594-6246
Email contact—bober@mail.sdsu.edu **URL**—http://edweb2.net/ldt
Contact person—Dr. Marcie Bober-Michel, Professor and Graduate Advisor
Specializations—Certificate in Instructional Technology. Advanced Certificate in Instructional Design. A Master's degree in Education with an emphasis in Learning Design and Technology.
Features—Focus on the design, development, and implementation of learning opportunities that positively influence both individual and organizational performance via strategies that combine theory and practice in relevant, real-world experiences. Programs offered both on campus and online.
Admission requirements—Please refer to SDSU Graduate bulletin at http://arweb.sdsu.edu/es/catalog/2014-15/GraduateBulletin/!!Graduate%202014-15.pdf Requirements include satisfactory scores on the GRE (verbal, quantitative, writing), a personal statement, undergraduate GPA of 2.85 or higher, and recommendations from supervisors, previous instructors, etc. See our website for more details: http://edweb2.net/ldt/prospective-students/apply/.
Degree requirements—30 semester units for the Masters; 15–18 semester hours for the certificates.
Number of full-time faculty—4; **Number of other faculty**—2
Degrees awarded in 2012–13 academic year—**Masters:** 40; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—250,000

Name of institution—Azusa Pacific University
Name of department or program—School of Education—Teacher Education
Address:
701 E. Alosta
Azusa, CA
91702
USA
Phone number—(626)815-5355 **Fax number**—(626)815-5416
Email contact—kbacer@apu.edu **URL**—http://www.apu.edu
Contact person—Kathleen Bacer—Online Master of Arts in Educational Technology
Specializations—Educational Technology, online learning, Infusing technology in teaching/learning environments, digital learning for the twenty-first century learner
Features—100 % Online Master of Arts in Educational Technology program designed for the K-12 educator
Admission requirements—undergraduate degree from accredited institution with at least 12 units in education, 3.0 GPA
Degree requirements—36 unit program
Number of full-time faculty—2; **Number of other faculty**—8

Degrees awarded in 2012–13 academic year—Masters: 90; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—10,000

Name of institution—University of Northern Colorado
Name of department or program—Educational Technology
Address:
College of Education and Behavioral Sciences
Greeley, CO
80639
USA
Phone number—(970)351-2807 **Fax number**—(970)351-1622
Email contact—james.gall@unco.edu **URL**—http://www.unco.edu/cebs/edtech
Contact person—James Gall, Department Chair, Educational Technology
Specializations—M.A. in Educational Technology; Ph.D. in Educational Technology.
Features—The Educational Technology programs are designed to develop knowledge and skills in instructional design and technologies for a variety of learning contexts (K-12, higher education, military training, business/organizational, and international settings).
Admission requirements—Masters Criteria: A Bachelor's degree from a regionally accredited college or university and a GPA of 3.00 or better (on a 4.00 scale) on the most recent 60 semester hours of work. Applicants must submit academic transcripts, three letters of recommendations, and a statement of purpose. Applications are reviewed continuously. Doctoral Criteria: Bachelors degree from a regionally accredited college or university, a minimal level of achievement combining GPA and GRE scores (GRE scores must be less than 5 years old). Applicants must submit academic transcripts, current GRE scores, three letters of recommendations, and a statement of purpose. They must also participate in an interview with the faculty. The deadline for applications for programs beginning in the Fall is March 1. The deadline for applications for programs beginning in the Spring is November 1. Applicants with no or limited English ability can apply for the University's Intensive English Program. Under this option, a conditional admission is made to the academic program, but the student first attends English language courses until skilled enough to being the regular course work.
Degree requirements—M.A. in Educational Technology: 33 credit hours of course work followed by a comprehensive exam. Ph.D. in Educational Technology: 67 credit hours of course work followed by a comprehensive exam and an oral defense. An original piece of research must be conducted with both a proposal and dissertation defense.
Number of full-time faculty—5; **Number of other faculty**—0
Degrees awarded in 2012–13 academic year—Masters: 16; **Ph.D.:** 4; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—University of Connecticut
Name of department or program—Educational Psychology

Address:
249 Glenbrook Rd, Unit-3064
Storrs, CT
06269-3064
USA
Phone number—(860)486-0182 **Fax number**—(860)486-0180
Email contact—myoung@UConn.edu **URL**—http://www.epsy.uconn.edu/
Contact person—Michael Young, program coordinator
Specializations—M.A. in Educational Technology (portfolio or thesis options), 1-year partially online Masters (summer, fall, spring, summer), 6th-year certificate in Educational Technology and Ph.D. in Cognition, Instruction and Learning Technology. This program is titled UConn 2 Summers M.A. in Learning Technology.
Features—M.A. can be on-campus or 2 Summers (blended) and Fall-Spring (Online) that can be completed in a year. The Ph.D. emphasis in Learning Technology is a unique program at UConn. It strongly emphasizes Cognitive Science and how technology can be used to enhance the way people think and learn. The Program seeks to provide students with knowledge of theory and applications regarding the use of advanced technology to enhance learning and thinking. Campus facilities include $2 billion twenty-first century UConn enhancement to campus infrastructure, including a new wing to the Neag School of Education. Faculty research interests include interactive video for anchored instruction and situated learning, telecommunications for cognitive apprenticeship, technology-mediated interactivity for learning by design activities, and in cooperation with the National Research Center for Gifted and Talented, research on the use of technology to enhance cooperative learning, and the development of gifted performance in all students.
Admission requirements—admission to the graduate school at UConn, GRE scores (or other evidence of success at the graduate level). Previous experience in a related area of technology, education, or experience in education or training.
Degree requirements—completion of plan of study course work, comprehensive exam (portfolio-based with multiple requirements), and completion of an approved dissertation.
Number of full-time faculty—2; **Number of other faculty**—3
Degrees awarded in 2012–13 academic year—**Masters:** 13; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—George Washington University
Name of department or program—Graduate School of Education and Human Development
Address:
2134 G Street NW
Washington, DC
20052
USA

Phone number—(866)-498-3382 **Fax number**—(202)994-2145

Email contact—rwatkins@gwu.edu **URL**—http://www.gwu.edu/~etl

Contact person—Dr. Ryan Watkins, Educational Technology Leadership, Program Director

Specializations—The Educational Technology Leadership program began in 1988. It was one of the first online degree programs in the field. The program offers a high-quality, flexible program rich in knowledge of the field and distance education delivery. The result is an outstanding experience for our students.

M.A. in Education and Human Development with a major in Educational Technology Leadership as well as the following Graduate Certificates:

(1) Instructional Design, (2) Multimedia Development, (3) Leadership in Educational Technology, (4) E-Learning, (5) Training and Educational Technology, (6) Integrating Technology into Education.

Features—https://www.facebook.com/groups/153686921326555/

Admission requirements—Application fee, transcripts, GRE or MAT scores, two letters of recommendation from academic professionals, computer access, undergraduate degree with 2.75 GPA. No GRE or MAT is required for entry into the Graduate Certificate programs.

Degree requirements—Masters Program: 36 credit hours (including 27 required hours and 9 elective credit hours). Required courses include computer application management, media and technology application, software implementation and design, public education policy, and quantitative research methods.

Graduate Certificate Programs: 18 credit hours

Number of full-time faculty—3; **Number of other faculty**—0

Degrees awarded in 2012–13 academic year—Masters: 24; **Ph.D.:** 0; **Other:** 15

Grant monies awarded in 2012–13 academic year—0

Name of institution—Florida State University

Name of department or program—Educational Psychology and Learning Systems

Address:

3210 Stone Building

Tallahassee, FL

32306-4453

USA

Phone number—(850)644-4592 **Fax number**—(850)644-8776

Email contact—mmckee@oddl.fsu.edu **URL**—http://insys.fsu.edu

Contact person—Mary Kate McKee, Program Coordinator

Specializations—M.S. and Ph.D. in Instructional Systems with specializations for persons planning to work in academia, business, industry, government, or military, both in the United States and in International settings.

Features—Core courses include systems and materials development, performance improvement, online learning, development of multimedia, project management, psychological foundations, current trends in instructional design, and research and statistics. Internships are recommended. Strong alumni network. M.S. courses available both on campus and online.

Admission requirements—M.S.: 3.0 GPA in last 2 years of undergraduate program, 1,000 GRE (verbal plus quantitative), 550 TOEFL (for international applicants). Ph.D.: 1,100 GRE (V+Q), 3.5 GPA in last 2 years; international students, 550/90 TOEFL.

Degree requirements—M.S.: 36 semester hours, 2–4 h internship, comprehensive exam preparation of professional portfolio

Number of full-time faculty—5; **Number of other faculty**—1

Degrees awarded in 2012–13 academic year—Masters: 32; **Ph.D.:** 1; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—University of Central Florida

Name of department or program—College of Education & Human Performance, Educational & Human Sciences, Instructional Design & Technology

Address:

4000 Central Florida Blvd.

Orlando, FL

32816-1250

USA

Phone number—(407) 823-4835 **Fax number**—(407) 823-4880

Email contact—richard.hartshorne@ucf.edu **URL**—http://www.education.ucf.edu/insttech/

Contact person—Dr. Richard Hartshorne, Dr. Atsusi Hirumi, Dr. Glenda Gunter

Specializations—Graduate Certificates in (a) Instructional Design of Simulations, (b) Educational Technology, and (c) e-Learning Professional Development. M.A. in Instructional Design and Technology with professional tracks in: (a) Instructional Systems, (b) Educational Technology, and (c) e-Learning, Ph.D. in Education with Instructional Design and Technology track. Ed.D. in Education with Instructional Technology concentration. There are approximately 200 students in M.A. program, 5 in Ed.D., and 15 in Ph.D. programs.

Features—All programs rely heavily on understanding of fundamental competencies as reflected by NCATE, ASTD, AECT, AASL, and ISTE. There is an emphasis on the practical application of theory through intensive hands-on experiences. Orlando and the surrounding area is home to many high-tech companies, military training and simulation organizations, and tourist attractions. UCF, established in 1963, now has in excess of 55,000 students, representing more than 90 countries. It has been ranked as one of the leading "most-wired" universities in North America.

Admission requirements—GRE score of 1,000 for consideration for doctoral program. No GRE required for M.A. or graduate certificate programs. GPA of 3.0 of greater in last 60 h of undergraduate degree for M.A. program; TOEFL of 550 (270 computer-based version) if English is not first language; three letters of recommendation; resume, statement of goals; residency statement, and health record. Financial statement if coming from overseas.

Degree requirements—M.A. in Instructional Technology/Instructional Systems, 39 semester hours; M.A. in Instructional Technology/Educational Technology, 39 semester hours; M.A. in Instructional Technology/eLearning, 39 semester hours. Practicum required in all three programs: thesis, research project, or substitute additional course work. Ph.D. and Ed.D. require between 58 and 69 h beyond the Masters for completion.

Number of full-time faculty—3; **Number of other faculty**—5

Degrees awarded in 2012–13 academic year—Masters: 60; **Ph.D.:** 2; **Other:** 15

Grant monies awarded in 2012–13 academic year—500,000

Name of institution—Georgia Southern University

Name of department or program—College of Education

Address:
Box 8131
Statesboro, GA
30460-8131
USA

Phone number—(912)478-5307 **Fax number**—(912)478-7104.

Email contact—chodges@georgiasouthern.edu **URL**—http://coe.georgiasouthern.edu/itec/

Contact person—Charles Hodges, Ph.D., Associate Professor, Dept. of Leadership, Technology, and Human Development.

Specializations—Online M.Ed. and GA certification for School Library Media and Instructional Technology Specialists. An online Ed.S. is available in both concentrations as well. The Online Teaching and Learning Endorsement is offered at both levels.

Features—Completely online program. Strong emphasis on technology and use of Web 2.0 tools online portfolios as culminating program requirement for M.Ed. students http://www.facebook.com/itec.georgiasouthern.

Admission requirements—B.S. (teacher certification NOT required) GRE or MAT not required for applicants who are certified teachers with a 2.5 undergraduate grade point average M.Ed. required for admission to the Ed.S. program.

Degree requirements—36 semester hours for the M.Ed. 42 semester hour M.Ed. with dual certification in School Library Media and Instructional Technology 30 semester hours for the Ed.S. 9 semester hour Online Teaching and Learning Endorsement

Number of full-time faculty—8; **Number of other faculty**—0

Degrees awarded in 2012–13 academic year—Masters: 75; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—Georgia State University

Name of department or program—Learning Technologies Division

Address:
Box 3976
Atlanta, GA
30302-3976
USA

Phone number—(404)413-8064 **Fax number**—none

Email contact—swharmon@gsu.edu. **URL**—http://edtech.gsu.edu

Contact person—Dr. Stephen W. Harmon, contact person.
Specializations—M.S. and Ph.D. in Instructional Design and Technology.
Features—Focus on research and practical application of instructional technology in educational and corporate settings. Online M.S. in Instructional Design and Technology available.
Admission requirements—M.S.: Bachelors degree, 2.5 undergraduate GPA, >40th percentile GRE, 550 TOEFL. Ph.D.: Masters degree, 3.30 graduate GPA, >50th percentile verbal plus >50th percentile quantitative GRE.
Degree requirements—M.S.: 36 sem. hours, internship, portfolio, comprehensive examination. Ph.D.: 60 sem. hours, internship, comprehensive examination, dissertation.
Number of full-time faculty—5; **Number of other faculty**—2
Degrees awarded in 2012–13 academic year—Masters: 18; **Ph.D.:** 14; **Other:** 0
Grant monies awarded in 2012–13 academic year—9,150,000

Name of institution—University of Georgia
Name of department or program—Department of Career and Information Studies; Learning, Design, and Technology Program
Address:
216 Rivers Crossing
Athens, GA
30602-4809
USA
Phone number—(706)542-1682 **Fax number**—(706)542-4054
Email contact—mikeorey@uga.edu **URL**—http://ldt.uga.edu/
Contact person—Dr. Michael Orey, LDT Program Chair
Specializations—M.Ed. and Ed.S. in Learning, Design and Technology with three emphasis areas: Instructional Design & Development, Instructional Technology, and School Library Media; Ph.D. for leadership positions as specialists in instructional design and development and university faculty. The program offers advanced study for individuals with previous preparation in instructional media and technology, as well as a preparation for personnel in other professional fields requiring a specialty in instructional systems or instructional technology. Representative career fields for graduates include designing new courses, educational multimedia (especially web-based), tutorial programs, and instructional materials in state and local school systems, higher education, business and industry, research and non-profit settings, and in instructional products development.
Features—Minor areas of study available in a variety of other departments. Personalized programs are planned around a common core of courses and include practical, internships, or clinical experiences. Research activities include grant-related activities and applied projects, as well as dissertation studies.
Admission requirements—All degrees: application to graduate school, satisfactory GRE score, other criteria as outlined in Graduate School Bulletin, and on the program website.

Degree requirements—M.Ed.: 36 semester hours with 3.0 GPA, portfolio with oral exam. Ed.S.: 30 semester hours with 3.0 GPA and project exam. Ph.D.: 3 full years of study beyond the Master's degree, two consecutive semesters full-time residency, comprehensive exam with oral defense, internship, dissertation with oral defense.

Number of full-time faculty—11; **Number of other faculty**—0

Degrees awarded in 2012–13 academic year—Masters: 40; **Ph.D.:** 11; **Other:** 10

Grant monies awarded in 2012–13 academic year—100,000

Name of institution—Valdosta State University

Name of department or program—Curriculum, Leadership, & Technology

Address:

1500 N. Patterson St.
Valdosta, GA
31698
USA

Phone number—(229)333-5633 **Fax number**—(229)259-5094

Email contact—ewiley@valdosta.edu **URL**—http://www.valdosta.edu/colleges/education/curriculum-leadership-and-technology/

Contact person—Ellen W. Wiley

Specializations—M.Ed. in Instructional Technology with concentrations in: Library/Media, P-12 Technology Applications (leads to certification in Instructional Technology for applicants with a clear and renewable Georgia Certificate), and Non P-12 Technology Applications Online Ed.S. in Instructional Technology with two tracks: P-12 Technology Applications (leads to certification in Instructional Technology for applicants with a clear and renewable Georgia Certificate) Non P-12 Technology Applications Ed.D. in Curriculum and Instruction (Leads to certification in Curriculum and Instruction for applicants with a clear and renewable Georgia Certificate).

Features—The program has a strong emphasis on systematic design and technology in M.Ed., Ed.S., and Ed.D. Strong emphasis on change leadership, reflective practice, applied research in Ed.S. and Ed.D.

Admission requirements—M.Ed.: 2.75 GPA, GRE, or MAT accepted Ed.S.: Masters degree, 3 years of experience, 3.0 GPA, GRE, or MAT accepted. Ed.D. degree, 3 years of experience, 3.50 GPA, GRE, or MAT accepted. GRE and MAT scores are only one of the factors considered in admission decisions. These test scores are not the sole criteria for admission.

Degree requirements—M.Ed.: 33–36 semester hours. Ed.S.: 27 semester hours. Ed.D.: 55 semester hours.

Number of full-time faculty—7; **Number of other faculty**—5

Degrees awarded in 2012–13 academic year—Masters: 16; **Ph.D.:** 0; **Other:** 24

Grant monies awarded in 2012–13 academic year—0

Name of institution—University of Northern Iowa

Name of department or program—Instructional Technology Program

Address:
618 Schinder Education Center
Cedar Falls, IA
50614-0606
USA
Phone number—(319)273-3249 **Fax number**—(319)273-5886
Email contact—leigh.zeitz@uni.edu **URL**—http://www.uni.edu/itech
Contact person—Leigh E. Zeitz, Ph.D.
Specializations—M.A. in Curriculum & Instruction: Instructional Technology
Features—The Instructional Technology Masters is designed to prepare educators for a variety of professional positions in K-12 and adult learning/corporate educational settings. This is a hands-on program that requires students to apply the theoretical foundations presented in the courses. The UNI Instructional Technology Masters program is available primarily online but some on-campus courses are offered. An online 2-year cohort is initiated during the summer in even numbered years. The programs practical perspective prepares professionals for fulfilling technology leadership roles. On a PK-12 level, these roles include technology coordinators, Masters teachers, special education media specialists, and county educational specialists. On an adult and corporate level, the roles include instructors at vocational-technical schools, community colleges, and universities. They can work as trainers in the corporate world as well as higher education. Many of our graduates have also become successful instructional designers throughout the country. The Master's degree is aligned with the AECT standards and is focused on addressing specific career choices.
Admission requirements—Bachelors degree, 3.0 undergraduate GPA, 500 TOEFL Licensure as a teacher is not required for admission to the Master's program. The Bachelor's degree may be in any field.
Degree requirements—33 semester credits. Research paper (literature review, project report, journal article, or research report on original research) is required. A thesis option is available. An online digital portfolio will be created by each student to share and reflect upon the students learning experiences in the program.
Number of full-time faculty—2; **Number of other faculty**—1
Degrees awarded in 2012–13 academic year—**Masters:** 14; **Ph.D.:** 1; **Other:** 0
Grant monies awarded in 2012–13 academic year—4,000

Name of institution—Boise State University
Name of department or program—Organizational Performance and Workplace Learning
Address:
1910 University Drive, ENGR-327
Boise, ID
83725
USA

Phone number—(208)426-2489; (800)824-7017 ext. 61312 **Fax number**—(000)000-0000

Email contact—jfenner@boisestate.edu **URL**—http://opwl.boisestate.edu/

Contact person—Dr. Don Stepich, OPWL Program Chair; Jo Ann Fenner, Manager, Marketing and Outreach Services

Specializations—The Master of Science in Organizational Performance and Workplace Learning (OPWL) degree is intended to prepare students for careers in instructional design, performance technology, training and development, training management, workplace e-learning, human resources, organizational development, and performance consulting. The department also offers three graduate certificate programs in; Workplace Performance Improvement (WPI), Workplace E-Learning and Performance Support (WELPS), and Workplace Instructional Design (WIDe). The graduate certificates can be earned enroute to the M.S. with the credits eligible for application to the degree.

Features—The degrees curriculum results in students working on virtual teams to resolve an organizational problem for an actual client. The resulting projects become part of the students' portfolio. OPWL students write a monthly column called Tales from the Field in the International Society for Performance Improvements free e-newsletter performance express; http://opwl.boisestate.edu/about-opwl/tales-from-the-field/ We have a group on LinkedIn called the Organizational Performance and Workplace Learning-Network (OPWL-N) that individuals are invited to join; http://opwl.boisestate.edu/resources/linkedin/.

Admission requirements—undergraduate degree with 3.0 GPA, one-to-two page statement of purpose describing why you want to pursue this program and how it will contribute to your personal and professional development, and a resume of personal qualifications and work experience. For more information, visit: http://opwl.boisestate.edu/admission/admission-process/.

Degree requirements—36 semester hours in organizational performance and workplace learning and related course work; and two options for a culminating activity; thesis or portfolio defense (included in 36 credit hours).

Number of full-time faculty—7; **Number of other faculty**—8

Degrees awarded in 2012–13 academic year—Masters: 30; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—Governors State University

Name of department or program—College of Arts and Sciences

Address:

1 University Parkway
University Park, IL
60484
USA

Phone number—(708)534-4051 **Fax number**—(708)534-7895

Email contact—mlanigan@govst.edu **URL**—http://www.govst.edu/hpt

Contact person—Mary Lanigan, Associate Prof., Human Performance and Training

Specializations—M.A. in Communication and Training with HP&T major—Program concentrates on building instructional design skills; however, we do follow a performance improvement perspective with an emphasis on evaluation. Most classes are delivered in a hybrid format of online and face to face.

Features—Instructional Design overview; front-end analysis including both needs and task; design and delivery using various platforms; evaluation skills and how to predict behavior transfer; various technologies; consulting; project management; systems thinking; principles of message design; and more.

Admission requirements—Undergraduate degree in any field; 2.75 GPA; and, a statement of purpose.

Degree requirements—36 credit hours. 27–30 h in instructional and performance technology; internship or advanced field project required. Metropolitan Chicago area based.

Number of full-time faculty—1; **Number of other faculty**—5

Degrees awarded in 2012–13 academic year—Masters: 11; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—Southern Illinois University at Carbondale

Name of department or program—Department of Curriculum and Instruction

Address:

625 Wham Drive, Mailcode 4610
Carbondale, IL
62901
USA

Phone number—(618) 453-4019 **Fax number**—(618) 453-4244

Email contact—fadde@siu.edu **URL**—http://ehs.siu.edu/ci/graduate/lsdt/index.php

Contact person—Peter Fadde, Coord., Learning Systems Design and Technology

Specializations

M.S.Ed. in Curriculum & Instruction (with concentration in Learning Systems Design and Technology)

Ph.D. in Education (with concentration in Learning Systems Design and Technology)

Features

All specializations are oriented to multiple education settings.

The LSDT concentration is designed to prepare students for careers as learning systems designers and learning technologists in higher education, schools, corporations, military, government, and non-profit organizations. The Master's program focuses on the principles and techniques of creating learning products and multimedia-based online resources for learning, instruction, and education. Courses cover topics including learning theories, systems design, and principles that apply to the design, development, evaluation, and management of learning systems, resources, and technologies.

The doctoral program covers the same knowledge base but with an emphasis on research and scholarship.

Admission requirements
M.S.Ed.: Bachelors degree, 2.7 undergraduate GPA, transcripts.
Ph.D.: Masters degree with 3.25 GPA, GRE scores, three letters of recommendation, transcripts, writing sample.
International students without a degree from a US institution must submit TOEFL score.
Degree requirements
M.S.Ed., 32 credit hours with thesis; 36 credit hours without thesis;
Ph.D., 46 credit hours beyond the Master's degree in courses, 24 credit hours for the dissertation.
Number of full-time faculty—2; **Number of other faculty**—1
Degrees awarded in 2012–13 academic year—Masters: 6; **Ph.D.:** 2; **Other:** 0
Grant monies awarded in 2012–13 academic year—71,000

Name of institution—Southern Illinois University Edwardsville
Name of department or program—Instructional Technology Program
Address:
School of Education
Edwardsville, IL
62026-1125
USA
Phone number—(618) 650-3277 **Fax number**—(618) 650-3808
Email contact—dknowlt@siue.edu **URL**—http://www.siue.edu/instructionaltechnology
Contact person—Dr. Dave S. Knowlton, Instructional Technology Program Director; Department. of Educational Leadership
Specializations—The Educational Technologies option enables teachers and other school personnel to learn how to plan, implement, and evaluate technology-based instruction and learning activities in P-12 settings. Students pursuing this option will become knowledgeable users of technology as well as designers of curriculum and instruction that effectively utilize and integrate technology to improve student learning. Students interested in leadership roles in educational technology, such as those wishing to become technology coordinators in schools or school districts, can work toward meeting the standards for the Illinois State Board of Education's (ISBE) Technology Specialist endorsement through this program. The Library Information Specialist option enables teachers and other school personnel to learn how to plan, implement, and evaluate library information-based activities in P-12 settings. Students pursuing this option will become knowledgeable users of library information as well as designers of curriculum and instruction that effectively utilize and integrate library information to improve student learning. Students interested in Library Information Specialist endorsement can work toward meeting the standards for the Illinois State Board of Education's Library Information Specialist endorsement through this program. The Instructional Design & Performance Improvement option focuses on skills necessary for careers in the areas of instructional design, training, and per-

formance consulting. Emphasis is placed on systematic instructional design and on the use of various media and technologies for learning and instruction. Students in this option may also focus on the design and development of online learning and other performance improvement strategies.

Features—Several unique features of the program provide students with opportunities for important practical experiences that complement course work. First, the program can be taken as 100 % online program. Second, juried portfolios provide students with an opportunity to share their work with a jury of professors and peers, and defend their work in light of their own goals and the content of their degree program. Third, virtual Design Studios provide students with opportunities to work on real-world projects for a variety of real clients in order to develop skills in collaboration, design, development tools and techniques, and project management.

Admission requirements—The requirements for admission are a Bachelor's degree in any discipline and a GPA of 3.0 or above during their last 2 years of undergraduate work.

Degree requirements—36 semester hours; Thesis or Final Project options.

Number of full-time faculty—4; **Number of other faculty**—2

Degrees awarded in 2012–13 academic year—**Masters:** 10; **Ph.D.:** 0; **Other:** 1

Grant monies awarded in 2012–13 academic year—0

Name of institution—Western Illinois University

Name of department or program—Instructional Design and Technology

Address:

47 Harrabin Hall

Macomb, IL

61455

USA

Phone number—(309)298-1952 **Fax number**—(309)298-2978

Email contact—hh-hemphill@wiu.edu **URL**—http://www.wiu.edu/coehs/idt

Contact person—Hoyet H. Hemphill, Ph.D., Chair. Ph.D. in Instructional Technology

Specializations—Undergraduate programs B.S. degree in Media and Instructional Technology, with emphasis on corporate instructional design, instructional multimedia and web-based development, animation, online learning, instructional simulations and games, and instructional project management. Undergraduate Minors in—Web Design—Digital Media—Photographic Media Graduate Program M.S. in Instructional Design and Technology (available online) with optional emphasis on K-12 Technology Specialist. Six Post-Baccalaureate Certificates (PBC)—three completely online, including Educational Technology Specialist option.

Features—M.S. program approved by Illinois Board of Higher Education in January 1996 with emphases in Instructional Design and Technology, Web-Design, Interactive Multimedia, and Distance Education. M.S. can be completed entirely online. M.S. and Post-Baccalaureate Certificate in K-12 Technology

Specialist both offered online B.S. in Instructional Design and Technology approved in 1997, now Media and Instructional Technology. Courses are lab based, hands-on. Emphasis is on media development and instructional design for instructional media production in corporate and organizational environment. Undergraduate Minors in:—Web Design—Digital Media—Photographic Media.

Admission requirements—M.S.: Bachelors degree with minimum 2.75 GPA overall or 3.0 for last 2 years. Otherwise, 12 semester hours of graduate work with GPA of 3.2 or higher. English proficiency (TOEFL) for international students.

Degree requirements—M.S.: 32 semester hours, thesis or applied project, or 35 semester hours with portfolio. Certificate Program in Instructional Technology Specialization. Graphic applications, training development, video production. Each track option is made of 5 courses or a total of 15 semester hours, except for Technology Specialist, which is 24 semester hours. B.S.: 120 h program.

Number of full-time faculty—8; **Number of other faculty**—5

Degrees awarded in 2012–13 academic year—Masters: 28; **Ph.D.:** 0; **Other:** 7

Grant monies awarded in 2012–13 academic year—1,100

Name of institution—Iowa State University

Name of department or program—School of Education

Address:

N031 Lagomarcino Hall
Ames, IA
50011
USA

Phone number—(515)294-9141 **Fax number**—(515)294-2763

Email contact—dschmidt@iastate.edu **URL**—http://www.educ.iastate.edu/

Contact person—Denise Crawford, Director, Center for Technology in Learning and Teaching

Specializations—M.Ed., M.S., and Ph.D. in Curriculum and Instructional Technology. Features: Prepares candidates as practitioners and researchers in the field of curriculum and instructional technology. All areas of specialization emphasize appropriate and effective applications of technology in teacher education. M.Ed. program also offered at a distance.

Features—Twitter: @ctltisu Graduate Programs: http://www.education.iastate.edu/graduate/

Admission requirements—Admission Requirements: M.Ed. and M.S.: Bachelors degree, top half of undergraduate class, official transcripts, three letters of reference, autobiography. Ph.D.: top half of undergraduate class, official transcripts, three letters of reference, autobiography, GRE scores, scholarly writing sample.

Degree requirements—Degree Requirements: M.Ed. 32 credit hours (7 research, 12 foundations, 13 applications, and leadership in instructional technology); M.S. 33 credit hours (13 research, 12 foundations, 8 applications, and leadership in instructional technology) and thesis; Ph.D. 78 credit hours (minimum of 12 research, minimum of 15 foundations, additional core credits in conceptual, technical, and advanced specialization areas, minimum of 12 dissertation) and dissertation.

Number of full-time faculty—5; **Number of other faculty**—1
Degrees awarded in 2012–13 academic year—Masters: 10; **Ph.D.:** 2; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—Kansas State University
Name of department or program—Curriculum & Instruction
Address:
261 Bluemont Hall
Manhattan, KS
66506
USA
Phone number—785-532-5716 **Fax number**—785-532-7304
Email contact—talab@ksu.edu **URL**—http://coe.ksu.edu/ecdol
Contact person—Dr. Rosemary Talab
Specializations—The Educational Computing, Design, and Online Learning Program has these specializations: I. M.S. in Curriculum & Instruction with specialties in (1) Educational Computing, Design, and Online Learning (online) (2) Digital Teaching and Learning (online) II. Ph.D. in Curriculum & Instruction with specialty in Educational Computing, Design, and Online Learning (available online) III. KSU Graduate School Certificate in Digital Teaching and Learning Masters program started in 1982; Ph.D. in 1987 and OCD Certificate in 2014.
Features—All course work for the certificates, M.A., and Ph.D. can be taken online. ECDOL is an online program that focuses on research, theory, practice, ethics, and the design of learning environments, with an emphasis on emerging technologies. Course work includes instructional design, virtual learning environments, game-based learning, the design and evaluation of online courses, etc. Classes are offered regularly on a rotating basis. A cohort group is begun each fall for the Professional Seminar 1 and 2 academic year via videoconferencing, in which major areas of the field (change and ID models, distance education and online learning, etc.) are explored, as well as various delivery methods and technologies. E-portfolios are required at the Certificate and Masters degree levels. The Ph.D. program allows the student to tailor the classes to individual needs. At the Certificate and Masters degree levels the DTL program offers classroom teachers leadership opportunities as technology facilitators and lead teachers, with course work available in integrating emerging technologies into instruction to improve student achievement through a blend of practical technology skills with research and theory. The Master's degree level ECDOL program is offered to those who have B.A.s in other fields who wish to pursue a specialty in instructional design or prepare for the Ph.D. in ECDOL or who wish to design instructional environments in online and virtual learning environments. The KSU Graduate School Certificate in Digital Teaching and Learning is a 15-h completely online program for the classroom teacher with uniform exit outcomes and an e-portfolio requirement. The emphasis is on the application of technological and pedagogical theory, knowledge, and practical application skills that can be

directly translated into the classroom. The ECDOL program, as a whole, is on Twitter (#Proseminar1) and on Facebook (KSUECDOL) http://www.facebook.com/group.php?gid=113228718719613, though the group is private.

Admission requirements—M.S. in ECDOL: B average in undergraduate work, mid-range scores on TOEFL. M.S./Certificate in DTL: B average in undergraduate work and teaching experience. Ph.D.: B average in undergraduate and graduate work, GRE, three letters of recommendation, experience, or basic courses in educational computing.

Degree requirements—OCD Certificate is 14 h and requires a final e-portfolio and an online course/workshop M.S.: 31 semester hours (minimum of 15 in specialty); thesis, internship, or practicum not required, but all three are possible; e-portfolio and project are required. The Ph.D. degree is 30–42 h, with 30 h of research, for a total of 60 h, minimum. Of that, 60 h semester hours are required, of which 30 h are required for dissertation research and 30 h are taken from the student's previous Masters degree program.

Number of full-time faculty—1; **Number of other faculty**—6

Degrees awarded in 2012–13 academic year—Masters: 7; **Ph.D.:** 3; **Other:** 2

Grant monies awarded in 2012–13 academic year—0

Name of institution—University of Louisville

Name of department or program—Organizational Leadership & Learning

Address:

1905 South 1st Street
Louisville, KY
40292
USA

Phone number—(502)852-6667 **Fax number**—(502)852-4563

Email contact—rod.githens@louisville.edu **URL**—http://louisville.edu/education/departments/elfh/oll

Contact person—Rod Githens

Specializations—B.S. in Workforce Leadership (specialization in Training and Development) (100 % online or face-to-face), M.S. in Human Resources & Organization Development (specialization in Workplace Learning & Performance) (100 % online or face-to-face), M.Ed. in Instructional Technology (please note: this program is offered for educators in P-12 settings through the Department of Teaching and Learning), Ph.D. track in Human Resources and Organization Development.

Features—Our program is Relevant, Rigorous, and Research based:

– Relevant. The program has a strong emphasis on hands-on, applied projects that provide direct application to the field. Our instructors have practitioner experience in the field and many currently work in HR-related positions in Louisville and around the country.
– Rigorous. Expect to work hard and complete challenging assignments. Our goal is to help you develop the skills to think unconventionally about conventional problems.

– Research based. The program is designed around research-based competencies from the American Society for Training and Development, International Society for Performance Improvement, and the Society for Human Resource Management. Faculty members have strong theoretical and conceptual backgrounds that guide both their teaching and their practical approach to the field.

Admission requirements—Masters Degree: 3.0 GPA, 800 GRE, 2 letters of recommendation, goal statement, resume Ph.D.: 3.5 GPA, 1,000 GRE, letters of recommendation, goal statement, resume.

Degree requirements—See program websites: B.S. in Workforce Leadership: http://louisville.edu/education/degrees/bs-wl.html M.S. in Human Resource Education: http://louisville.edu/education/degrees/ms-hre.html M.Ed. in Instructional Technology: http://louisville.edu/education/degrees/med-it.html Ph.D. track in Human Resources and Organization Development: http://louisville.edu/education/degrees/phd-elod-hrd.html

Number of full-time faculty—11; **Number of other faculty**—14

Degrees awarded in 2012–13 academic year—Masters: 25; **Ph.D.:** 5; **Other:** 100

Grant monies awarded in 2012–13 academic year—4,500,000

Name of institution—Fitchburg State University

Name of department or program—Division of Graduate and Continuing Education

Address:
160 Pearl Street
Fitchburg, MA
01420
USA

Phone number—(978) 665-3544 **Fax number**—(978) 665-3055

Email contact—rhowe@fitchburgstate.edu **URL**—www.fitchburgstate.edu

Contact person—Dr. Randy Howe, Chair

Specializations—M.Ed. in Educational Leadership and Management with specialization in Technology Leadership.

Features—Collaborating with professionals working in the field both for organizations and as independent producers, Fitchburg offers a unique M.Ed. program. The objectives are to develop in candidates the knowledge and skills for the effective implementation of technology within business, industry, government, not-for-profit agencies, health services, and education.

Admission requirements—MAT or GRE scores, official transcript(s) of a baccalaureate degree, 2 or more years of experience in communications or media or education, three letters of recommendation.

Degree requirements—39 semester credit hours.

Number of full-time faculty—5; **Number of other faculty**—7

Degrees awarded in 2012–13 academic year—Masters: 4; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—Lesley University
Name of department or program—Educational Technology
Address:
29 Everett St.
Cambridge, MA
02138-2790
USA
Phone number—(617)349-8419 **Fax number**—(617)349-8169
Email contact—gblakesl@lesley.edu **URL**—http://www.lesley.edu/soe/111tech.html
Contact person—Dr. George Blakeslee
Specializations—M.Ed. in Technology in Education CAGS/Ed.S. in Technology in Education Ph.D. in Educational Studies with specialization in Technology in Education.
Features—M.Ed. program is offered off-campus at 70+ sites in 21 states; contact 617-349-8311 for information. The degree is also offered completely online. Contact Maureen Yoder, myoder@lesley.edu, or (617)348-8421 for information. Or check our website: URL above.
Admission requirements—Completed Bachelors Teaching certificate
Degree requirements—M.Ed.: 33 semester hours in technology, integrative final project in lieu of thesis, no internship or practicum. C.A.G.S.: 36 semester hours. Ph.D. requirements available on request.
Number of full-time faculty—11; **Number of other faculty**—70
Degrees awarded in 2012–13 academic year—Masters: 225; **Ph.D.:** 11; **Other:** 40
Grant monies awarded in 2012–13 academic year—25,000

Name of institution—McDaniel College (formerly Western Maryland College)
Name of department or program—Graduate and Professional Studies
Address:
2 College Hill
Westminster, MD
21157
USA
Phone number—(410)857-2507 **Fax number**—(410)857-2515
Email contact—rkerby@mcdaniel.edu **URL**—http://www.mcdaniel.edu
Contact person—Dr. Ramona N. Kerby, Coord., School Librarianship, Graduate Studies
Specializations—M.S. in Education with an emphasis in School Librarianship
Features—School librarianship
Admission requirements—3.0 Undergraduate GPA, 3 reference checklist forms from principal and other school personnel, acceptable application essay, acceptable Praxis test scores.
Degree requirements—37 credit hours, including professional digital portfolio.
Number of full-time faculty—1; **Number of other faculty**—5

Degrees awarded in 2012–13 academic year—Masters: 15; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—Towson University
Name of department or program—College of Education
Address:
Hawkins Hall
Towson, MD
21252
USA
Phone number—(410)704-4226 **Fax number**—(410)704-4227
Email contact—jkenton@towson.edu **URL**—http://www.towson.edu/coe/edtl/insttech/
Contact person—Dr. Jeffrey M. Kenton, Assistant Dean—College of Education
Specializations—M.S. degrees in Instructional Development, and Educational Technology (Contact Liyan Song: lsong@towson.edu) M.S. degree in School Library Media (Contact, David Robinson: derobins@towson.edu). Ed.D. degree in Instructional Technology (Contact, William Sadera, bsadera@towson.edu) (http://grad.towson.edu/program/doctoral/istc-edd/).
Features—Excellent labs. Strong practical hands-on classes. Focus of M.S. program-Students produces useful multimedia projects for use in their teaching and training. Many group activities within courses. School library media degree confers with Maryland State Department of Education certification as a Prek-12 Library Media Specialist. Innovative Ed.D. program with online hybrid courses and strong mix of theory and practical discussions.
Admission requirements—Bachelors degree from accredited institution with 3.0 GPA (Conditional admission granted for many applicants with a GPA over 2.75). Doctoral requirements are listed: http://grad.towson.edu/program/doctoral/istc-edd/ar-istc-edd.asp.
Degree requirements—M.S. degree is 36 graduate semester hours without thesis. Ed.D. is 63 h beyond the M.S. degree.
Number of full-time faculty—17; **Number of other faculty**—5
Degrees awarded in 2012–13 academic year—Masters: 180; **Ph.D.:** 5; **Other:** 2
Grant monies awarded in 2012–13 academic year—0

Name of institution—Eastern Michigan University
Name of department or program—Teacher Education
Address:
313 John W. Porter Building
Ypsilanti, MI
48197
USA
Phone number—(734)487-3260 **Fax number**—(734)487-2101
Email contact—tjones1@emich.edu **URL**—http://www.emich.edu/coe/edmt
Contact person—Toni Jones, Ph.D.—Professor/Graduate Coordinator

Specializations—M.A. and Graduate Certificate in Educational Media and Technology. The mission of this program is to prepare professionals who are capable of facilitating student learning in a variety of settings. The program is designed to provide students with both the knowledge base and the application skills that are required to use technology effectively in education. Focusing on the design, development, utilization, management, and evaluation of instructional systems moves us toward achieving this mission. Students who complete the educational technology concentration will be able to: (a) provide a rationale for using technology in the educational process; (b) identify contributions of major leaders in the field of educational media technology and instructional theory, and the impact that each leader has had on the field; (c) assess current trends in the area of educational media technology and relate the trends to past events and future implications; (d) integrate technology into instructional programs; (e) teach the operation and various uses of educational technology in instruction; (f) act as consultants/facilitators in educational media technology; (g) design and develop instructional products to meet specified needs; and (h) evaluate the effectiveness of instructional materials and systems.

Features—Courses in our 30 credit hour Educational Media & Technology (EDMT) program include technology and student-centered learning, technology-enhanced learning environments, issues and emerging technologies, instructional design, development of online materials, psychology of the adult learner, principles of classroom learning, curriculum foundations, research seminar, and seminar in educational technology. All of the EDMT courses have been taught online. The program can be completed entirely online. Students who do not want to receive a Master's degree may apply for admission to our 20-credit hour Educational Media and Technology certificate. The EDMT courses for the certificate are also offered online. Visit our blog at: http://blogs.emich.edu/edmt/. Like us on Facebook (Group: EDMT, Ypsilanti).

Admission requirements—Individuals seeking admission to this program must: (1) Comply with the Graduate School admission requirements. (2) Score 550 or better on the TOEFL and 5 or better on TWE, if a non-native speaker of English. (3) Have a 2.75 undergraduate grade point average, or a 3.30 grade point average in 12 h or more of work in a Master's program. (4) Solicit two letters of reference. (5) Submit a statement of professional goals.

Degree requirements—In order to graduate, each student is expected to: (1) Complete all work on an approved program of study (30+ semester hours). (2) Maintain a "B" (3.0 GPA) average or better on course work taken within the program. (3) Get a recommendation from the faculty adviser. (4) Fill out an application for graduation and obtain the advisers recommendation. (5) Meet all other requirements for a Master's degree adopted by the Graduate School of Eastern Michigan University. (6) Complete a culminating experience (research, instructional development, or evaluation project) as determined by the student and faculty adviser.

Number of full-time faculty—4; **Number of other faculty**—0

Degrees awarded in 2012–13 academic year—Masters: 21; **Ph.D.:** 0; **Other:** 1

Grant monies awarded in 2012–13 academic year—0

Name of institution—Michigan State University
Name of department or program—College of Education
Address:
620 Farm Lane, Room 509D
East Lansing, MI
48824
USA
Phone number—517-432-7195 **Fax number**—517-353-6393
Email contact—edutech@msu.edu **URL**—http://edutech.msu.edu
Contact person—Leigh Wolf
Specializations—M.A. in Educational Technology with Learning, Design and Technology specialization. Online, overseas, and on-campus hybrid options.
Features—@maet on Twitter https://www.facebook.com/MAETMSU on Facebook
Admission requirements—Please visit: http://edutech.msu.edu/apply
Degree requirements—30 semester hours, web-based portfolio.
Number of full-time faculty—6; **Number of other faculty**—6
Degrees awarded in 2012–13 academic year—**Masters:** 60; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—Wayne State University
Name of department or program—Instructional Technology
Address:
381 Education
Detroit, MI
48202
USA
Phone number—(313)577-1728 **Fax number**—(313)577-1693
Email contact—tspannaus@wayne.edu **URL**—http://coe.wayne.edu/aos/it/
Contact person—Timothy W. Spannaus, Ph.D., Program Coord., Instructional Technology Programs, Div. of Administrative and Organizational Studies, College of Education.
Specializations—B.A. and B.S. degrees in Instructional Technology; M.Ed. degrees in Design & Performance Systems, K-12 Technology Integration, and Interactive Technologies. Ed.D. and Ph.D. programs to prepare individuals for leadership in academic, business, industry, health care, and the K-12 school setting as professor, researcher, instructional design, and development specialists; media or learning resources managers or consultants; specialists in instructional video; and web-based instruction and multimedia specialists. The school also offers a 6-year specialist degree program in Instructional Technology. The IT program offers certificates in Online Learning, Educational Technology, and University Teaching.
Features—Guided experiences in instructional design and development activities in business and industry are available. Specific classes use a variety of technologies, including blogs, wikis, twitter, facebook, google docs, and many others.

M.Ed. programs are available online. We now offer a B.A./B.S. program in Instructional Technology. This is a 2+2 program with Macomb Community College.

Admission requirements—Ph.D.: Masters degree, 3.5 GPA, GRE, strong academic recommendations, interview.

Degree requirements—Ph.D. 100 Cr. Hrs, including IT core and electives, research courses, 30 cr. dissertation. M.Ed.: 33–37 semester hours, including required project; internship recommended.

Number of full-time faculty—5; **Number of other faculty**—10

Degrees awarded in 2012–13 academic year—Masters: 48; **Ph.D.:** 11; **Other:** 8

Grant monies awarded in 2012–13 academic year—1,600,000

Name of institution—University of Missouri-Columbia

Name of department or program—School of Information Science & Learning Technologies

Address:
303 Townsend Hall
Columbia, MO
65211
USA

Phone number—(573)884-2670 **Fax number**—(573)884-2917

Email contact—caplowj@missouri.edu **URL**—http://sislt.missouri.edu

Contact person—Julie Caplow

Specializations—The Educational Technology program takes a theory-based approach to designing, developing, implementing, and researching computer-mediated environments to support human activity. We seek individuals who are committed to life-long learning and who aspire to use advanced technology to improve human learning and performance. Graduates of the program will find opportunities to use their knowledge and competencies as classroom teachers, media specialists, district technology specialists and coordinators, designers and developers of technology-based learning and information systems, training specialists for businesses, medical settings, and public institutions, as well as other creative positions. The curriculum at the Masters and Specialist levels has two focus areas: Technology in Schools, Online Educator and Learning Systems Design and Development; with course work tailored to each focus area. In addition, a Certificate in Online Educator is offered. For information regarding our Ph.D., see http://education.missouri.edu/SISLT/PhD/index.php.

Features—The three focus areas are available online via the Internet or on the MU campus. The Technology in Schools focus area is based on the ISTE competencies and culminates in an online portfolio based on these competencies. Several courses are augmented by technical resources developed at MU, including a technology integration knowledge repository and online collaboration tools. The Learning Systems Design and Development focus area links to business, military, and government contexts. This focus area offers a challenging balance of design and development course work, in addition to course work dealing with needs assessment and evaluation. The Online Educator focus area emphasizes the development of the knowledge and skills needed to design and provide effective online learning experiences in a variety of settings. For information regarding our Ph.D., see http://sislt.missouri.edu/phd.

Admission requirements—Certificate: Bachelors degree with a minimum 3.0 GPA Master: Bachelors degree, GRE (V > 500; A > 500; W > 3.5) Ed.S.: Masters degree, GRE (V > 500; A > 500; W > 3.5) Ph.D.: 3.5 graduate GPA, GRE (V > 500; A > 500; W > 3.5) See website for details

Degree requirements—Certificate: Minimum of 12 graduate credit hours required for the certificate Masters and Ed.S.: Minimum of 30 graduate credit hours required for the degree; 15 h of upper division course work. Maximum of 6 h of transfer credit. Ph.D. See website for details.

Number of full-time faculty—16; **Number of other faculty**—2

Degrees awarded in 2012–13 academic year—Masters: 30; **Ph.D.:** 10; **Other:** 26

Grant monies awarded in 2012–13 academic year—763,934

Name of institution—The University of Southern Mississippi

Name of department or program—Instructional Technology and Design

Address:

118 College Drive #5057

Hattiesburg, MS

39406-0001

USA

Phone number—601-266-5247 **Fax number**—601-266-4548

Email contact—Taralynn.Hartsell@usm.edu **URL**—http://www.usm.edu/cise

Contact person—Dr. Taralynn Hartsell

Specializations—The Department of Curriculum, Instruction, and Special Education at The University of Southern Mississippi has two graduate programs relating to Instructional Technology and Design. The Master of Science in Instructional Technology is a 30 h program, and the Ph.D. of Instructional Technology and Design is a 57–66 h program. Both programs are hybrid meaning that over 60 % of the course work could be taken online. The Master's program, however, could be taken all online depending upon the electives chosen by the student.

Features—The Master of Science concentrates more on the technology application and integration aspect that helps students learn both hands-on application of technology, as well as theoretical and historical aspects related to the field of study. Depending upon the electives selected, students could take all of their courses online. The Ph.D. program is an advanced study program for those wishing to pursue their education in the application of technology and design, research, and leadership (established in August, 2009). A majority of the course work in the program can be completed online (60 % or more depending upon courses completed) or hybrid. Research core requirements tend to be more traditional in nature.

Admission requirements—Please review the Department website for more information on the application procedures for each program: http://www.usm.edu/cise. The GRE is mandatory for graduate programs. Applications for the university is now completed online: http://www.usm.edu/graduateschool/admissions.php

Degree requirements—Please review the Department website for more information on degree requirements for each program: http://www.usm.edu/cise

Number of full-time faculty—4; **Number of other faculty**—1

Degrees awarded in 2012–13 academic year—Masters: 5; **Ph.D.:** 3; **Other:** 0

Grant monies awarded in 2012–13 academic year—1

Name of institution—North Carolina State University

Name of department or program—Digital Teaching and Learning Program

Address:
602 Poe Hall, Campus Box 7801
Raleigh, NC
27695-7801
USA

Phone number—(919) 515-6229 **Fax number**—(919) 515-6978

Email contact—kevin_oliver@ncsu.edu **URL**—http://ced.ncsu.edu/cice/it

Contact person—Dr. Kevin Oliver, Associate Professor

Specializations—Online M.Ed. and M.S. in Digital Teaching & Learning. On-Campus Ph.D. in Curriculum and Instruction with a concentration in Digital Teaching & Learning. Masters students choose one of three strands for specialization—digital leadership, digital design, or digital inquiry. Licensed teachers in North Carolina may earn the 079 computer educator endorsement after 12 credits or 6 courses (degree program not required—can simply take courses as a non-degree studies student), and may earn the 077 technology director endorsement after either complete Masters program.

Features—Fully online Masters programs with flexibility for residents near the Raleigh-Durham area to take some on-campus courses if they wish. Doctoral program is not online. A limited number of assistantships are available for students who live near Raleigh, go to school full time (9 h/semester), and can work on campus 20 h per week. Pays $15–20 k per semester with health benefits, tuition remission for doctoral assistantships only. Program Facebook group: http://www.facebook.com/groups/329701684366/ Program Twitter feed: http://twitter.com/dltncsu Program LinkedIn group: http://www.linkedin.com/groups?gid=2811382.

Admission requirements—Masters: undergraduate degree from an accredited institution, 3.0 GPA in major or in latest graduate degree program; transcripts; GRE or MAT scores; 3 references; goal statement. Ph.D.: undergraduate degree from accredited institution, 3.0 GPA in major or latest graduate program; transcripts; recent GRE scores, writing sample, three references, vita, research, and professional goals statement (see http://ced.ncsu.edu/node/615).

Degree requirements—Masters: 30 semester hours (M.Ed.), 36 semester hours (M.S.), thesis required for M.S. program. Ph.D.: 60 h. Up to 12 h of graduate-level transfer credits may be applied to any program if the transfer credits are from Instructional Technology/Digital Learning courses similar to those in the program.
Number of full-time faculty—3; **Number of other faculty**—3
Degrees awarded in 2012–13 academic year—Masters: 16; **Ph.D.:** 2; **Other:** 0
Grant monies awarded in 2012–13 academic year—325,000

Name of institution—University of Nebraska Kearney
Name of department or program—Teacher Education
Address:
1625 West 24th Street
Kearney, NE
68849-5540
USA
Phone number—(308)865-8833 **Fax number**—(308)865-8097
Email contact—fredricksons@unk.edu **URL**—http://www.unk.edu/academics/ecampus.aspx?id=6217
Contact person—Dr. Scott Fredrickson, Professor and Chair of the Instructional Technology Graduate Program
Specializations—M.S.Ed. in Instructional Technology, Emphasis areas: Instructional Technology, School Library, Information Technology, and Leadership in Instructional Technology.
Features—Two main emphasis areas—Instructional Technology, School Library. The Instructional Technology track has an Information Technology endorsement module, a Leadership in Instructional Technology Module, and an Instructional Technology module. The School Library track has a module to obtain a School Library endorsement. To obtain any of the endorsements requires a current teaching certificate, however the degree itself and the classwork in the endorsement areas, do not.
Admission requirements—Graduate Record Examination or completion of an electronic portfolio meeting department requirements, acceptance into graduate school, and approval of Instructional Technology Advising Committee.
Degree requirements—36 credit hours—18 of which are required and 18 are elective (30 h are required for the endorsement with 6 h of electives), and a capstone Instructional Technology project.
Number of full-time faculty—5; **Number of other faculty**—24
Degrees awarded in 2012–13 academic year—Masters: 46; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—University of Nebraska-Omaha
Name of department or program—College of Education Department of Teacher Education

Address:
Roskens Hall 308
Omaha, NE
68182
USA
Phone number—(402)554-2119 **Fax number**—(402)554-2125
Email contact—rpasco@unomaha.edu **URL**—http://www.unomaha.edu/libraryed/
Contact person—Dr. Rebecca J. Pasco
Specializations—Undergraduate Library Science Program (school, public, academic, and special libraries) School Library Endorsement (Undergraduate and Graduate), Master of Science in Secondary Education with School Library concentration, Master of Science in Elementary Education with School Library concentration, Master of Science in Reading with School Library concentration, Masters in Library Science Program (Cooperative program with University of Missouri).
Features—Web-assisted format (combination of online and on-campus) for both undergraduate and graduate programs. School Library programs nationally recognized by American Association of School Librarians (AASL) Programs for Public, Academic, and Special Libraries Cooperative UNO/University of Missouri MLS program is ALA accredited.
Admission requirements—As per University of Nebraska at Omaha undergraduate and graduate admissions requirements for College of Education and College of Arts and Sciences.
Degree requirements:

- School Library Endorsement (Undergraduate and Graduate)
- 30 h M.S. in Secondary and Elementary Education with School Library endorsement
- 36 h M.S. in Reading with School Library endorsement
- 36 h Masters in Library Science Program (Cooperative program with University of Missouri at Columbia)
- 42 h

Number of full-time faculty—4; **Number of other faculty**—14
Degrees awarded in 2012–13 academic year—Masters: 39; **Ph.D.:** 0; **Other:** 23
Grant monies awarded in 2012–13 academic year—48500

Name of institution—Rutgers-The State University of New Jersey
Name of department or program—School of Communication and Information
Address:
4 Huntington Street
New Brunswick, NJ
08901-1071
USA
Phone number—(848) 932-8936 **Fax number**—(732)932-6916

Email contact—joyce.valenza@rutgers.edu **URL**—http://comminfo.rutgers.edu/
Contact person—Dr. Joyce Valenza, Director, Master of Library and Information Science, Dept. of Library and Information Studies, School of Communication, Information and Library Studies. (732)932-7500 Ext 8955. Fax (732)932-2644. Dr. Michael Lesk, Chair.
Specializations—The Master of Library and Information Science (M.L.I.S.) program provides professional education for a wide variety of service and management careers in libraries, information agencies, the information industry, and in business, industry, government, research, and similar environments where information is a vital resource. Specializations include: school library media; services for children and youth; digital libraries; information retrieval/information systems; knowledge management; social media (http://comminfo.rutgers.edu/master-of-library-and-information-science/curriculum-overview.html).
Features—The M.L.I.S. program, available both on campus and online, is organized around six themes in the field of library and information science: human–information interaction; information access; information and society; information systems; management; and organization of information. Six lead courses, one in each area, form the foundation of the curriculum and offer general knowledge of the major principles and issues of the field. Two or more central courses in each theme offer basic understanding and competencies in important components of the field. Specialization courses in each theme allow students to develop expertise in preparation for specific career objectives. The specialization in School Librarianship is certified with the NJ Department of Education. All students in the New Brunswick M.L.I.S. program work with an advisor to plan a course of study appropriate for their interests and career objectives.
Admission requirements—A Bachelor's degree or its equivalent from a recognized institution of higher education with a B average or better; GRE scores; Personal statement which presents a view of the library and information science profession and applicants, aspirations, and goals in the library and information science professions; three letters of recommendation which focus on the applicants academic capacity to undertake a rigorous program of graduate study.
Degree requirements—A minimum of 36 credits, or 12 courses, is required to earn the M.L.I.S. degree. All students are required to enroll in three non-credit classes, 501–Introduction to Library and Information Professions in their first semester, 502–Colloquium in a later semester, and 503-e-Portfolio in the last semester. There are no language requirements for the M.L.I.S. degree, and there is no thesis or comprehensive examination.
Number of full-time faculty—21; **Number of other faculty**—15
Degrees awarded in 2012–13 academic year—Masters: 121; **Ph.D.:** 5; **Other:** 0
Grant monies awarded in 2012–13 academic year—830,000

Name of institution—Fordham University
Name of department or program—M.A. Program in Public Communications in the Department of Communication and Media Studies

Address:
Rose Hill Campus, 441 E. Fordham Rd.
Bronx, NY
10458
USA
Phone number—(718)817-4860 **Fax number**—(718)817-4868
Email contact—mccourt@fordham.edu **URL**—http://www.fordham.edu
Contact person—Fred Wertz, Department Chair, Tom McCourt, Director of Graduate Studies
Specializations—The M.A. in Public Communications has three concentrations: (1) Media Analysis and Criticism; (2) Industries, Publics, and Policy; (3) Screen Arts and Culture.
Features—Extensive Internship program: full-time students can complete program in 12 months, but many students take 18 months to complete the program.
Admission requirements—3.0 undergraduate GPA. Fellowship Applicants must take the GREs.
Degree requirements—10 courses (30) credits and either a media project, or a research paper or an M.A. Thesis to complete the degree.
Number of full-time faculty—12; **Number of other faculty**—4
Degrees awarded in 2012–13 academic year—**Masters:** 20; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—150,000

Name of institution—Ithaca College
Name of department or program—Roy H. Park School of Communications
Address:
953 Danby Road
Ithaca, NY
14850
USA
Phone number—(607)274-1025 **Fax number**—(607)274-7076
Email contact—youngc@ithaca.edu **URL**—http://www.ithaca.edu/gps/gradprograms/programsites/comm/programs/gradcomm/
Contact person—Cory Young, Associate Professor, Chair, Graduate Program in Communications; Roy H. Park, School of Communications.
Specializations—M.S. in Communications. Students in this program find employment in such areas as instructional design/training, web development, corporate/community/public relations and marketing, and employee communication. The program can be tailored to individual career goals.
Features—Program is interdisciplinary, incorporating organizational communication, instructional design, management, and technology.
Admission requirements—3.0 GPA, recommendations, statement of purpose, resume, application forms and transcripts, TOEFL 550 (or 213 computer-scored; 80 on the iBT version) where applicable.
Degree requirements—36 semester hours including capstone seminar.
Number of full-time faculty—6; **Number of other faculty**—3

Degrees awarded in 2012–13 academic year—Masters: 15; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—State University College of Arts and Science at Potsdam
Name of department or program—Organizational Leadership and Technology
Address:
392 Dunn Hall
Potsdam, NY
13676
USA
Phone number—(315)267-2670 **Fax number**—(315)267-3189
Email contact—betrusak@potsdam.edu **URL**—http://www.potsdam.edu/olt
Contact person—Dr. Anthony Betrus, Program Coordinator
Specializations—M.S. in Education in Instructional Technology with the following program concentrations: Educational Technology Specialist, K-12 Track Educational Technology Specialist, Non-K-12 Track Organizational Performance, Leadership, and Technology Organizational Leadership.
Features—Live instruction Evening courses 12-week courses Internships.
Admission requirements—(1) Submission of an official transcript of an earned baccalaureate degree from an accredited institution. (2) A minimum GPA of 2.75 (4.0 scale) in the most recent 60 credit hours of course work. (3) Submission of the Application for Graduate Study (w/$ 50 nonrefundable fee). (4) For students seeking the Educational Technology Specialist Certification, a valid NYS Teaching Certificate is required.
Degree requirements—36 semester hours, including internship or practicum; culminating project required.
Number of full-time faculty—2; **Number of other faculty**—5
Degrees awarded in 2012–13 academic year—Masters: 18; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—Wright State University
Name of department or program—College of Education and Human Services, Dept. of Leadership Studies
Address:
421 Allyn Hall, 3640 Colonel Glenn Highway
Dayton, OH
45435
USA
Phone number—(937)775-2509 or (937)775-4148 **Fax number**—(937)775-2405
Email contact—marguerite.veres@wright.edu **URL**—http://www.cehs.wright.edu/academic/educational_leadership/lib-media/index.php
Contact person—Maggie Veres
Specializations—M.Ed. or M.A. in Computer/Technology or Library Media
Features—Ohio licensure available in Multi-age library media (ages 3–21) Computer/technology endorsement above licensure only available on a graduate basis. Multi-age library media licensure available in two tracks: initial (no previ-

ous teaching license) and advanced (with current teaching license in another field). The computer/technology endorsement must be added to a current teaching license.

Admission requirements—Completed application with nonrefundable application fee, Bachelors degree from accredited institution, official transcripts, 2.7 overall GPA for regular status (conditional acceptance possible), statement of purpose, satisfactory scores on MAT or GRE.

Degree requirements—M.Ed. requires a comprehensive portfolio; M.A. requires a 6-h thesis

Number of full-time faculty—2; **Number of other faculty**—5

Degrees awarded in 2012–13 academic year—Masters: 7; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—Kent State University

Name of department or program—Instructional Technology

Address:

405 White Hall

Kent, OH

44242

USA

Phone number—(330) 672-2294 **Fax number**—(330) 672-2512

Email contact—dtiene@kent.edu **URL**—http://www.kent.edu/ehhs/itec/index.cfm

Contact person—Dr. Drew Tiene, Coordinator: Instructional Technology Program

Specializations—M.Ed. in Instructional Technology and licensure program in Computing/Technology. Ph.D. in Educational Psychology with concentration in Instructional Technology. Online Teaching & Learning Certificate.

Features—Programs are planned with advisors to prepare students for careers in elementary, secondary, or higher education, business, industry, government agencies, or health facilities. Students may take advantage of independent research, individual study, and internships. Most courses and programs can be taken online.

Admission requirements—Masters: Bachelors degree with 3.00 undergraduate GPA, 2 references Doctorate: Masters Degree, acceptable graduate GPA & GRE scores, goal statement, 3 references.

Degree requirements—Masters: 34–37 semester hours, portfolio, practicum (for licensure) Doctoral: minimum of 45 post-Masters semester hours, comprehensive exam, dissertation.

Number of full-time faculty—5; **Number of other faculty**—5

Degrees awarded in 2012–13 academic year—Masters: 30; **Ph.D.:** 3; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—Ohio University

Name of department or program—Instructional Technology

Address:
McCracken Hall
Athens, OH
45701-2979
USA
Phone number—(740)597-1322 **Fax number**—(740)593-0477
Email contact—moored3@ohio.edu **URL**—http://www.cehs.ohio.edu/academics/es/it/index.htm
Contact person—David Richard Moore, Instructional Technology Program Coordinator
Specializations—Certificate in Instructional Design http://www.ohio.edu/education/academic-programs/educational-studies/instructional-technology/index.cfm M. Ed. in Computer Education and Technology. Ph.D. in Curriculum and Instruction with a specialization in Instructional Technology also available; call for details (740-593-4561) or visit the website: http://www.ohio.edu/education/dept/es/it/index.cfm.
Features—Masters program is a blended online delivery.
Admission requirements—Bachelors degree, 3.0 undergraduate GPA, 35 MAT, 500 GRE (verbal), 500 GRE (quantitative), 550 TOEFL, three letters of recommendation, paper describing future goals and career expectations from completing a degree in our program.
Degree requirements—Masters—36 semester credits, electronic portfolio, or optional thesis worth 2–10 credits or alternative seminar research paper. Students may earn two graduate degrees simultaneously in education and in any other field. Ph.D.—66 h with 15 h being dissertation work.
Number of full-time faculty—4; **Number of other faculty**—0
Degrees awarded in 2012–13 academic year—**Masters:** 18; **Ph.D.:** 10; **Other:** 0
Grant monies awarded in 2012–13 academic year—500,000

Name of institution—University of Toledo
Name of department or program—Curriculum & Instruction
Address:
2801 W. Bancroft Street, Mail Stop 924
Toledo, OH
43606
USA
Phone number—(419)530-7979 **Fax number**—(419)530-2466
Email contact—Berhane.Teclehaimanot@utoledo.edu **URL**—http://tipt3.utoledo.edu
Contact person—Berhane Teclehaimanot, Ph.D.
Specializations—Technology Using Educator/Technology Coordinator and Instructional Designer.
Features—Graduate students may concentrate in one of the two primary "roles," or may choose a blended program of study. Program was completely redesigned in 2004.
Admission requirements—Masters: 3.0 undergrad. GPA, GRE (if undergrad. GPA<2.7), recommendations; Doctorate: Masters degree, GRE, TOEFL (as necessary), recommendations, entrance writing samples, and interview.

Degree requirements—Masters: 30 semester hours, culminating project; Doctorate: 60 semester hours (after Ms), major exams, dissertation.
Number of full-time faculty—2; **Number of other faculty**—5
Degrees awarded in 2012–13 academic year—Masters: 13; **Ph.D.:** 3; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—The University of Oklahoma
Name of department or program—Instructional Psychology and Technology, Department of Educational Psychology
Address:
321 Collings Hall
Norman, OK
73019
USA
Phone number—(405)325-5974 **Fax number**—(405)325-6655
Email contact—mcrowson@ou.edu **URL**—http://education.ou.edu/ipt/
Contact person—Dr. H. Michael Crowson, Program Area Coordinator
Specializations—Masters degree with emphases in Instructional Design & Technology and Instructional Psychology & Technology (includes tracks: Instructional Psychology & Technology and Integrating Technology in Teaching). Doctoral degree in Instructional Psychology and Technology.
Features—Strong interweaving of principles of instructional psychology with instructional design and development. Application of IP&T in K-12, vocational education, higher education, business and industry, and governmental agencies.
Admission requirements—Masters: acceptance by IPT program and Graduate College based on minimum 3.00 GPA for last 60 h of undergraduate work or last 12 h of graduate work; written statement that indicates goals and interests compatible with program goals. Doctoral: minimum 3.25 GPA, GRE scores, written statement that indicates goals and interests compatible with program goals, writing sample, and letters of recommendation.
Degree requirements—Masters: 36 h course work with 3.0 GPA; successful completion of thesis or comprehensive exam. Doctorate: see program description from institution or http://www.ou.edu/content/education/edpy/instructional-psychology-and-technology-degrees-and-programs.html.
Number of full-time faculty—11; **Number of other faculty**—0
Degrees awarded in 2012–13 academic year—Masters: 8; **Ph.D.:** 2; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—Bloomsburg University
Name of department or program—Instructional Technology & Institute for Interactive Technologies
Address:
207 Sutliff Hall.
Bloomsburg, PA
17815
USA

Phone number—(717)389-4875 **Fax number**—(717)389-4943
Email contact—tphillip@bloomu.edu **URL**—http://iit.bloomu.edu
Contact person—Dr. Timothy L. Phillips, contact person
Specializations—M.S. in Instructional Technology—Corporate Concentration M.S. in Instructional Technology—Instructional Technology Specialist Concentration (education eLearning Developer Certificate
Features—M.S. in Instructional Technology with emphasis on preparing for careers as Instructional Technologist in corporate, government, health care, higher education, and K-12 educational settings. The program is highly applied and provides opportunities for students to work on real-world projects as part of their course work. Our program offers a corporate concentration and an Instructional Technology Specialist Concentration for educators. The program offers a complete Master's degree online as well as on campus. Graduate assistantships are available for full-time students. The program is closely associated with the nationally known Institute for Interactive Technologies.
Admission requirements—Bachelors degree
Degree requirements—33 semester credits (27 credits + 6 credit thesis, or 30 credits + three credit internship).
Number of full-time faculty—5; **Number of other faculty**—3
Degrees awarded in 2012–13 academic year—Masters: 70; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—350,000

Name of institution—Lehigh University.
Name of department or program—Teaching, Learning, and Technology
Address:
111 Research Drive
Bethlehem, PA
18015
USA
Phone number—(610)758-3230 **Fax number**—(610)758-6223
Email contact—mj.bishop@lehigh.edu **URL**—http://www.lehigh.edu/education/tlt/
Contact person—MJ Bishop, Associate Professor and Teaching, Learning, and Technology Program Director
Specializations—M.S. in Instructional Design and Technology: Emphasizes design, development, implementation, integration, and evaluation of technology for teaching and learning. The degree is well suited to both designers (producers) and implementers (consumers) of instructional technologies. Graduate certificate in Technology Use in the Schools: This 12-credit grad certificate focuses on integrating technology into daily practice in the schools. Ph.D. in Teaching and Learning, concentration in Instructional Design and Technology: Emphasizes cognitive processes and their implications for the design, development, and evaluation of technology-based teaching and learning products in a variety of settings.

Features—Our professional development programs in instructional design and technology focus on the systematic design, planning, and use of technology. The program is targeted toward individuals from varied backgrounds who wish to help educators or learn themselves to design, develop, and incorporate technology more effectively in diverse educational settings (including K-12, higher education, informal learning, and corporate training). Both Masters and doctoral students collaborate with faculty on projects and studies (including national presentation and publication).

Admission requirements—M.S. (competitive): 3.0 undergraduate GPA or 3.0 graduate GPA, GREs recommended, transcripts, at least two letters of recommendation, statement of personal and professional goals, application fee. Application deadlines: July 15 for fall admission, Dec 1 for spring admission, Apr 30 for summer admission. Ph.D. (highly competitive): 3.5 graduate GPA, GREs required. Copy of two extended pieces of writing (or publications); statement of future professional goals; statement of why Lehigh best place to meet those goals; identification of which presentations, publications, or research by Lehigh faculty attracted applicant to Lehigh. Application deadline: December 1 (admission only once per year from competitive pool).

Degree requirements—M.S.: 30 credits; thesis option. Ph.D.: 48 credits post-Masters (including dissertation). Qualifying Exam (written and oral) + General Examination Research Project (publication quality) + dissertation.

Number of full-time faculty—5; **Number of other faculty**—1

Degrees awarded in 2012–13 academic year—**Masters:** 8; **Ph.D.:** 2; **Other:** 0

Grant monies awarded in 2012–13 academic year—500,000

Name of institution—University of South Carolina Aiken and University of South Carolina Columbia

Name of department or program—Aiken: School of Education; Columbia: Department of Educational Psychology

Address:

471 University Parkway

Aiken, SC

29801

USA

Phone number—803.641.3489 **Fax number**—803.641.3720

Email contact—smyth@usca.edu **URL**—http://edtech.usca.edu

Contact person—Dr. Thomas Smyth, Professor, Program Director

Specializations—Master of Education in Educational Technology (A Joint Program of The University of South Carolina Aiken and Columbia)

Features—The Master's Degree in Educational Technology is designed to provide advanced professional studies in graduate-level course work to develop capabilities essential to the effective design, evaluation, and delivery of technology-based instruction and training (e.g., software development, multimedia development, assistive technology modifications, web-based development, and distance learning). The program is intended (1) to prepare educators to assume leadership roles in the integration of educational technology into the school curriculum, and (2) to provide graduate-level instructional opportunities for several populations (e.g., classroom teachers, corporate trainers, educational software developers) that need to acquire both technological competencies and understanding of sound instructional design principles and techniques. The program is offered entirely online as high-quality, interactive, web-based courses. There are occasional synchronous online meetings, but the vast majority of the program is asynchronous. Candidates present a program portfolio for review by the faculty at the end of the program.

Admission requirements—Application to the Educational Technology Program can be made after completion of at least the Bachelor's degree from a college or university accredited by a regional accrediting agency. The standard for admission will be based on a total profile for the applicant. The successful applicant should have an undergraduate grade point average of at least 3.0, a score of 45 on the Miller's Analogies Test or scores of 450 on both the verbal and quantitative portions of the Graduate Record Exam, a well-written letter of intent that matches the objectives of the program and includes a description of previous technology experience, and positive letters of recommendation from individuals who know the professional characteristics of the applicant. Any exceptions for students failing to meet these standards shall be referred to the Admissions Committee for review and final decision.

Degree requirements—36 semester hours, including instructional theory, computer design, and integrated media.

Number of full-time faculty—4; **Number of other faculty**—2

Degrees awarded in 2012–13 academic year—**Masters:** 21; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—Dakota State University

Name of department or program—Educational Technology

Address:

820 North Washington Ave.

Madison, SD

57042

USA

Phone number—1-888-DSU-9988 **Fax number**—(605) 256-5093

Email contact—mark.hawkes@dsu.edu **URL**—http://www.dsu.edu/mset/index.aspx

Contact person—Mark Hawkes

Specializations—The MSET program offers two specializations: Distance Education and Technology Systems. These specializations are indicated on the official transcript. Students who wish to choose one of these specializations or the technology endorsement must take designated electives as follows: Distance Education: CET 747 Web & ITV Based Applications of Dist Ed (3 credit hours) CET 749 Policy and Management of Distance Education (3 credit hours) CET 769 Adult Learning for Distance Education (3 credit hours) Technology Systems

CET 747 Web & ITV Based Applications of Dist Ed (3 credit hours) CET 750 Multimedia II (2 credit hours) CET 753 Network Management in Educational Institutions (3 credit hours) CET 758 Advanced Instructional Programming (2 credit hours) K-12 Educational Technology Endorsement Individuals who hold or are eligible for teaching certification may earn the K-12 Educational Technology Endorsement by completing specified courses within the MSET program.

Features—The Master of Science in Educational Technology (MSET) is an instructional technology program designed to meet the rapidly increasing demand for educators who are trained to integrate computer technologies into the curriculum and instruction. As computers and technology have become a significant part of the teaching and learning process, addressing the information needs of teachers has become the key to integrating technology into the classroom and increasing student learning. The primary emphasis of the Master's program is to prepare educators who can create learning environments that integrate computing technology into the teaching and learning process. The MSET degree is an advanced degree designed to equip educators to be: leaders in educational technology current in teaching and learning processes and practices current in research technologies and designs knowledgeable of technologies and programming skills knowledgeable of current, technology-based educational tools and products. Specifically by the end of the program MSET students will understand the capabilities of the computer and its impact upon education. They will be proficient in the use and application of computer software and will be able to demonstrate proficiency in using computers and related technologies to improve their own and their students learning needs. The program integrates a highly technological environment with a project-based curriculum. Its focus is supported by an institutionally systemic belief that there is a substantial role for technology in teaching and learning in all educational environments.

Admission requirements—Baccalaureate degree from an institution of higher education with full regional accreditation for that degree. Satisfactory scores on the GRE. The test must have been taken within the last 5 years. The GRE test can be waived if one of the following conditions is met: A cumulative grade point average of 3.25 or higher on a 4.0 scale for a baccalaureate degree from a regionally accredited college or university in the U.S. Official admission into and demonstrated success in a regionally accredited graduate program in the U.S. Demonstrated success is defined as grades of A or B in at least 12 h of graduate work. OR Graduation from a regionally accredited college/university in the United States at least 15 years ago or more. Other factors (such as student maturity, references, or special expertise) also may be used to determine admission to the program. Also see program-specific admission requirements for additional requirements. Demonstrated basic knowledge of computers and their applications for educational purposes. Basic knowledge can be demonstrated in one of the following ways: Technology endorsement from an accredited university; or In-service position as full or part-time technology coordinator in a public school. A personal statement of technological competency. The statement should not exceed two pages and should be accompanied by supporting documentation or electronic references, e.g., URL.

Degree requirements—The program requires a total of 36 credits beyond the baccalaureate degree. All students must take the following: 25 h of required courses. 11 h of electives. It is possible to specialize in either Distance Education or Technology Systems by selecting the designated electives for that specialization. You can also get a K-12 Educational Technology Endorsement. It is also possible to select the thesis option from among the electives. MSET courses are offered using a variety of distance delivery methods. At this time, one required course and one elective course has a limited length hands-on campus requirement. These courses are offered in summer and the residency requirement is limited to 1 week per course. Alternatives may be available for the distance student.

Number of full-time faculty—3; **Number of other faculty**—5

Degrees awarded in 2012–13 academic year—Masters: 25; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—10,000

Name of institution—Texas A&M University

Name of department or program—Educational Technology Program, Dept. of Educational psychology

Address:

College of Education & Human Development

College Station, TX

77843-4225

USA

Phone number—(979)845-7276 **Fax number**—(979)862-1256

Email contact—spedersen@tamu.edu **URL**—http://epsy.tamu.edu/degrees-and-programs/graduate-degree-programs/learning-sciences/edtech

Contact person—Susan Pedersen (contact Kristie Stramaski for application materials/questions)

Specializations—M.Ed. in Educational Technology; Ph.D. in Learning Sciences. The purpose of the Educational Technology Program is to prepare educators with the competencies required to improve the quality and effectiveness of instructional programs at all levels. A major emphasis is placed on the design of educational materials that harness the potential of emerging technologies. The program goal is to prepare graduates with a wide range of skills to work as professionals and leaders in a variety of settings, including education, business, industry, and the military.

Features—Masters program can be completed entirely online. The college and university maintain facilities and technology services to support both distance and resident students.

Admission requirements—M.Ed.: Bachelors degree, GRE (no specific cut-offs, but 147 both V and Q recommended), TOEFL; Ph.D.: 3.0 GPA, 150 GRE Verbal; letters of recommendation, general background, and student goal statement.

Degree requirements—M.Ed.: 36 semester credits; Ph.D.: course work varies with student goals—degree is a Ph.D. in Learning Sciences with specialization in educational technology.
Number of full-time faculty—2; **Number of other faculty**—1
Degrees awarded in 2012–13 academic year—Masters: 6; **Ph.D.:** 2; **Other:** 0
Grant monies awarded in 2012–13 academic year—200,000

Name of institution—The University of Texas at Austin
Name of department or program—Curriculum & Instruction
Address:
406 Sanchez Building
Austin, TX
78712-1294
USA
Phone number—(512)471-5942 **Fax number**—(512)471-8460
Email contact—Mliu@austin.utexas.edu **URL**—http://www.edb.utexas.edu/education/departments/ci/programs/it/
Contact person—Min Liu, Ed.D., Professor and IT Program Area Coordinator/Graduate Advisor
Specializations—The University of Texas at Austin's College of Education is ranked number one in the nation among public universities by U.S. News & World Report's 2013 edition of "America's Best Graduate Schools." It's ranked number three among public and private universities nationally. The Learning Technologies (LT) Program is a graduate program and offers degrees at the Masters and doctoral levels. Masters degrees in LT provide students with knowledge and skills of cutting-edge new media technologies, learning theories, instructional systems design, human–computer interaction, and evaluation. They prepare students to be leaders and practitioners in various educational settings, such as K-12, higher education, and training in business and industry. Ph.D. program provides knowledge and skills in areas such as instructional systems design, learning and instructional theories, instructional materials development and design of learning environments using various emerging technology-based systems and tools. Graduates assume academic, administrative, and other leadership positions such as professors, instructional technologists at school district level, managers and researchers of instructional design and instructional evaluators.
Features—The program is interdisciplinary in nature, although certain competencies are required of all students. Programs of study and dissertation research are based on individual needs and career goals. Learning resources include state-of-the-art labs in the Learning Technology Center in the College of Education, and university-wide computer labs. Students can take courses offered by other departments and colleges as relevant to their interests. Students, applying to the program, have diverse backgrounds and pursue careers of their interests. The program caters students with K-12 as well as corporate backgrounds.
Admission requirements—Learning Technologies program considers only applications for Fall admission, with the deadline of December 15. November 15—

Deadline for consideration of financial award Admission decisions are rendered based on consideration of the entire applicant file, including GPA, test scores, references, experience, and stated goals. No single component carries any more significance than another. However, priority may be given to applicants who meet the following preferred criteria: GPA 3.0 or above GRE 1,100 or above (verbal+quantitative, with at least 400 verbal) TOEFL 213 or above (computer)/550 or above (paper-based)/79 or 80 (Internet-based) TOEFL http://www.edb.utexas.edu/education/departments/ci/studentinfo/pstudents/grad/application/.

Degree requirements—see http://www.edb.utexas.edu/education/departments/ci/programs/lt/ for details

Number of full-time faculty—3; **Number of other faculty**—41

Degrees awarded in 2012–13 academic year—Masters: 15; **Ph.D.:** 2; **Other:** 0

Grant monies awarded in 2012–13 Academic Year—41,000

Name of institution—East Tennessee State University

Name of department or program—College of Education, Dept. of Curriculum and Instruction

Address:
Box 70684
Johnson City, TN
37614-0684
USA

Phone number—(423) 439-7843 **Fax number**—(423) 439-8362

Email contact—danielsh@etsu.edu **URL**—http://www.etsu.edu/coe/cuai/graduate/mediatech/default.aspx

Contact person—Harold Lee Daniels

Specializations—(1) M.Ed. in School Library Media (2) M.Ed. in Educational Technology (3) School Library Media Specialist add on certification for those with current teaching license and a Master's degree (4) M.Ed. in Classroom Technology for those with teaching license.

Features—Two (MAC & PC) dedicated computer labs (45+ computers). Online and evening course offerings for part-time, commuter, and employed students. Student pricing/campus licensing on popular software (MS, Adobe, Apple, etc.). Off site cohort programs for classroom teachers. Extensive software library (900+titles) with review/checkout privileges.

Admission requirements—Bachelors degree from accredited institution with undergraduate GPA of 3.0 or higher, transcripts, personal application essay, and three letters of recommendation. An interview, and/or GRE may be required in some cases.

Degree requirements—36 semester hours, including 12 h in common core of instructional technology and media, 18 professional content hours, and 2–5-credit hour practicum (80–200 field experience hours).

Number of full-time faculty—4; **Number of other faculty**—4

Degrees awarded in 2012–13 academic year—Masters: 11; **Ph.D.:** 0; **Other:** 2

Grant monies awarded in 2012–13 academic year—32,000

Name of institution—Texas Tech University
Name of department or program—Instructional Technology
Address:
Box 41071, TTU
Lubbock, TX
79409
US
Phone number—(806)742-1997, ext. 297 **Fax number**—(806)742-2179
Email contact—Steven.Crooks@ttu.edu **URL**—http://edit.educ.ttu.edu
Contact person—Dr. Steven Crooks, Program Coordinator, Instructional Technology
Specializations—M.Ed. in Instructional Technology; completely online M.Ed. in Instructional Technology; Ed.D. in Instructional Technology
Features—Program is NCATE accredited and follows ISTE and AECT guidelines.
Admission requirements—Holistic evaluation based on GRE scores (Doctorate only), GPA, student goals, and writing samples.
Degree requirements—M.Ed.: 39 h (21 h instructional technology core, 12 h instructional technology electives, 6 h education foundations and research). Ed.D.: 93 h (45 h in educational technology, 15 h in minor or additional support courses, 21 h in education or resource area, 12 h dissertation.
Number of full-time faculty—4; **Number of other faculty**—2
Degrees awarded in 2012–13 academic year—**Masters:** 22; **Ph.D.:** 5; **Other:** 0
Grant monies awarded in 2012–13 academic year—200,000

Name of institution—University of Houston
Name of department or program—Learning, Design, and Technology Graduate Program
Address:
214 Farish Hall, Mail Code 5023
Houston, TX
77204-5023
USA
Phone number—713-743-4975 **Fax number**—713-743-4990
Email contact—smcneil@uh.edu **URL**—http://www.coe.uh.edu/current-students/academic-programs/instructional-technology/index.php
Contact person—Sara McNeil
Specializations—Instructional design; Urban community partnerships enhanced by technology; Integration of technology in teacher education; Visual representation of information; Linking instructional technology with content area instruction; Educational uses of digital media (including digital photography, digital video, and digital storytelling); Collaborative design and development of multimedia; Uses of instructional technology in health sciences education.

Features—The Learning, Design, and Technology Program at the University of Houston can be distinguished from other instructional technology programs at other institutions through our unique philosophy based on a strong commitment to the broad representations of community, the individual, and the collaboration that strengthens the two. We broadly perceive community to include our college, the university, and the local Houston environment. The community is a rich context and resource from which we can solicit authentic learning tasks and clients, and to which we can contribute new perspectives and meaningful products. Our students graduate with real-world experience that can only be gained by experience with extended and coordinated community-based projects, not by contrived course requirements. Our program actively seeks outside funding to promote and continue such authentic projects because we so strongly believe it is the best context in which our students can develop expertise in the field. We recognize that each student brings to our program a range of formal training, career experience, and future goals. Thus, no longer can we be satisfied with presenting a single, static curriculum and still effectively prepare students for a competitive marketplace. Our beliefs have led us to develop a program that recognizes and celebrates student individuality and diversity. Students work with advisors to develop a degree plan that begins from their existing knowledge and strives toward intended career goals. We aim to teach not specific software or hardware operations, but instead focus on transferable technical skills couched in solid problem-solving experiences, theoretical discussions, and a team-oriented atmosphere. Students work throughout the program to critically evaluate their own work for the purpose of compiling a performance portfolio that will accurately and comprehensively portray their individual abilities to themselves, faculty, and future employers. Completing our philosophical foundation is a continuous goal of collaboration. Our faculty operates from a broad collaborative understanding that recognizes how everyone involved in any process brings unique and valuable experiences and perspectives. Within the Learning, Design and Technology program, faculty, staff, and students rely on each other to contribute relevant expertise. Faculty members regularly seek collaboration with other faculty in the College of Education, especially those involved with teacher education, as well as with faculty in other schools across campus. Collaboration is a focus that has been infused through the design of our courses and our relationships with students. Facebook: http://www.facebook.com/groups/189269174434698/.

Admission requirements—Admission information for graduate programs: http://www.coe.uh.edu/current-students/academic-programs/instructional-technology/index.php Masters program: 3.0 grade point average (GPA) for unconditional admission or a 2.6 GPA or above for conditional admission over the last 60 h of course work attempted Graduate Record Exam: The GRE must have been taken within 5 years of the date of application for admission to any Graduate program in the College of Education. Doctoral program: Each applicant must normally have earned a Master's degree or have completed 36 semester hours of appropriate graduate work with a minimum GPA of 3.0 (A = 4.0). Graduate Record Exam:

The GRE must have been taken within 5 years of the date of application for admission to any graduate program in the College of Education.

Degree requirements—Masters: Students with backgrounds in educational technology can complete the Master's program with 30 h of course work. For the typical student, the M.Ed. in Instructional Technology consists of 9 semester hours of core courses required by the College of Education, and an additional 12 h core in Instructional Technology as well as 9 h that are determined by the students' career goals (K-12, higher education, business, and industry). Students complete a capstone project that demonstrates the depth and breadth of their educational growth throughout the program and highlights their knowledge and skills gained as well as their development as a reflective practitioner. Doctoral: The minimum hours required in the doctoral program is 66. More details about the courses and requirements can be found online at: http://www.coe.uh.edu/academic-programs/cuin-ed-instruction-technology/index.php.

Number of full-time faculty—5; **Number of other faculty**—5

Degrees awarded in 2012–13 academic year—Masters: 10; **Ph.D.:** 9; **Other:** 0

Grant monies awarded in 2012–13 academic year—50,000

Name of institution—Utah State University

Name of department or program—Department of Instructional Technology & Learning Sciences, Emma Eccles Jones College of Education and Human Services

Address:

2830 Old Main Hill
Logan, UT
84322-2830
USA

Phone number—(435)797-2694 **Fax number**—(435)797-2693

Email contact—mimi.recker@usu.edu **URL**—http://itls.usu.edu

Contact person—Dr. Mimi Recker, Prof., Head.

Specializations—M.S. and M.Ed. with concentrations in the areas of Instructional Technology, Learning Sciences, Multimedia, Educational Technology, and Information Technology/School Library Media Administration. Ph.D. in Instructional Technology & Learning Sciences is offered for individuals seeking to become professionally involved in instructional/learning sciences research and development in higher education, corporate education, public schools, community colleges, and government. M.Ed. and M.S. programs in Instructional Technology/School Library Media Administration and Educational Technology are also available completely online. The doctoral program is built on a strong Master's and Specialists program in Instructional Technology. All doctoral students complete a core with the remainder of the course selection individualized, based upon career goals.

Features—Facebook: http://www.facebook.com/usuitls (online: facebook.com/usuitlsonline) Online Students Facebook Page: http://www.facebook.com/usuitlsonline

Twitter: http://www.twitter.com/utahstateitls LinkedIn: http://www.linkedin.com/ YouTube: http://www.youtube.com/usuitls

Admission requirements—M.S. and Ed.S.: 3.0 GPA, a verbal and quantitative score at the 40th percentile on the GRE or 43 MAT, three written recommendations. Ph.D.: relevant Masters degree, 3.0 GPA, verbal and quantitative score at the 40th percentile on the GRE, three written recommendations, essay on research interests.

Degree requirements—M.S.: 36 sem. hours; thesis or project option. Ed.S.: 30 sem. hours if M.S. is in the field, 40 h if not. Ph.D.: 43 total hours, dissertation, 3-sem. residency, and comprehensive examination.

Number of full-time faculty—10; **Number of other faculty**—1

Degrees awarded in 2012–13 academic year—Masters: 35; **Ph.D.:** 5; **Other:** 0

Grant monies awarded in 2012–13 academic year—1,350,000

Name of institution—George Mason University

Name of department or program—Learning Technologies

Address:

Mail Stop 5D6, 4400 University Dr.

Fairfax, VA

22030-4444

USA

Phone number—(703)993-3798 **Fax number**—(703)993-2722

Email contact—ndabbagh@gmu.edu **URL**—http://learntech.gmu.edu/

Contact person—Dr. Nada Dabbagh, Director, Division of Learning Technologies

Specializations—Ph.D. Program Learning Technologies Design Research (with specialization in Instructional Design, Integration of Technology in Schools or Assistive Technology) Masters Degrees—Curriculum and Instruction with concentrations in—Instructional Design & Technology—Integration of Technology in Schools—Integration of Online Learning in Schools Graduate Certificates—eLearning—Integration of Online Learning in Schools.

Features—The Division of Learning Technologies supports the following academic programs: Instructional Design and Technology (IDT): provides professionals with the knowledge and skills to design effective and innovative learning solutions to instructional and performance problems; graduates of this program are workplace-ready for instructional design responsibilities in public, private, government, and educational settings. Learning Technologies in Schools (LTS) program provides teachers and educators with the knowledge and skills to effectively integrate technology in K-12 classroom and online learning environments; graduates of this program frequently become the local expert and change agent for technology in schools. Ph.D. Concentration in Learning Technologies Design Research (LTDR): an innovative program that engages doctoral students in real world, workplace-based integrated design and research; LTDR addresses cross-disciplinary progressive cycles of design, development, and research focused on promoting strategic thinking, innovation, and creativity in the design of learning technologies to achieve organizational goals. http://www.facebook.com/MasonLearnTech https://twitter.com/MasonCEHD.

Admission requirements—Masters and Certificate Programs—Teaching or training experience, undergrad GPA of 3.0, TOEFL of 575(written)/230(computer), three letters of recommendation, goal statement, resume. Ph.D. Program—http://gse.gmu.edu/programs/phd/.

Degree requirements—M.Ed. in Curriculum Instructional Design and Development, 30 h; M.Ed. in Curriculum and Instruction Integration of Technology in Schools, 36 h; practicum M.Ed. in Curriculum and Instruction Integration of Online Learning in Schools, 30 h; Ph.D., 65 h beyond Masters degree. Certificate programs, 15 h.

Number of full-time faculty—7; **Number of other faculty**—4

Degrees awarded in 2012–13 academic year—Masters: 60; **Ph.D.:** 8; **Other:** 25

Grant monies awarded in 2012–13 academic year—100,000

Name of institution—Virginia Tech

Name of department or program—Instructional Design and Technology

Address:

116 War Memorial Hall (0313)
Blacksburg, VA
24061-0313
USA

Phone number—(540)231-5587 **Fax number**—(540)231-9075

Email contact—mae@vt.edu **URL**—http://www.soe.vt.edu/idt/

Contact person—Michael A. Evans, Program Area Leader

Specializations—M.A., Ed.S. Ed.D., and Ph.D. in Instructional Design and Technology. Graduates of our Masters and Educational Specialist programs find themselves applying their expertise in a variety of rewarding, professional venues; for example, as instructional designers, trainers, or performance consultants in industrial settings and as teachers or technology coordinators in preK-12. Graduates of our Doctoral program typically assume exciting roles as faculty in higher education, advancing research in the field and preparing the next generation of instructional technologists for the profession.

Features—Areas of emphasis are Instructional Design, Learning Sciences, Distance Education, and Multimedia Development. Facilities include computer labs, extensive digital video and audio equipment, distance education classroom, and computer graphics production areas.

Admission requirements—Ed.D. and Ph.D.: 3.3 GPA from Masters degree, GRE scores, writing sample, three letters of recommendation, transcripts. M.A.: 3.0 GPA Undergraduate.

Degree requirements—Ph.D.: 90 h above B.S., 2-year residency, 12 h research classes, 30 h dissertation; Ed.D.: 90 h above B.S., 1 year residency, 12 h research classes; M.A.: 30 h above B.S.

Number of full-time faculty—6; **Number of other faculty**—1

Degrees awarded in 2012–13 academic year—Masters: 28; **Ph.D.:** 5; **Other:** 4
Grant monies awarded in 2012–13 academic year—4,100,000

Name of institution—University of Alaska Southeast
Name of department or program—Educational Technology Program
Address:
11120 Glacier Hwy, HA1
Juneau, AK
99801
USA
Phone number—907-796-6050 **Fax number**—907-796-6059
Email contact—marsha.gladhart@uas.alaska.edu **URL**—http://uas.alaska.edu/education/experienced
Contact person—Marsha Gladhart
Specializations—Educational Technology
Features:

- Distance program
- Standards-based learning
- Integration of the most current technologies
- Collaboration with other teachers
- Instructors with K-12 teaching experience
- Focus on improving student learning
- Use of technology as a tool to assist learning

Admission requirements:

- A completed graduate application and $ 60 processing fee.
- Official academic transcript indicating baccalaureate degree and a GPA of 3.0
- Two (2) general recommendations written by former or current professors, employers, or supervisors who are familiar with your work and performance. Each recommendation must be submitted using the Letter of Recommendation for Graduate Programs form.
- A recommendation documenting your ability to meet the educational technology standards required for entry to the program. This recommendation should be completed by an administrator, supervisor, or technology leader.
- Statement of Professional Objectives.

Degree requirements—Official academic transcript indicating baccalaureate degree and a GPA of 3.0
Number of full-time faculty—2; **Number of other faculty**—5
Degrees awarded in 2012–13 academic year—Masters: 15; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—University of South Alabama
Name of department or program—Department of Professional Studies, College of Education

Address:
University Commons 3700
Mobile, AL
36688
USA
Phone number—(251)380-2861 **Fax number**—(251)380-2713
Email contact—jdempsey@usouthal.edu **URL**—http://www.southalabama.edu/coe/profstudies/index.shtml
Contact person—Brenda Litchfield, IDD Program Coor.; Edward C. Lomax, Ed Media Program Coor

Specializations—M.S. and Ph.D. in Instructional Design and Development. M.Ed. in Educational Media (Ed Media). Online Masters degrees in ED Media and IDD are available for qualified students. For information about online Masters degree programs, http://usaonline.southalabama.edu.

Features—The IDD Masters and doctoral programs emphasize extensive education and training in the instructional design process, human performance technology and multimedia—and online-based training. The IDD doctoral program has an additional emphasis in research design and statistical analysis. The Ed Media Masters program prepares students in planing, designing, and administering library/media centers at most levels of education, including higher education.

Admission requirements—For the ED Media & IDD Masters: undergraduate degree in appropriate academic field from an accredited university or college; admission to Graduate School; satisfactory score on the GRE. ED Media students must have completed requirements for a certificate at the baccalaureate or Masters level in a teaching field. For IDD Ph.D.: Masters degree, all undergraduate and graduate transcripts, three letters of recommendations, written statement of purpose for pursuing Ph.D. in IDD, satisfactory score on GRE.

Degree requirements—Ed Media Masters: satisfactorily complete program requirements (minimum 33 semester hours), 3.0 or better GPA, satisfactory score on comprehensive exam. IDD Masters: satisfactorily complete program requirements (minimum 40 semester hours), 3.0 or better GPA; satisfactory complete comprehensive exam. Ph.D.: satisfactory complete program requirements (minimum 82 semester hours of approved graduate course), 1-year residency, satisfactory score on examinations (research and statistical exam and comprehensive exam), approved dissertation completed. Any additional requirements will be determined by students' doctoral advisory committee.

Number of full-time faculty—0; **Number of other faculty**—0

Degrees awarded in 2012–13 academic year—Masters: 0; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—University of Arkansas

Name of department or program—Educational Technology

Address:
101 Peabody Hall
Fayetteville, AR
72701
USA

Phone number—479-575-5111 **Fax number**—479-575-2493
Email contact—etec@uark.edu **URL**—http://etec.uark.edu
Contact person—Dr. Cheryl Murphy

Specializations—The program prepares students for a variety of work environments by offering core courses that are applicable to a multitude of professional venues. The program also allows for specific emphasis area studies via open-ended assignments and course electives that include courses particularly relevant to higher education, business/industry, or K-12 environments. The primary focus of the program is on the processes involved in instructional design, training and development, media production, and utilization of instructional technologies. Because technology is continually changing, the program emphasizes acquisition of a process over the learning of specific technologies. Although skills necessary in making Educational Technology products are taught, technology changes rapidly; therefore, a primary emphasis on making technological products would lead to the acquisition of skills that are quickly outdated. However, learning the principles and mental tools critical to producing successful training and education will endure long after "new" technologies have become obsolete. That is why the University of Arkansas ETEC program focuses on the processes as opposed to specific technologies.

Features—The Educational Technology Program is a 34-h non-thesis online Masters program that prepares students for professional positions as educational technologists of education, business, government, and the health professions. Because the program is offered online, there are no on-campus requirements for the completion of this degree. Check us out on Facebook at UAetec.

Admission requirements—The Educational Technology online Masters program admits students in the fall, spring, and summer. Applications and all accompanying documents must be submitted within 3 months of the desired starting semester to ensure adequate processing time. To qualify for admission, applicants must have earned a Bachelor's degree and an undergraduate GPA of 3.0 within the last 60 h of course work. Specific application materials can be found at http://etec.uark.edu/1069.htm Applicants for the M.Ed. degree must have met all requirements of Graduate School admission, completed a Bachelor's degree, earned a 3.0 GPA in all undergraduate course work, and obtained an acceptable score on the Graduate Record Examination or Miller Analogies Test. A Graduate School application, ETEC Program Application, writing sample, autobiographical sketch, and letters of recommendation are required for admission consideration.

Degree requirements—In addition to general admission requirements, students must complete a minimum of 34 h to include 22 semester hours of educational technology core courses; 9 semester hours of educational technology electives; and 3 semester hours of research. Additionally, a Culminating Student Portfolio must be successfully completed during the last semester of course work. There are no on-campus requirements for the completion of this degree, although approved courses that meet the research requirements may be taken on campus if desired.

Number of full-time faculty—2; **Number of other faculty**—4

Degrees awarded in 2012–13 academic year—Masters: 10; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—5,000

Name of institution—University of Arkansas at Little Rock
Name of department or program—Learning Systems Technology
Address:
2801 S. University
Little Rock, AR
72204
USA
Phone number—501-569-3267 **Fax number**—(501) 569-3547
Email contact—eivaughn@ualr.edu **URL**—http://ualr.edu/med/LSTE/
Contact person—Elizabeth Vaughn-Neely, Ph.D., Chair
Specializations—The Learning Systems Technology (LSTE) Programs mission is to prepare instructional designers and learning scientists for careers in public schools, community colleges, higher education institutions, business, industry, government, military, and medical settings or facilities. Specifically, the program enables instructional designers to act in teaching and administrative roles in order to analyze problems and apply solutions for learning including planning, preparation, implementation, evaluation, and management. Aspects of the program include the psychology and development of diverse learners, learning resources development and application, and societal concerns pertaining to instructional technology. The Learning Systems Technology master's degree prepares you for instructional design, production, and application of these new methods, including creating and designing the following learning products:

- Documents and electronic displays
- Interactive tutorials for web-based delivery
- Instructional blogs
- Useful web pages
- Courses using a variety of online course management systems

Features—This program is offered entirely online.
Admission requirements—Admission to the LSTE master's program requires: Admissions Requirements: Applicants for Regular or Conditional Admission must submit a Biographical Data Form Regular Admission (additional requirement): LSTE program coordinator. After you have completed your online application to the Graduate School, your folder with all of your transcripts will be sent to the program coordinator for evaluation. Once you get your letter of acceptance you will be able to start the program in any semester: Fall, Spring, or Summer. If you have any questions, please contact the program coordinator.
Degree requirements—The 36 graduate credit hours include:

- 6 Educational Foundations hours
- 21 Learning Technologies hours
- At least to 2 elective courses (For example: Foundations, English writing, Learning Technologies, or other content area approved by the adviser) No more than 6 h earned within the last 3 years of transfer credit will be accepted in the program.

Number of full-time faculty—1; **Number of other faculty**—5
Degrees awarded in 2012–13 academic year—Masters: 7; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—California State Polytechnic University
Name of department or program—Educational Multimedia Design
Address:
3801 West Temple Ave.
Pomona, CA
91768
USA
Phone number—909-869-2255 **Fax number**—909-869-5206
Email contact—slotfipour@csupomona.edu **URL**—www.csupomona.edu/emm
Contact person—Dr. Shahnaz Lotfipour
Specializations—Design and production of eLearning materials and educational multimedia software (including audio, video, animation, web programming (3 levels), graphics, eBooks, mobile apps) for educational and corporate training environments using the sound instructional design principles and strategies.
Features—Hands-on training, project-based, combination of online and hybrid courses, internship possibilities in educational and corporate settings.
Admission requirements—Undergraduate GPA of 3.0, three strong letters of recommendations for this program, and satisfying graduate writing test (GWT) within the first couple of quarters.
Degree requirements—B.A. or B.S. in any area
Number of full-time faculty—3; **Number of other faculty**—5
Degrees awarded in 2012–13 academic year—Masters: 30; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—50,000

Name of institution—California State University Fullerton
Name of department or program—Program: Educational Technology
Address:
800 N. State College Blvd
Fullerton, CA
92834
USA
Phone number—6572787614 **Fax number**—6572785133
Email contact—tgreen@fullerton.edu **URL**—http://www.fullerton.edu/edtech
Contact person—Tim Green, Ph.D. or Loretta Donovan, Ph.D.
Specializations—M.S. in Educational Technology
Features—100 % online, 16-month, aligned to the ISTE Standards for Coaches, applicable to K-12 and adult educators, all courses are a balance of theory and practice
Admission requirements—Teaching credential, undergraduate degree from an accredited institution
Degree requirements—30 semester hours—10 courses
Number of full-time faculty—2; **Number of other faculty**—3
Degrees awarded in 2012–13 academic year—Masters: 54; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—California State University, East Bay
Name of department or program—M.S.Ed., option Online Teaching & Learning
Address:
25800 Carlos Bee Blvd
Hayward, CA
94542
USA
Phone number—510-885-4384 **Fax number**—510-885-4498
Email contact—nan.chico@csueastbay.edu **URL**—http://www.ce.csueastbay.edu/degree/education/index.shtml
Contact person—Nan Chico
Specializations—A professional development degree for experienced K-12, college/university faculty, and corporate or non-profit trainers at institutions creating new, or building on old, fully online course and program degrees, workshops, trainings. A major focus is on learning how to design courses so that barriers to learning are minimized for those with disabilities, or who are English language learners, etc.
Features—Courses are in Blackboard; students are given a Blackboard shell of their own to design in or may choose among other course management systems. We focus on best practices in online teaching and learning, using a CMS and varieties of other social media. Not cohort-based, admission in quarterly (Fall and Spring); maximum two courses per quarter; may skip 1–2 consecutive quarters.
Admission requirements—B.A. or B.S. degree from a regionally accredited US institution, in any major; GPA 3.0 in last 60 semester units or last 90 quarter units. Selection is also based on mandatory Letter of Intent.
Degree requirements—Four 5-week courses taken over two quarters (which earn the Certificate in Online Teaching & Learning); two 10-week electives, four 10-week required courses, the last of which is a Capstone Project. Each course earns 4.5 quarter units; all required courses must earn a "B" or better, overall GPA must be 3.0 or better. Total of 10 courses, 45 units.
Number of full-time faculty—0; **Number of other faculty**—9
Degrees awarded in 2012–13 academic year—Masters: 60; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—California State University, Fresno
Name of department or program—M.A. in Education & Certificate of Advanced Study in Educational Technology
Address:
5005 N. Maple Ave., MS2,
Fresno, CA
93740
USA
Phone number—559-278-0245 **Fax number**—559-278-0107

Email contact—royb@csufresno.edu **URL**—http://www.fresnostate.edu/kremen/ci/graduate/ma-education.html
Contact person—Dr. Roy M. Bohlin
Specializations—None
Features—None
Admission requirements—2.75 undergraduate GPA, writing requirement, three letters of recommendation, letter of interest
Degree requirements—Bachelors degree
Number of full-time faculty—6; **Number of other faculty**—5
Degrees awarded in 2012–13 academic year—**Masters:** 15; **Ph.D.:** 0; **Other:** 7
Grant monies awarded in 2012–13 academic year—0

Name of institution—Metropolitan State University of Denver
Name of department or program—Department of Secondary and Educational Technology
Address:
Teacher Education, Campus Box 21 P.O Box 173362
Denver, CO
80217
USA
Phone number—(303)556-3322 **Fax number**—(303) 556-5353
Email contact—mchung3@msudenver.edu **URL**—http://www.mscd.edu/~ted
Contact person—Dr. Miri Chung
Specializations—x
Features—x
Admission requirements—x
Degree requirements—x
Number of full-time faculty—2; **Number of other faculty**—1
Degrees awarded in 2012–13 academic year—**Masters:** 0; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—Regis University
Name of department or program—School of Education and Counseling
Address:
3333 Regis Boulevard
Denver, CO
80221
USA
Phone number—800-388-2366 **Fax number**—303-964-5053
Email contact—kpyatt@regis.edu **URL**—www.regis.edu
Contact person—Dr. Kevin Pyatt
Specializations—Instructional Technology Curriculum, Instruction, and Assessment Ed Leadership for Innovation and Change—Principal Licensure Adult Learning, Training, and Development Reading.
Features—The majority of our programs are offered in the online format.

Admission requirements—Essay Letters of Recommendation Minimum GPA of 2.75.
Degree requirements—x
Number of full-time faculty—15; **Number of other faculty**—150
Degrees awarded in 2012–13 academic year—**Masters:** 200; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—University of Bridgeport
Name of department or program—Instructional Technology
Address:
126 Park Avenue
Bridgeport, CT
06604
USA
Phone number—2035764217 **Fax number**—2035764633
Email contact—jcole@bridgeport.edu **URL**—http://www.bridgeport.edu/imsit
Contact person—Jerald D. Cole
Specializations—Masters and Professional Diploma (6th year) Instructional Technology Tracks: (1) Teacher (2) Trainer (3) Developer (4) Technology Education (5) Technology Leadership
Features—(1) Open Source Curriculum and Software Model. (2) Cross Platform Mobil Tablet Computing Initiative. (3) Social Constructionist Pedagogy. (4) Hybrid and online courses. (5) Cohort based. (6) Tuition-free internships for Teacher track.
Admission requirements—Online Application Essay on experience and objectives for study two letters of reference Praxis 1 for teacher track TOEFL for non-native English speakers Transcripts Phone interview.
Degree requirements—4 core courses, 2 distribution requirements, 1 research, 1 practicum, 4 electives
Number of full-time faculty—14; **Number of other faculty**—21
Degrees awarded in 2012–13 academic year—**Masters:** 294; **Ph.D.:** 15; **Other:** 117
Grant monies awarded in 2012–13 academic year—350,000

Name of institution—University of Florida
Name of department or program—School of Teaching and Learning
Address:
2403 Norman Hall
Gainesville, FL
32611-7048
USA
Phone number—352-273-4180 **Fax number**—352-392-9193
Email contact—aritzhaupt@coe.ufl.edu **URL**—http://education.ufl.edu/educational-technology/
Contact person—Albert Ritzhaupt

Specializations—Educational technology students may earn M.A.E., M.Ed., Ed.S., Ed.D., or Ph.D. degrees. The M.Ed., Ed.S., and Ed.D. programs are online. The M.A.E. and Ph.D. programs are blended.

Features—Students take core courses listed on our Educational Technology website, and then select an area of specialization. Opportunities to collaborative research, write and design with faculty members. Strong community of graduate students.

Admission requirements—Please see the Educational Technology website for the most up-to-date information.

Degree requirements—Please see the Educational Technology website for the most up-to-date information. Program and college requirements must be met, but there is considerable flexibility for doctoral students to plan an appropriate program with their advisers.

Number of full-time faculty—5; **Number of other faculty**—3

Degrees awarded in 2012–13 academic year—Masters: 10; **Ph.D.:** 2; **Other:** 10

Grant monies awarded in 2012–13 academic year—0

Name of institution—University of West Florida

Name of department or program—Instructional and Performance Technology

Address:
11000 University Parkway
Pensacola, FL
32514
USA

Phone number—850-474-2300 **Fax number**—850-474-2804

Email contact—nhastings@uwf.edu **URL**—http://onlinecampus.uwf.edu

Contact person—Nancy B. Hastings

Specializations—M.Ed., Instructional Technology: Distance Learning Human Performance Technology M.S.A., H.P.T.: Human Performance Technology Ed.S., Instructional Technology: Performance Technology Distance Learning Ed.D., Curriculum and Instruction, Instructional Technology Specialization: Performance Technology Distance Learning Certificate Programs: Instructional Design and Technology Human Performance Technology Virtual Educator.

Features—Fully online programs at all levels small classes recognized nationally as a "Best Buy" in Online Masters in Administration Like us on Facebook and Follow us on Twitter Military Friendly University Out-of-State Tuition Waivers for admitted students in fully online programs.

Admission requirements—GRE or MAT Score Official Transcripts Letter of Intent See Department website for additional information for specific programs.

Degree requirements—M.Ed., 36 credit hours M.S.A., 36 credit hours Ed.S., 36 credit hours Ed.D., minimum 66 credit hours

Number of full-time faculty—4; **Number of other faculty**—2

Degrees awarded in 2012–13 academic year—Masters: 21; **Ph.D.:** 0; **Other:** 5

Grant monies awarded in 2012–13 academic year—260,000

Name of institution—Ball State University
Name of department or program—Master of Arts in Curriculum and Educational Technology
Address:
Teachers College
Muncie, IN
47306
USA
Phone number—(765) 285-5461 **Fax number**—(765) 285-5489
Email contact—sadaf@bsu.edu **URL**—http://cms.bsu.edu/Academics/CollegesandDepartments/Teachers/Departments/EdStudies/AcProgram/GradDegr/MACurriEdTech.aspx
Contact person—Ayesha Sadaf
Specializations—Specialization tracks in curriculum or educational technology
Features—The Master of Arts in Curriculum and Educational Technology is a 30-h program designed for educators seeking to integrate technology into K-12 curriculum and other instructional contexts where teaching and learning occur. Graduates are prepared to become leaders within their instructional contexts by course work and experiences that focus on development of a conceptual framework in which technology is an embedded aspect of the teaching and learning process. The program prepares graduates to utilize technology to meet learning needs of students and to critically examine technologies ever-changing presence within schools and society.
Admission requirements—Prospective students should apply to the Graduate College and provide official transcripts from all universities/colleges attended. A student seeking admittance for a Master's degree must meet the following minimum criteria:

- Hold an earned bachelor's degree from a college or university that is accredited by its regional accrediting association.
- Have one of the following:
  - An undergraduate cumulative GPA of at least 2.75 on a scale of 4.0.
  - A cumulative GPA of at least 3.0 on a 4.0 scale in the latter half of the baccalaureate. Additional Information regarding application and admission to the graduate college can be found at the following website. http://www.bsu.edu/gradschool.

Degree requirements—Successful completion of 30 graduate hours.
Number of full-time faculty—8; **Number of other faculty**—4
Degrees awarded in 2012–13 academic year—**Masters:** 20; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—Indiana University
Name of department or program—Instructional Systems Technology, School of Education

Address:
W. W. Wright Education Bldg., Rm. 2276, 201 N. Rose Ave.
Bloomington, IN
47405-1006
USA
Phone number—(812)856-8450 **Fax number**—(812)856-8239
Email contact—istdept@indiana.edu **URL**—http://education.indiana.edu/~ist/
Contact person—Thomas Brush, Chair, Dept. of Instructional Systems Technology

Specializations—The M.S. and Ed.S. degrees are designed for individuals seeking to be practitioners in the field of Instructional Technology. The M.S. degree is also offered in a web-based format with instructional product and portfolio requirements, with specializations in Workplace Learning and Performance Improvement; Instructional Systems Design Practice; and Learning Technologies. A studio specialization is available to residential students. Online certificate and licensure programs are also available.

An online Ed.D. is now being offered as well. Our first cohort of students began in the Fall of 2012. Applications are now being accepted for our Fall 2015 cohort. The emphasis of the Ed.D. is the application of theory to practice.

The Ph.D. degree features a heavy research emphasis via faculty-mentored research groups and student dossiers for assessing research, teaching, and service competencies.

Features—Requires computer skills as a prerequisite and makes technology utilization an integral part of the curriculum; eliminates separation of various media formats; and establishes a series of courses of increasing complexity integrating production and development. The latest in technical capabilities have been incorporated, including teaching, computer, and laptop-ready laboratories, a multimedia laboratory, and video and audio production studios. Residential Masters students have a studio facility available for their exclusive use for two semesters.

Ph.D. students participate in faculty-mentored research groups throughout their program. Students construct dossiers with evidence of research, teaching, and service that are evaluated by faculty on three occasions during the program. The second and third dossier reviews replace the traditional written and oral examinations.

Admission requirements—M.S.: Bachelors degree from an accredited institution, 1,350 GRE (3 tests required) or combined verbal + math = 291, analytical writing = 3.5 (new format), 2.75 undergraduate GPA. Ed.S., Ed.D., and Ph.D.: 1,650 GRE (3 tests required) or combined verbal + math = 302, analytical writing = 4.0 (new format), 3.5 graduate GPA.

Degree requirements—M.S.: 36 credit hours (including 15 credits in required courses); an instructional product; 9 credits in outside electives, and portfolio. Ed.S.: 65 h, capstone project with written report and a portfolio. Ed.D.: 60 h post-Masters (M.S. credits not counted toward 60 h), with written and oral qualifying exams, and dissertation. Ph.D.: 90 h, dossier reviews, and thesis.

Number of full-time faculty—12; **Number of other faculty**—10
Degrees awarded in 2012–13 academic year—**Masters:** 20; **Ph.D.:** 8; **Other:** 0
Grant monies awarded in 2012–13 academic year—600,000

Name of institution—Purdue University Calumet
Name of department or program—Instructional Technology
Address:
2200 169th Street
Hammond, IN
46323
USA
Phone number—219-989-2692 **Fax number**—219-989-3215
Email contact—buckenme@purduecal.edu **URL**—http://www.purduecal.edu/education/grad/it.html
Contact person—Janet Buckenmeyer
Specializations—Instructional Technology and Instructional Design
Features—The Instructional Technology program at Purdue University Calumet is a practitioner-based program. Students entering the program may be teachers but do not need a teaching license to enroll. The program does not lead to PK-12 licensure. http://www.facebook.com/PUCIDT @pucidt
Admission requirements—3.0 GPA; Three (3) letters of recommendation; Essay; Two (2) official copies of all transcripts
Degree requirements—x
Number of full-time faculty—3; **Number of other faculty**—1
Degrees awarded in 2012–13 academic year—**Masters:** 12; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—Emporia State University
Name of department or program—Instructional Design and Technology
Address:
1 Kellogg Circle—Campus Box 4037
Emporia, KS
66801
USA
Phone number—620-341-5829 **Fax number**—620-341-5785
Email contact—jcolorad@emporia.edu **URL**—http://idt.emporia.edu
Contact person—Dr. Zeni Colorado, Chair
Specializations—Distance learning, online learning, corporate education, P-12 technology integration
Features—All program courses are offered both online and face to face on the ESU campus. The Master of Science in Instructional Design and Technology program prepares individuals for leadership in the systematic design, development, implementation, evaluation, and management of technology-rich learning in a variety of settings. Individuals obtaining the IDT degree serve as instructional designers/trainers in business, industry, health professions, and the military and are charged with training, development, and eLearning programs within their organizations.

Other graduates hold leadership positions in P-12 and post-secondary institutions. In addition to positions in the workplace, graduates regularly choose to pursue their Ph.D. degrees in IDT at top-ranked universities. IDT faculty members hold leadership positions on the Association for Educational Communications and Technology (AECT) board of directors, executive committee, and research and theory division. Forms and application materials available at the website, http://idt.emporia.edu Other social media contacts, Ning—http://idtesu.ning.com/ Twitter—http://twitter.com/idtesu Blogspot—http://idtesu.blogspot.com/ YouTube—http://www.youtube.com/idtesu.

Admission requirements—Graduate application, official transcripts, GPA of 2.75 or more based on a 4-point scale in the last 60 semester hours of undergraduate study, resume, two current recommendations, writing competency. The program admits on a rolling basis. The departmental admission committee reviews and decides on applications as they are received, until there are no remaining openings.

Degree requirements—36 credit hours: 21 cr. core, 6 cr. research, 9 cr. electives.

Number of full-time faculty—6; **Number of other faculty**—7

Degrees awarded in 2012–13 academic year—**Masters:** 33; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—284,112

Name of institution—Morehead State University

Name of department or program—Educational Technology Program

Address:

Ginger Hall
Morehead, KY
40351
USA

Phone number—606-783-2040 **Fax number**—606-783-5032

Email contact—c.miller@morehead-st.edu **URL**—www.moreheadstate.edu/education

Contact person—Christopher T. Miller

Specializations—Master of Arts in Education degree focuses on technology integration, multimedia, distance education, educational games, and instructional design. Educational Leadership Doctor of Education in Educational Technology Leadership is a practitioner-based doctoral degree program focused on the development of leaders in the field of educational technology.

Features—Masters program is fully online. Ed.D. program is fully online with the exception of a 1 week face-to-face seminar course each year.

Admission requirements:

- Admission requirements for Masters degree:
  - Standard or provisional teaching certification, a statement of eligibility for teaching, or letter describing your role as educational support. Those students who fit the criteria of educational support will be able to obtain the Master's degree, but it cannot be used for initial teacher certification.

- A GRE minimum combined score of 750 (verbal and quantitative) and 2.5 on the analytic writing portion or a minimum 31 raw score (381–386 Scaled Score) on the Miller Analogies Test.
- For students who have not met testing requirements for admission into the program, but who have successfully completed 12 h of course work required for the program with a 3.5 or above GPA, the department chair may waive the testing requirement.
- The testing requirement is waived for students who have already completed a Master's degree.
- A minimum of 2.75 undergraduate GPA.
- Demonstrated competency of computer fluency (i.e., undergraduate or graduate computer competency course or computer competency assessment).

• Ed.D. admission requirements:

  - GRE, Miller Analogies Test (MAT), or GMAT scores including GRE writing score or on-demand writing sample.
  - Official transcripts of all undergraduate and graduate course work.
  - Documentation of a Master's degree from an institution accredited by a nationally recognized accreditation body.
  - Resume or vita documenting years of related professional/leadership or educational technology, instructional design, and training experience.
  - Letter of introduction/interest stating professional goals, leadership style, and educational philosophy.
  - Recommendation forms: at least three professional references from persons in a position to evaluate the applicants potential for success in a doctoral program. At least one to be completed by immediate or up-line supervisor or (for Ed. Tech track) professional familiarity with candidates use of technology, instructional design, and training. Other recommendation forms to be completed by professional colleagues or university faculty who are familiar with the applicant.
  - Documentation of previous statistical methodology, research-related course work or evidence of use and application of data-informed decision making to determine possible need for statistical methodology course work.
  - International students and ESL students must meet university minimum TOEFL score or its equivalent.
  - No more than 24 h of previously completed postgraduate work from MSU may be counted in the Ed.D. program.

Degree requirements:

• Masters program degree requirements

  - Satisfy general degree requirements.

- Must submit a professional portfolio demonstrating work completed within the program during the final semester of graduate work.
- Must apply for graduation in the Graduate Office, 701 Ginger Hall, in the beginning of the term that completion is anticipated.
- Maintain a 3.0 GPA in all courses taken after completing the Bachelor's degree.
- Must be unconditionally admitted.

• Ed.D. Degree Requirements:

- Satisfy all degree requirements.
- The student must successfully complete and defend a qualifying examination to enroll in EDD 899 capstone courses and continue within the doctoral program.
- Students are required to successfully complete and defend a doctoral capstone.
- Students must apply for graduation with the Graduate Office at the beginning of the semester in which they intend to complete.
- Maintain a cumulative 3.0 GPA in all courses taken. Must be unconditionally admitted. If a student is not unconditionally admitted after completing 12 graduate hours, he/she will not be permitted to register for additional credit hours.
- Students are encouraged to complete the program within the cohort time limit. The maximum allowed time for completion is 10 years.
- A total of 18 h will be permitted to be transferred from other universities.

Number of full-time faculty—4; **Number of other faculty**—0
Degrees awarded in 2012–13 academic year—**Masters:** 12; **Ph.D.:** 5; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—University of Massachusetts, Amherst
Name of department or program—Learning, Media, and Technology Masters Program/Math Science and Learning Technology Doctoral Program
Address:
813 N. Pleasant St.
Amherst, MA
01003
USA
Phone number—413-545-0246 **Fax number**—413-545-2879
Email contact—fsullivan@educ.umass.edu **URL**—http://www.umass.edu/education/academics/tecs/ed_tech.shtml
Contact person—Florence R. Sullivan
Specializations—The Master of Education concentration in Learning, Media, and Technology prepares students to understand, critique, and improve technology- and media-based learning and teaching. The program is structured such that students construct solid knowledge of theories of learning and instruction, as well as theories of the design and use of educational technologies and media. Just as

importantly, we offer a number of courses and research experiences through which students develop facility with applied aspects of technology-centered educational practices (e.g., developing digital media utilizing a number of authoring tools). By encountering multiple opportunities for the analysis, design, and testing of educational technology/media, students develop a principled approach to technology- and media-based instruction and learning. The Math, Science, and Learning Technology doctoral program prepares graduate students to improve the learning and instruction of Science, Technology, Engineering, and Mathematics (STEM) disciplines. To achieve that goal, we are deeply committed to research and scholarship, using both basic and applied research. We put a premium on developing principled approaches to affect educational practice and pursuing rigorous theory building about educational phenomena. We apply such knowledge in developing state-of-the-art instructional designs. These efforts grow from an understanding of educational practice and close work with practitioners in both formal and informal learning settings. Importantly, we recognized that certain social groups have been historically marginalized from STEM disciplines, education, and work. We seek to understand the processes and structures contributing to the systematic exclusion of these groups and to actively contribute to correcting such inequities. Our work draws from a variety of disciplines including cognitive science, sociology, anthropology, the learning sciences, psychology, and computer science.

Features—In the Master's program, we consider media and technology both as tools in learning and teaching specific disciplines (e.g., mathematics and science) and as objects of study in and of themselves. With regard to the former, and in line with the affiliated faculty's expertise, students explore the educational uses of a variety of technological forms (e.g., robotics systems for learning engineering, physics, programming, and the arts) and computer-based environments (e.g., software systems for learning scientific image processing). As for the latter, students actively engage in designing and using various learning technologies and media, including web-based environments, computer-mediated communications systems, computer-based virtual worlds, and new media for new literacies. The features of the doctoral program of study are:

- Provide an interconnected locus of intellectual activity for graduate students and faculty;
- Increase equity (in gender, ethnicity, and opportunities) in recruitment, admission, and retention of students and faculty and pursue issues of equity in science education;
- Teach relevant courses, seminars, and independent studies in mathematics and science education;
- Conduct pertinent research studies in mathematics and science learning, teaching, curriculum development, and assessment;
- Build a base of scholarship, disseminate new knowledge, and apply it actively in education;
- Provide apprenticeship opportunities for graduate students;

- Understand and support effective practice in mathematics and science education;
- Coordinate outreach efforts with K-12 schools and related projects;
- Collaborate with faculty in the Department, School, and University as well as in the wider profession throughout the Commonwealth of Massachusetts, nationally, and internationally.

Admission requirements—For the Master's program—GPA of 2.75 or higher, TESOL test score of 80 points or higher, excellent letters of recommendation, clear statement of purpose. For the doctoral program—earned Masters degree in math, natural sciences, learning technology or education, GPA of 2.75 or higher, TESOL test score of 80 points or higher, excellent letters of recommendation, clear statement of purpose.
Degree requirements—Masters degree—33 credit hours and thesis. Doctoral degree—36 credit hours beyond the Master's degree, 18 dissertation credit hours, successful completion of comprehensive exams, successful completion of doctoral dissertation.
Number of full-time faculty—6; **Number of other faculty**—2
Degrees awarded in 2012–13 academic year—**Masters:** 4; **Ph.D.:** 2; **Other:** 0
Grant monies awarded in 2012–13 academic year—5,700,000

Name of institution—Oakland University
Name of department or program—Master of Training and Development Program
Address:
2200 North Squirrel Road
Rochester, MI
48309-4494
USA
Phone number—248 370-4171 **Fax number**—248 370-4095
Email contact—ouhrdmtd@gmail.com **URL**—www2.oakland.edu/sehs/hrd/
Contact person—Dr. Chaunda L. Scott—Graduate Coordinator
Specializations—The Master of Training and Development Program at Oakland University provides a unique blend of knowledge and skills in all aspects of training and development. Students can choose between two areas of emphasis:

- Instructional Design and Technology
- Organizational Development and Leadership

Features—The Master of Training and Development Program develops practitioners with the knowledge and skills required to enhance individual performance. Graduates of the program will be able to lead interventions associated with diagnosing performance problems and opportunities. Graduates will also be able to design and implement individual and organizational solutions and evaluate results. All courses are taught by outstanding faculty who have diverse backgrounds and experience in business and academia. The Master of Training and Development Program and be completed in 2½ years. Graduates of the program will be qualified to work as human resource development professionals including directors of training centers, organizational development consultants, instructional designers, and performance technologists.

Admission requirements—Official transcripts for undergraduate and graduate course work showing a Bachelor's degree from a regionally accredited institution and a cumulative GPA of 3.0 or higher. A formal statement, between 100 and 1,500 words, highlighting work and life experience—preferably 1 year or longer that have led to desire to pursue the Master of Training and Development Degree. Three letters of recommendations to attest to the quality and scope of the applicant's academic and professional ability and an interview will be required.

Degree requirements—The completion of 36 credits approved credits with an overall GPA of 3.0 or better and a grade of 2.8 or above in each additional course. The completion of five core courses is also required: HRD 530 Instructional Design, HRD 506 Theoretical Foundations of Training and Development, HRD 507 Needs Assessment, HRD 605 Program Evaluation, and HRD 611 Program Administration along with 4 elective courses.

Number of full-time faculty—4; **Number of other faculty**—4

Degrees awarded in 2012–13 academic year—**Masters:** 15; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—University of Michigan

Name of department or program—Department of Educational Studies

Address:
610 East University
Ann Arbor, MI
48109-1259
USA

Phone number—734-763-9497 **Fax number**—734-763-9497

Email contact—quintana@umich.edu **URL**—http://www.soe.umich.edu/academics/doctoral_programs/lt/

Contact person—Chris Quintana

Specializations—Ph.D. in Learning Technologies M.A. in Educational Studies with a focus on Digital Media & Education

Features—The Learning Technologies Program at the University of Michigan integrates the study of technology with a focus in a substantive content area. A unique aspect of the program is that your learning and research will engage you in real-world educational contexts. You will find that understanding issues related to a specific content area provides an essential context for meaningful research in learning. Your understanding of technology, school contexts, and a content area will place you among the leaders who design and conduct research on advanced technological systems that change education and schooling. The Doctoral specialization in Learning Technologies must be taken in conjunction with a substantive concentration designed in consultation with your advisor. Current active concentrations include: Science, Literacy, Culture and Gender, Teacher Education, Design and Human–Computer Interaction, Policy, and Social Studies. Other areas are possible. The Master's Degree in Educational Studies with a focus on Digital Media & Education at the University of Michigan prepares professionals for leadership roles in the design, development, implementation, and research of powerful technologies to enhance learning. Our approach to design links current knowledge and research about how people learn with technological tools that enable new means of organizing and evaluating learning environments. Course and project work reflects the latest knowledge and practice in learning, teaching, and technology. Core courses prepare students to use current understandings about learning theory, design principles, research methodologies, and evaluation strategies in educational settings ranging from classrooms to web-based and distributed learning environments. Faculty work with students to shape programs that meet individual interests. Practical experience is offered through internships with area institutions.

Admission requirements—GRE, B.A. for M.A., or Ph.D.; TOEFL (minimum score of 84) for students from countries where English is not the primary language.

Degree requirements—M.A.: 30 h beyond B.A. Ph.D.: 60 h beyond B.A. or 30 h beyond Masters plus research paper/qualifying examination, and dissertation.

Number of full-time faculty—3; **Number of other faculty**—5

Degrees awarded in 2012–13 academic year—**Masters:** 5; **Ph.D.:** 2; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—University of Missouri—Columbia

Name of department or program—School of Information Science & Learning Technologies

Address:

303 Townsend Hall

Columbia, MO

65211

USA

Phone number—573-882-4546 **Fax number**—573-884-2917

Email contact—sislt@missouri.edu **URL**—http://edtech.missouri.edu/index.html

Contact person—John Wedman

Specializations—The Educational Technology emphasis area prepares educators and technologists for excellence and leadership in the design, development, and implementation of technology in education, training, and performance support. The program offers three focus areas: Technology in Schools, Learning Systems Design, and Development Online Educator. Each focus area has its own set of competencies, course work, and processes.

Features—All three focus areas are available online via the Internet or on the MU campus. The Online Educator program of study will help you develop the knowledge and skills needed to design and provide effective online learning experiences in a variety of settings. In this focus area you will: Design online learning activities for meaningful learning. Promote student engagement in online learning environments. Select appropriate technology and learning objects to support online learners. Use Learning Management Systems to support and deliver online learning. Find and evaluate Internet-based resources to enhance online learning. The Learning Systems Design & Development (LSDD) focus area prepares you to plan and create learning and performance support systems and resources. The Program is available ONLINE and several courses are offered every semester. In this focus area you will: Conduct needs assessment and evaluating learning systems. Design learning environments, including systems for direct instruction, constructivist learning, collaborative work, and performance support. Develop learning systems applications or components of applications. The Technology in the Schools focus area prepares you to use plan and implement advanced technologies in classrooms and other learning environments. In this focus area you will engage in professional growth and leadership to: Facilitate and inspire student learning and creativity. Design and develop digital-age learning experiences and assessments. Model digital-age work, learning, and technology leadership. Promote and model digital citizenship and responsibility. Ed.S. and Ph.D. programs are also available.

Admission requirements—Bachelors degree with 3.0 in last 60 credit hours of course work. GRE (V > 156; A > 146; W > 3.5) TOEFL of 500 paper-based (61 Internet-based test) (if native language is not English) Letters of reference

Degree requirements—Masters: 30 credit hours; 15 h at or above the 8,000 level. Specific course requirements vary by focus area.

Number of full-time faculty—9; **Number of other faculty**—0

Degrees awarded in 2012–13 academic year—**Masters:** 40; **Ph.D.:** 4; **Other:** 21

Grant monies awarded in 2012–13 academic year—0

Name of institution—University of North Carolina, Wilmington

Name of department or program—Master of Science in Instructional Technology–Dept. of Instructional Technology, Foundations & Secondary Education

Address:
601 South College Rd.
Wilmington, NC
28403
USA

Phone number—910-962-4183 **Fax number**—910-962-3609

Email contact—moallemm@uncw.edu **URL**—http://www.uncw.edu/ed/mit

Contact person—Mahnaz Moallem

Specializations—The Master of Science degree in Instructional Technology (MIT) program provides advanced professional training for teachers and school technology coordinators; business and industry personnel such as executives, trainers, and human resource development employees; persons in the health care field; and community college instructors. The program focuses on the theory and practice of design and development, utilization, management, and evaluation of processes and resources for learning. It emphasizes product development and utilization of advanced technology and provides applied training in the total design, development, implementation, and evaluation of educational and training programs. Instructional Technology Specialist (ITS) & 079 Special Endorsement

In Educational Computing and Technology Facilitation (TF): An Online Post-Baccalaureate Certificate. The ITS/TF Certificate Program is designed to address the needs of K-12 teachers, as well as instructional technology specialists, community college faculty/staff, and individuals interested in the design and development, implementation and management of educational and training materials. The Certificate program serves individuals who do not wish to earn a Master of Science degree but wish to expand their knowledge and skills in design, development, implementation, and management of instructional materials for different delivery systems. It is also designed for students who are already enrolled in other graduate programs and desire the additional concentration in instructional technology to improve their employment candidacy. The certificate is not a license to teach but rather a University endorsement of instructional technology competence. The program uses an online delivery system for the majority of courses. Some courses may require real-time virtual or face-to-face meetings to provide hands-on activities for production purposes or to offer site visitations. The certificate program in Online Teaching and Learning. This graduate certificate program in Online Teaching and Learning (OT&L) is designed to meet the needs of K-12 educators, higher education faculty, instructional design specialists, chief learning officers, and other professionals and individuals who wish to design, develop, implement, manage, and evaluate online learning environments. The certificate program serves individuals who do not wish to earn a Master of Science degree, but wish to expand their knowledge and skills in teaching online courses and managing online learning environments.

Features—As an exciting and innovative program, MIT provides students the opportunity to gain skills and knowledge from educational and applied psychology, instructional systems design, computer science, systems theory, and communication theory, allowing for considerable flexibility to tailor individual needs across other academic disciplines. Students from diverse fields can plan programs which are consistent with their long-range academic and professional goals. MIT courses are offered both on campus and online, allowing professionals to earn their degrees and/or certificates by taking MIT on-campus courses, or MIT online courses, or a combination of both types. In addition, the MIT program is directed toward preparing students to function in a variety of roles to be performed in a broad range of settings, including business and industry, human services, health institutions, higher education, government, military, and public and private K-12 education.

Admission requirements—Students desiring admission into the graduate program in instructional technology must present the following: A Bachelor's degree from an accredited college or university or its equivalent from a foreign institution of higher education based on a 4-year program. A strong academic record (an average GPA of 3.0 or better is expected) in the basic courses required in the area of the proposed graduate study. Academic potential as indicated by satisfactory performance on standardized test scores (e.g., Miller Analogy Test or Graduate Record Examination). The MAT or GRE must have been taken within the last 5 years. Three recommendations from individuals who are in a position to evaluate the students' professional competence as well as potential for graduate study. A statement of career goals and degree objectives. A letter describing educational and professional experiences, their reasons for pursuing graduate study, and the contributions that the student hopes to make after completing the degree. North Carolina essential and advanced technology competencies. Individuals who fall below a specified criterion may be admitted if other factors indicate potential for success. Individuals with identified deficiencies may be accepted provisionally with specified plans and goals for the remediation of those deficiencies. Such remediation may include a requirement of additional hours beyond those normally required for the degree.

Degree requirements—Applicants should submit the following to the UNCW Graduate School:

- Official graduate application (Use the following link https://app.applyyourself.com/?id=uncw-grad to apply electronically.)
- Official transcripts of all college work (undergraduate and graduate). The transcripts should be mailed directly to UNCW Graduate School.
- Official scores on the Miller Analogy Test (MAT) or Graduate Record Examination (GRE). Scores more than 5 years old will not be accepted. The UNCW institution code for the MAT and GRE is 5,907.
- Three recommendations from individuals in professionally relevant fields, addressing the applicants demonstrated academic skills and/or potential for successful graduate study.
- Evidence of a Bachelor's degree at the time of entrance.
- International students: TOEFL score of 550 or higher or IELTS (International English Language Testing System) score of 217 or better (computerized test), 550 or better (paper test), or a minimum score of 79 on the Internet-based test (TOEFL iBT) or IELTS minimum score of 6.5 or 7.0 to be eligible for a teaching assistantship.
- Letter of application and a statement of professional goals describing applicant's educational and professional experiences, reasons for pursuing a Master's degree in instructional technology, and contributions that applicant hopes to make after degree completion.

Number of full-time faculty—5; **Number of other faculty**—6
Degrees awarded in 2012–13 academic year—**Masters:** 20; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—1,199,546

Name of institution—University of North Dakota
Name of department or program—Instructional Design & Technology
Address:
231 Centennial Drive, Stop 7189
Grand Forks, ND
58202
USA
Phone number—701-777-3486 **Fax number**—701-777-3246

Email contact—Woei.hung@email.und.edu **URL**—http://education.und.edu/teaching-and-learning/idt/index.cfm
Contact person—Woei Hung
Specializations—Serious Games, Game-Based Learning K-12 Technology Integration Human Performance Technology eLearning Problem-Based Learning
Features—Online hybrid with synchronous and asynchronous learning Masters and Certificates fully available at a distance Three graduate certificates (K-12 Technology Integration; Corporate Training and Performance; eLearning) M.S., and M.Ed., Ph.D. Interdisciplinary studies Research Opportunities: Northern Plains Center for Behavioral Research Odegard School of Aerospace Sciences (Aviation & Radar simulators; Unmanned Aerial Systems Training).
Admission requirements—http://education.und.edu/teaching-and-learning/idt/index.cfm
Degree requirements—Masters: http://education.und.edu/teaching-and-learning/idt/masters.cfm Doctoral: http://education.und.edu/teaching-and-learning/idt/doctor.cfm
Number of full-time faculty—3; **Number of other faculty**—1
Degrees awarded in 2012–13 academic year—**Masters:** 10; **Ph.D.:** 0; **Other:** 1
Grant monies awarded in 2012–13 academic year—0

Name of institution—Valley City State University
Name of department or program—School of Education and Graduate Studies
Address:
101 College St.
Valley City, ND
58072
USA
Phone number—701-845-7304 **Fax number**—701-845-7190
Email contact—jim.boe@vcsu.edu **URL**—www.vcsu.edu/graduate
Contact person—James Boe
Specializations—The Master of Education Degree has four concentrations that focus on technology and the learner. Teaching and Technology concentration Technology Education concentration Library and Information Technologies concentration Teaching English Language Learners concentration Elementary Education concentration English Education concentration The program also offers Graduate Certificates in the following areas: Library and Information Technologies certificate Teaching English Language Learners certificate Elementary and Secondary STEM certificates.
Features—This is a completely online program which focuses on how technology can be used in a school setting to enhance student learning.
Admission requirements—(1) Baccalaureate degree with a 3.0 undergraduate GPA or a test is required. (2) Three letters of recommendation (3) Written goals statement (4) Resume (5) $35 fee for application.
Degree requirements—Completion of 32–37 credits depending on concentration. Action Research Study. Final portfolio demonstrating program core values.

Number of full-time faculty—20; **Number of other faculty**—11
Degrees awarded in 2012–13 academic year—Masters: 36; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—116,958

Name of institution—New York Institute of Technology
Name of department or program—Dept. of Instructional Technology and Educational Leadership
Address:
Northern Blvd/26 61st Street
Old Westbury/New York City, NY
11568/10023
USA
Phone number—(516)686-7777/(212)261-1529 **Fax number**—(516)686-7655
Email contact—smcphers@nyit.edu **URL**—http://www.nyit.edu/education
Contact person—Dr. Sarah McPherson, Chair, Dept. of Instructional Technology and Educational Leadership
Specializations—Master of Science in Instructional Technology for Educators and Professional Trainers; Certificates in Computers in Education, Teaching twenty-first century skills, Science, Technology, Engineering, and Mathematics (STEM), and Virtual Education; Advanced Diploma Educational Leadership and Technology for School Building Leader; M.S. in Childhood Education and School Counseling.
Features—Courses are offered face to face and hybrid in Long Island, New York City, upstate New York in partnership with NYS Teacher Centers, in School District partnerships and internationally (incl. Turkey and Abu Dhabi). Courses are also offered 100 % online statewide, nationally and internationally. The Instructional Technology program features: Integration into content area curriculum and instruction for K-12 teachers; Leadership and instructional technology for school building administrators; Professional trainer program for adult learning in corporate, government, and non-profit agencies. All courses are hand-on instruction in technology labs; or online and hybrid delivery. Evening, weekend, and summer courses are available in all formats.
Admission requirements—All programs require Bachelors degree from accredited college with 3.0 cumulative grade point average; Advanced Diploma requires Masters and 3 years teaching for admission.
Degree requirements—Master of Science: completion of 36 credits and 3.0 GPA. Advanced Certificates: completion of 12–18 credits (depending on min. credits for certificate) and 3.0 GPA. Advanced Diploma—completion of 33 credits and 3.0 GPA.
Number of full-time faculty—6; **Number of other faculty**—30
Degrees awarded in 2012–13 academic year—Masters: 75; **Ph.D.:** 0; **Other:** 12
Grant monies awarded in 2012–13 academic year—0

Name of institution—Richard Stockton College of New Jersey
Name of department or program—Master of Arts in Instructional Technology (MAIT)

Address:
101 Vera King Farris Drive
Galloway, NJ
08205
USA
Phone number—609-652-4688 **Fax number**—609-626-5528
Email contact—leej@stockton.edu **URL**—http://intraweb.stockton.edu/eyos/page.cfm?siteID=73&pageID=276
Contact person—Jung Lee
Specializations—The Master of Arts in Instructional Technology offered by The Richard Stockton College of New Jersey is designed to bring the best instructional technologies into both public and corporate curricula. With a strong theoretical foundation, the degree enables graduates to use technology as a tool to enhance learning and training.
Features—The program serves (1) students who seek or will continue employment in the P-12 schools; (2) students who wish to pursue coordinator or supervisor positions in P-12 schools and districts; and (3) students seeking or holding careers in business, industry, or non-profit organizations.
Admission requirements—Minimum 3.0 GPA, relevant experience, reference letters, and GRE General Exam scores or MAT (Miller Analogies Test scores).
Degree requirements—11 graduate courses (33 credits) including capstone project course
Number of full-time faculty—3; **Number of other faculty**—5
Degrees awarded in 2012–13 academic year—**Masters:** 42; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—New York University
Name of department or program—Educational Communication and Technology
Address:
MAGNET (Media and Games Network), 2 Metrotech Center Suite 800
New York (Brooklyn), NY
11201
USA
Phone number—(646) 997-0734 **Fax number**—(212)995-4041
Email contact—ectdmdl@nyu.edu **URL**—http://steinhardt.nyu.edu/alt/ect
Contact person—Jan L. Plass (Program Director); Ricki Goldman (Doctoral Program Coordinator)
Specializations—M.A. in Digital Media Design for Learning, M.S. in Games for Learning, and Ph.D. in Educational Communication and Technology—for the preparation of individuals as educational media designers, developers, media producers, and/or researchers in education, business and industry, health and medicine, community services, government, museums, and other cultural institutions; and to teach or become involved in administration in educational communications and educational technology or learning sciences programs in higher education, including instructional video, multimedia, web, serious games, and

simulations, interactive toys. The program also offers a post-Master's 30-credit Certificate of Advanced Study in Education. The degrees emphasize design and learning sciences research in learning in all contexts throughout the lifespan, including both formal and informal/nonformal environments. Faculty research areas include technology and media in collaborative learning, simulations and games for learning, medical education, language and literacy learning, global development, STEM education, early childhood education, and health education. Emphasizes theoretical foundations, especially a cognitive science and learning sciences perspective of learning and instruction, and their implications for designing media-based learning environments and materials. All efforts focus on video, multimedia, instructional television, web-based technology, and simulations and games; participation in special research and production projects and field internships. Uses an apprenticeship model to provide doctoral students and advanced M.A. students with research opportunities in collaboration with faculty.

Features—Program twitter: @ectdmdl; see http://steinhardt.nyu.edu/alt/ect/social/ for information about mailing lists, our private facebook group; also see our blog of educational technology events and jobs at http://blogs.nyu.edu/steinhardt/edtech/.

Admission requirements—M.A./M.S.: Bachelors degree or international equivalent required. Typically 3.0 undergraduate GPA, statement of purpose (no GRE required), optional portfolio. Ph.D.: Masters degree or international equivalent required. 3.0 GPA, GRE, responses to essay questions, interview related to academic or professional preparation and career goals. (TOEFL required for international students.)

Degree requirements—M.A./M.S.: 36 semester credit hours including specialization, elective courses, thesis, English Essay Examination. Ph.D.: 57 semester credit hours beyond Masters, including specialization, foundations, research, content seminar, and elective course work; candidacy papers; dissertation; English Essay Examination. Full-time or part-time study available; *no online option available*.

Number of full-time faculty—6; **Number of other faculty**—4

Degrees awarded in 2012–13 academic year—Masters: 22; **Ph.D.:** 2; **Other:** 0

Grant monies awarded in 2012–13 academic year—1,500,000

Name of institution—Syracuse University

Name of department or program—Instructional Design, Development, and Evaluation Program, School of Education

Address:
330 Huntington Hall
Syracuse, NY
13244-2340
USA

Phone number—(315)443-3703 **Fax number**—(315)443-1218

Email contact—takoszal@syr.edu **URL**—http://idde.syr.edu

Contact person—Tiffany A. Koszalka, Professor and Department Chair
Specializations—Certificates in Educational Technology and Instructional Design, M.S., M.S. in Instructional Technology, C.A.S., and Ph.D. degree programs in Instructional Design, Educational Evaluation, Human Issues in Instructional Development, Technology Integration, and Educational Research and Theory (learning theory, application of theory, and educational media research). Graduates are prepared to serve as curriculum developers, instructional designers, program and project evaluators, researchers, resource center administrators, technology coordinators, educational technology specialist, distance learning design and delivery specialists, trainers and training managers, and higher education faculty.
Features—The courses and programs are typically project centered. Collaborative project experience, fieldwork, and internships are emphasized throughout. There are special issue seminars, as well as student- and faculty-initiated mini-courses, seminars and guest lecturers, faculty-student formulation of department policies, and multiple international perspectives. International collaborations are an ongoing feature of the program. The graduate student population is highly diverse.
Admission requirements—Certificates and M.S.: undergraduate transcripts, recommendations, personal statement, interview recommended; TOEFL for international applicants; GRE recommended. Certificate of Advanced Study: Relevant Masters degree from accredited institution or equivalent, GRE scores, recommendations, personal statement, TOEFL for international applicants; interview recommended. Doctoral: Relevant Masters degree from accredited institution or equivalent, GRE scores, recommendations, personal statement, TOEFL for international applicants; interview strongly encouraged.
Degree requirements—Certificates: 12, 15, and 24 semester hours. M.S.: 30 semester hours, portfolio required. M.S. in Instructional Technology: 30 semester hours, practicum and portfolio required. C.A.S.: 60 semester hours, exam and project required. Ph.D.: 90 semester hours, research apprenticeship, portfolio, qualifying exams, and dissertation required.
Number of full-time faculty—3; **Number of other faculty**—6
Degrees awarded in 2012–13 academic year—Masters: 9; **Ph.D.:** 6; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Name of institution—East Stroudsburg University of Pennsylvania
Name of department or program—Instructional Technology: Department of Digital Media Technologies
Address:
200 Prospect Street
East Stroudsburg, PA
18301
USA
Phone number—(570)-422-3621 **Fax number**—(570) 422-3876
Email contact—bsockman@.esu.edu **URL**—www.esu.edu/gradit
Contact person—Beth Rajan Sockman Ph.D.

Specializations—Mission: The graduate programs are designed to prepare instructional technologists to utilize critical reflection with research in order to design, produce, and implement technological tools to improve learning in a global society. Instructional Technology Students can obtain a Master's in Education degree in Instructional Technology and/or a Pennsylvania Instructional Technologist Specialist Certificate. Students interested in PK-12 education may choose to concentrate in Technology Integration. Instructional technologist can be prepared for 5 areas:

- PK-12 Educators: technology literacy of educators and specialists to work in K-12 schools, school districts, or instructional technology personnel in education.
- Edu-business Entrepreneurs: technology to facilitate learning in customized learning environments.
- Instructional Designer: technology and instructional designer in the business, training, or cooperate environment.
- Higher Education Technology Integrators: learning management systems and work with faculty SMEs for technology integration into their curriculum.

Features—The program provides students with an opportunity to take courses from ESU University. Students who successfully complete the program become proficient in using technology in teaching. Students can choose courses that explore that following areas:

- Interactive web design (Including Web 2.0 applications)
- Convergence of Technology
- Desktop publishing
- Graphics
- Video
- New and emerging technologies
- Instructional design
- Learning theories
- Research in Instructional Technology

Admission requirements:

- For M.Ed. degree:
  - Two letters of recommendation
  - Portfolio or interview (Interview is granted after the application is received)
- For full admission, a minimum overall undergraduate 2.5 QPA For certification:
  - Contact the graduate coordinator for additional admission information to comply with Pennsylvania Department of Education requirements.
  - Minimum overall undergraduate QPA 3.0 (Pennsylvania Act 354).
  - If not 3.0 QPA, then completion of nine credits of Media Communication and Technology Department courses with prior written approval of department faculty adviser.
  - Two letters of recommendation.
  - Rolling deadline.

Degree requirements—Total = 33 credits

- Take courses and learn—Take 30 credits of courses for the Masters and learn based on your needs. You will learn to use and implement technologies outside average person's experience.
- Create, Submit, and Present your Portfolio—This is the time to display your learning in a professional manner. In the portfolio, you articulate your goals and may identify learning goals for your internship. Click here for the Portfolio Guidelines.
- Complete an Internship—You complete a 90 h internship that extends your knowledge base—3 credits.
- Complete Portfolio and Graduate.

Number of full-time faculty—6; **Number of other faculty**—4
Degrees awarded in 2012–13 academic year—Masters: 7; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—11,000

Name of institution—University of Memphis
Name of department or program—Instructional Design and Technology
Address:
406 Ball Hall
Memphis, TN
38152
USA
Phone number—901-678-5672 **Fax number**—901-678-3881
Email contact—treymartindale@gmail.com **URL**—http://idt.memphis.edu
Contact person—Dr. Trey Martindale
Specializations—Instructional Design, Educational Technology, Technology Integration, Web 2.0 and Social Media, Web-Based Instruction, E-Learning, Computer-Based Instruction, Professional Development, Online Teaching, Consulting and Project Management.
Features—IDT program: http://idt.memphis.edu Twitter: https://twitter.com/idtmemphis IDT Program News: http://idtmemphis.wordpress.com/ Google Plus: https://plus.google.com/+IDTMemphis/posts All our degrees and certificates are offered completely online. Our Masters degree is 30 credit hours, and our doctoral degree is 54 credit hours. Our educational technology certificate is 12 credit hours, and our e-learning design and development certificate is 12 credit hours. All are completely online. The IDT Studio (http://idtstudio.org), staffed and run by IDT faculty and students, serves as an R&D space for course work and research involving technologies such as digital media, WBT/CBT, pedagogical agents, gaming, and simulation. The IDT Studio contracts with local partners to give students real-world consulting and ID experience. The IDT program is an active partner in the Martin Institute for Teaching Excellence (http://martininstitute.org). We have also partnered with the Institute for Intelligent Systems and the Tutoring Research Group (www.autotutor.org) to work on intelligent agent development and research.

Admission requirements—An official transcript showing a Bachelor's degree awarded by an accredited college or university with a minimum GPA of 2.0 on a 4.0 scale, competitive MAT or GRE scores, GRE writing test, two letters of recommendation, graduate school, and departmental application. Doctoral students must also be interviewed by at least two members of the program.

Degree requirements—M.S.: 30 credit hours total. Ed.D: 54 credit hours total. 45 in major, 9 in research; residency project; comprehensive exams; dissertation. IDT Certificate: 12 credit hours total.

Number of full-time faculty—6; **Number of other faculty**—8

Degrees awarded in 2012–13 academic year—**Masters:** 6; **Ph.D.:** 6; **Other:** 5

Grant monies awarded in 2012–13 academic year—400,000

Name of institution—University of Texas at Brownsville

Name of department or program—Educational Technology

Address:

One West University Boulevard

Brownsville, TX

78520

USA

Phone number—(956) 882-7540 **Fax number**—(956) 882-8929

Email contact—Rene.Corbeil@UTB.edu **URL**—http://edtech.utb.edu

Contact person—J. Rene Corbeil, Ed.D.

Specializations—E-Learning Instructional Design Web-Based Instruction Multimedia Design

Features—The Online M. Ed. in Educational Technology is a 36-h program designed to prepare persons in K-12, higher education, corporate, and military settings to develop the skills and knowledge necessary for the classrooms of tomorrow. Graduates of this program will have a much better understanding of the uses of technology and how they can be applied in instructional/training settings. The program focuses on the theory, research, and applications related to the field of educational technology and is intended to help individuals—use instructional technology (computers, telecommunications, and related technologies) as resources for the delivery of instruction—serve as facilitators or directors of instructional technology in educational settings and/or be developers of instructional programs and materials for new technologies—design instructional materials in a variety of media. In addition to earning an M.Ed. in Educational Technology, students working in K-12 environments also have the opportunity to complete the Educational Technology Leader Certificate program. This certificate program is provided through the three graduate elective courses offered as an option in the degree program. An E-Learning Certificate is also available for individuals working in higher education or at e-learning industries. This certificate program is provided through the four graduate elective courses offered as an option in the degree program.

Admission requirements—Proof of a baccalaureate degree from a 4-year institution which has regional accreditation. GPA of 2.5 or higher (3.0 GPA for "unconditional" admission. Between 2.5 and 2.9 for "conditional" admission). Application Essay/Statement of Goals. Please provide a carefully considered statement of: (1) your academic and professional objectives and (2) explain how graduate study will help you to attain your goals. Note: The GRE is not required for students with undergraduate GPAs above 3.0.

Degree requirements—The M.Ed. in Educational Technology consists of 27 h from core courses plus 9 h of electives for a total of 36 h. Students can select the 9 h of electives based upon their professional needs and academic interests (e.g., Master Technology Teacher—MTT Certificate, e-Learning Certificate, or 12 h in a specific content area such as reading, mathematics, science) with advisor approval. Core Courses: (24 h) EDTC 6320—Educational Technology EDTC 6321—Instructional Design EDTC 6323—Multimedia/Hypermedia EDTC 6325—Educational Communications EDTC 6329—Selected Topics in Educational Technology EDTC 6332—Practicum in Educational Technology EDFR 6300—Foundations of Research in Education EPSY 6304—Learning and Cognition EDFR 6388—Socio Cultural Foundations Electives: (9 h) EDCI 6301—Instructional Technology in Teaching EDCI 6336—Problems in Education: International Technology Issues EDTC 6340—Applications of Advanced Technologies in the PK-12 Classroom EDTC 6341—Student-Centered Learning Using Technology EDTC 6342—Technology Leadership EDTC 6343—Master Teacher of Technology Practicum* EDTC 6351—Web-Based Multimedia in Instruction EDTC 6358—Theory and Practice of e-Learning.

Number of full-time faculty—4; **Number of other faculty**—2

Degrees awarded in 2012–13 academic year—**Masters:** 45; **Ph.D.:** 0; **Other:** 0

Grant monies awarded in 2012–13 academic year—0

Name of institution—Old Dominion University

Name of department or program—Instructional Design & Technology

Address:

Education 228

Norfolk, VA

23529

USA

Phone number—757-683-3246 **Fax number**—757-683-5862

Email contact—GSWatson@odu.edu **URL**—http://education.odu.edu/eci/idt/

Contact person—Gingers S. Watson

Specializations—Our faculty engages students in a rigorous course of study tailored to meet individual educational and career interests. Research opportunities and course work ensures that all students receive a solid foundation in Instructional Design Instructional Design Theory Human Performance Technology Gaming and Simulation Distance Education Evaluation & Assessment Trends and Issues in Instructional Technology Quantitative and Qualitative Research.

Features—All of our courses are offered via distance using a hybrid format. Classroom instruction uses a virtual classroom that allows all students to participate in a face-to-face classroom. A reduced tuition rate is available for students living outside of Virginia who are accepted into the program.

Admission requirements—M.S. degree: GRE scores or MAT scores; transcripts for undergraduate and graduate courses Ph.D.: GRE scores, transcripts for undergraduate and graduate courses, letters of recommendation, and an essay describing professional goals.

Degree requirements—M.S. program is 30–36 h Ph.D. program is a post-Master's degree consisting of 60 h.

Number of full-time faculty—4; **Number of other faculty**—1

Degrees awarded in 2012–13 academic year—Masters: 3; **Ph.D.:** 3; **Other:** 0

Grant monies awarded in 2012–13 academic year—25,000,000

Name of institution—Concordia University Wisconsin

Name of department or program—Educational Design and Technology

Address:

12800 N Lakeshore Drive

Mequon, WI

53092

USA

Phone number—262-243-4595 **Fax number**—262-243-3595

Email contact—bernard.bull@cuw.edu **URL**—http://www.cuw.edu/go/edtech

Contact person—Dr. Bernard Bull

Specializations—Designing digital age learning experiences, educational innovation, social and ethical implications of technology.

Features—This program is built around competency-based digital badges. Students earn digital badges as they progress through the courses, and these badges can be immediately exported to an open backpack to display in an online portfolio, website, resume, or social network. Courses are available online or face-to-face. Some cohorts may also be offered at off-campus sites in Wisconsin and beyond. In addition, we run occasional thematic cohorts where a group of students work through the program together over an 18–24 month period, all agreeing to focus their thesis or culminating project upon the cohort theme (e.g., new literacies, bridging the digital divide, global education, discipleship in the digital age).

Admission requirements—To be considered for admission, a student must: Have a Bachelor's degree from an accredited college or university. Have a minimum GPA of 3.00 in the undergraduate program.

Degree requirements—Required Courses EDT 970—Integrating Technology in the Classroom (3) EDT 889—Applying Technology in the Content Areas (3) EDT 908—Critical Issues in Educational Technology (3) EDT 892—Instructional Design (3) EDT 893—Theories of Learning and Design (3) EDT 815—Research in Educational Technology (3) EDT 927, 928, 929—Portfolio I, II, and III (0) EDT 895—Capstone Project (3) OR EDT 890—Thesis Completion Seminar (3) Electives EDT 805—Online Teaching and Learning (3) EDT 814—Educational Ministry in the Digital World (3) EDT 894—Digital Literacy (3) EDT 907—Multimedia for the Classroom (3) EDT 939—School Leadership in Technology

(3) EDT 851—Support and Troubleshooting for Teaching and Learning with Technology (3) EDT 957—Building Online Learning Communities (Web 2.0/ Learning 2.0) (3) EDT 971—Grants and Funding for Educational Technology Initiatives (3) EDT 804—Strategies for Teaching and Learning with Interactive Whiteboards (1) EDT 945—Readings in Educational Design and Technology EDT 815—Innovation in Education EDT 820—Blended Learning Other electives as approved by the program director.

Number of full-time faculty—3; **Number of other faculty**—8
Degrees awarded in 2012–13 academic year—Masters: 25; **Ph.D.:** 0; **Other:** 0
Grant monies awarded in 2012–13 academic year—0

Part V
Mediagraphy Print and Non-Print Resources

Chapter 18
Introduction

Jinn-Wei Tsao and Sheng-Shiang Tseng

Contents

This resource lists journals and other resources of interest to practitioners, researchers, students, and others concerned with educational technology and educational media. The primary goal of this section is to list current publications in the field. The majority of materials cited here were published in 2014 or mid-2015. Media-related journals include those listed in past issues of EMTY, as well as new entries in the field. A thorough list of journals in the educational technology field has been updated for the 2014 edition using Ulrich's Periodical Index Online and journal Websites. This chapter is not intended to serve as a specific resource location tool, although it may be used for that purpose in the absence of database access. Rather, readers are encouraged to peruse the categories of interest in this chapter to gain an idea of recent developments within the field. For archival purposes, this chapter serves as a snapshot of the field of instructional technology publications in 2014. Readers must bear in mind that technological developments occur well in advance of publication and should take that fact into consideration when judging the timeliness of resources listed in this chapter.

Selection

Items were selected for the Mediagraphy in several ways. The EBSCO Host Databases were used to locate most of the journal citations. Others were taken from the journal listings of large publishing companies. Items were chosen for this list

J.-W. Tsao (✉) • S.-S. Tseng
Learning, Design, and Technology Program, The University of Georgia, Athens, GA, USA
e-mail: miketsao@uga.edu; pattseng@uga.edu

M. Orey, R.M. Branch (eds.), *Educational Media and Technology Yearbook*,
Educational Media and Technology Yearbook 39,
DOI 10.1007/978-3-319-14188-6_18

when they met one or more of the following criteria: reputable publisher, broad circulation, coverage by indexing services, peer review, and coverage of a gap in the literature. The author chose items on subjects that seem to reflect the instructional technology field as it is today. Because of the increasing tendency for media producers to package their products in more than one format and for single titles to contain mixed media, titles are no longer separated by media type. The author makes no claims as to the comprehensiveness of this list. It is, instead, intended to be representative.

Obtaining Resources

Media-related periodicals: The author has attempted to provide various ways to obtain the resources listed in this Mediagraphy, including telephone and fax numbers, Web and postal addresses, as well as email contacts. Prices are also included for student (stud), individual (indiv), K-12 educator (k12), and institutional (inst) subscriptions. The information presented reflects the most current information available at the time of publication.

ERIC documents: As of December 31, 2003, ERIC was no longer funded. However, ERIC documents can still be read and copied from their microfiche form at any library holding an ERIC microfiche collection. The identification number beginning with ED (e.g., ED 332 677) locates the document in the collection. Document delivery services and copies of most ERIC documents can also continue to be available from the ERIC Document Reproduction Service. Prices charged depend on format chosen (microfiche or paper copy), length of the document, and method of shipping. Online orders, fax orders, and expedited delivery are available.

To find the closest library with an ERIC microfiche collection, contact:

ACCESS ERIC
1600 Research Blvd, Rockville, MD 20850-3172, USA
(800) LET-ERIC (538-3742)
Email: acceric@inet.ed.gov

To order ERIC documents, contact:

ERIC Document Reproduction Services (EDRS)
7420 Fullerton Rd, Suite 110, Springfield, VA 22153-2852, USA
(800) 433-ERIC (433-3742); (703) 440-1400
Fax: (703) 440-1408
Email: service@edrs.com

Journal articles: Photocopies of journal articles can be obtained in one of the following ways: (1) from a library subscribing to the title, (2) through interlibrary loan, (3) through the purchase of a back issue from the journal publisher, or (4) from an article reprint service such as ProQuest Microfilm.

ProQuest Microfilm, 789 E. Eisenhower Parkway, PO Box 1346
Ann Arbor, MI 48106-1346, USA
(734) 761-4700
Fax: (734) 997-4222
Email: sandra.piver@proquest.com

Journal articles can also be obtained through the Institute for Scientific Information (ISI).

ISI Document Solution
PO Box 7649
Philadelphia, PA 19104-3389, USA
(800) 336-4474, option 5
Fax: (215) 222-0840 or (215) 386-4343
Email: ids@isinet.com

Arrangement

Mediagraphy entries are classified according to major subject emphasis under the following headings:

- Artificial intelligence, robotics, and electronic performance support systems
- Computer-assisted instruction
- Distance education
- Educational research
- Educational technology
- Information science and technology
- Instructional design and development
- Learning sciences
- Libraries and media centers
- Media technologies
- Professional development
- Simulation, gaming, and virtual reality
- Special education and disabilities
- Telecommunications and networking

Chapter 19
Mediagraphy

Jinn-Wei Tsao and Sheng-Shiang Tseng

Artificial Intelligence, Robotics, and Electronic Performance Support Systems

Artificial Intelligence Review. Springer Science+Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/10462, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [8/year; $1,201 inst (print/online), $1,441 inst (print+online, content through 1997)] Publishes reports and evaluations, as well as commentary on issues and development in artificial intelligence foundations and current research.

AI Magazine. Association for the Advancement of Artificial Intelligence, 2275 East Bayshore Road, Suite 160, Palo Alto, California 94303. http://www.aaai.org/Magazine, tel: 650-328-3123, fax: 650-321-4457, info08@aaai.org [4/year; $75 stud, $145 indiv, $285 inst] Proclaimed "journal of record for the AI community," this magazine provides full-length articles on new research and literature, but is written to allow access to those reading outside their area of expertise.

International Journal of Human–Computer Interaction. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandfonline.com/hihc, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [12/year; $265 indiv (print), $277 indiv (print+online), $2,090 inst (online), $2,389 inst (print+online)] Addresses the cognitive, creative, social, health, and ergonomic aspects of interactive computing.

International Journal of Robotics Research. Sage Publications, 2455 Teller Rd, Thousand Oaks, CA 91320. http://ijr.sagepub.com, tel: 800-818-7243, fax: 800-583-2665, journals@sagepub.com [14/year; $236 indiv (print), $2,444 inst (print),

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M. Orey, R.M. Branch (eds.), *Educational Media and Technology Yearbook*,
Educational Media and Technology Yearbook 39,
DOI 10.1007/978-3-319-14188-6_19

$ 2,245 inst (online), $ 2,743 inst (online + backfile, content through Volume 1, Issue 1/print + online), $ 2,494 inst (print + online + backfile)] Interdisciplinary approach to the study of robotics for researchers, scientists, and students. The first scholarly publication on robotics research.

Journal of Intelligent and Robotic Systems. Springer Science + Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/10846, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [16/year; $ 2,573 inst (print/online), $ 3,088 inst (print + online, content through 1997)] Main objective is to provide a forum for the fruitful interaction of ideas and techniques that combine systems and control science with artificial intelligence and other related computer science concepts. It bridges the gap between theory and practice.

Journal of Interactive Learning Research. Association for the Advancement of Computing in Education, PO Box 1545, Chesapeake, VA 23327-1545. http://www.aace.org/pubs/jilr, tel: 757-366-5606, fax: 703-997-8760, info@aace.org [4/year; $ 25 stud, $ 55 indiv, $ 210 inst] Publishes articles on how intelligent computer technologies can be used in education to enhance learning and teaching. Reports on research and developments, integration, and applications of artificial intelligence in education.

Knowledge-Based Systems. Elsevier, Inc., Journals Customer Service, 3251 Riverport Lane, Maryland Heights, MO 63043. http://www.elsevier.com/locate/knosys, tel: 877-839-7126, fax: 314-447-8077, journalcustomerservice-usa@elsevier.com [12/year; $ 235 indiv, $ 1,857 inst (print/online)] Interdisciplinary applications-oriented journal on fifth-generation computing, expert systems, and knowledge-based methods in system design.

Minds and Machines. Springer Science + Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/11023, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [4/year; $ 924 inst (print/online), $ 1,109 inst (print + online, content through 1997)] Discusses issues concerning machines and mentality, artificial intelligence, epistemology, simulation, and modeling.

Computer-Assisted Instruction

AACE Journal. Association for the Advancement of Computing in Education, PO Box 1545, Chesapeake, VA 23327-1545. http://www.editlib.org/j/aacej, tel: 757-366-5606, fax: 703-997-8760, info@aace.org [4/year; $ 150 indiv, $ 1,995 inst] Publishes articles dealing with issues in instructional technology.

CALICO Journal. Computer-Assisted Language Instruction Consortium, 214 Centennial Hall, Texas State University, San Marcos, TX 78666. http://calico.org, tel: 512-245-1417, fax: 512-245-9089, info@calico.org [3/year; $ 20 stud, $ 65 indiv, $ 50 k12, $ 105 inst] Provides information on the applications of technology in teaching and learning languages.

Children's Technology Review. Active Learning Associates, 120 Main St, Flemington, NJ 08822. http://childrenstech.com, tel: 800-993-9499, fax: 908-284-0405, lisa@childrenstech.com [12/year; $30 indiv (online), $60 indiv (print+online)] Provides reviews and other information about software to help parents and educators more effectively use computers with children.

Computers and Composition. Elsevier, Inc., Journals Customer Service, 3251 Riverport Lane, Maryland Heights, MO 63043. http://www.elsevier.com/locate/compcom, tel: 877-839-7126, fax: 314-447-8077, journalcustomerservice-usa@elsevier.com [4/year; $93 indiv, $570 inst (print/online)] International journal for teachers of writing that focuses on the use of computers in writing instruction and related research.

Computers & Education. Elsevier, Inc., Journals Customer Service, 3251 Riverport Lane, Maryland Heights, MO 63043. http://www.elsevier.com/locate/compedu, tel: 877-839-7126, fax: 314-447-8077, journalcustomerservice-usa@elsevier.com [12/year; $462 indiv, $2,820 inst (print/online)] Presents technical papers covering a broad range of subjects for users of analog, digital, and hybrid computers in all aspects of higher education.

Computer-assisted language learning. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandfonline.com/ncal, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [6/year; $234 indiv, $719 inst (online), $822 inst (print+online)] An intercontinental and interdisciplinary journal which leads the field in its dedication to all matters associated with the use of computers in language learning (L1 and L2), teaching, and testing.

Computers in Human Behavior. Elsevier, Inc., Journals Customer Service, 3251 Riverport Lane, Maryland Heights, MO 63043. http://www.elsevier.com/locate/comphumbeh, tel: 877-839-7126, fax: 314-447-8077, journalcustomerservice-usa@elsevier.com [6/year; $349 indiv $2,253 inst (print), $2,254 inst (online)] Scholarly journal dedicated to examining the use of computers from a psychological perspective.

Computers in the Schools. Taylor & Francis Group, Customer Service Department, 325 Chestnut Street, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/07380569, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $148 indiv (online), $160 indiv (print+online), $797 inst (online), $911 inst (print+online)] Features articles that combine theory and practical applications of small computers in schools for educators and school administrators.

Converge. e.Republic, Inc., 100 Blue Ravine Rd, Folsom, CA 95630. http://www.convergemag.com, tel: 800-940-6039 ext 1319, fax: 916-932-1470, subscriptions@convergemag.com [4/year; free] Explores the revolution of technology in education.

Dr. Dobb's Journal. United Business Media LLC, Customer Service, PO Box 1093, Skokie, IL 60076. http://www.ddj.com, tel: 888-664-3332, fax: 847-763-9606, drdobbsjournal@halldata.com [12/year; free to qualified applicants] Articles on the latest in operating systems, programming languages, algorithms, hardware design and architecture, data structures, and telecommunications; in-Department hardware and software reviews.

eWEEK. Ziff Davis Media Inc., PO Box 3402, Northbrook, IL 60065-3402. http://www.eweek.com, tel: 888-663-8438, fax: 847-564-9453, eweek@ziffdavis.com [36/year; $125 (print), $85 (online), free to qualified applicants] Provides current information on the IBM PC, including hardware, software, industry news, business strategies, and reviews of hardware and software.

Instructor. Scholastic Inc., PO Box 420235, Palm Coast, FL 32142-0235. http://www.scholastic.com/teachers/instructor, tel: 866-436-2455, fax: 215-625-2940, instructor@emailcustomerservice.com [8/year; $80] Features articles on applications and advances of technology in education for K-12 and college educators and administrators.

Interactive Learning Environments. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/10494820, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [6/year; $320 indiv, $924 inst (online), $1,056 inst (print+online)] Explores the implications of the Internet and multimedia presentation software in education and training environments that support collaboration amongst groups of learners or co-workers.

Journal of Computer-Assisted Learning. John Wiley & Sons, Inc., Journal Customer Services, 350 Main St, Malden, MA 02148. http://www.blackwellpublishing.com/journals/JCA, tel: 800-835-6770, fax: 781-388-8232, cs-agency@wiley.com [6/year; $253 indiv (print+online), $1,660 inst (print/online), $1,992 inst (print+online)] Articles and research on the use of computer-assisted learning.

Journal of Educational Computing Research. Baywood Publishing Co., Inc., 26 Austin Ave, PO Box 337, Amityville, NY 11701-0337. http://www.baywood.com/journals/previewjournals.asp?id=0735-6331, tel: 800-638-7819, fax: 631-691-1770, info@baywood.com [8/year; $289 indiv (online), $275 indiv (print+online), $717 inst (online), $755 inst (print+online)] Presents original research papers, critical analyses, reports on research in progress, design and development studies, article reviews, and grant award listings.

Journal of Educational Multimedia and Hypermedia. Association for the Advancement of Computing in Education, PO Box 1545, Chesapeake, VA 23327-1545. http://www.aace.org/pubs/jemh, tel: 757-366-5606, fax: 703-997-8760, info@aace.org [4/year; $45 stud, $125 indiv, $195 inst] A multidisciplinary information source presenting research about and applications for multimedia and hypermedia tools.

Journal of Research on Technology in Education. International Society for Technology in Education, 180 West 8th Ave., Suite 300, Eugene, OR 97401-2916. http://www.iste.org/jrte, tel: 800-336-5191, fax: 541-434-8948, iste@iste.org [4/year; $54 member, $200 nonmember] Contains articles reporting on the latest research findings related to classroom and administrative uses of technology, including system and project evaluations.

Language Resources and Evaluation. Springer Science+Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/10579, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [4/year; $ 1,027 inst (print/online), $ 1,232 inst (print + online, content through 1997)] Contains papers on computer-aided studies, applications, automation, and computer-assisted instruction.

Learning and Leading with Technology. International Society for Technology in Education, 180 West 8th Ave., Suite 300, Eugene, OR 97401-2916. http://www.iste.org/LL, tel: 800-336-5191, fax: 541-302-3778, iste@iste.org [8/year; $ 54 member, $ 200 nonmember] Focuses on the use of technology, coordination, and leadership; written by educators for educators. Appropriate for classroom teachers, lab teachers, technology coordinators, and teacher educators.

MacWorld. Mac Publishing, Macworld Subscription Services, PO Box 37781, Boone, IA 50037. http://www.macworld.com, tel: 800-288-6848, fax: 515-432-6994, subhelp@macworld.com [12/year; $ 22] Describes hardware, software, tutorials, and applications for users of the Macintosh microcomputer.

OnCUE. Computer-Using Educators, Inc., 877 Ygnacio Valley Road, Suite 104, Walnut Creek, CA 94596. http://www.cue.org/oncue, tel: 925-478-3460, fax: 925-934-6799, cueinc@cue.org [4/year; $ 30 stud, $ 40 indiv] Contains articles, news items, and trade advertisements addressing computer-based education.

PC Magazine. Ziff Davis Media Inc., 28 E 28th St, New York, NY 10016-7930. http://www.pcmag.com, tel: 212-503-3500, fax: 212-503-4399, pcmag@ziffdavis.com [12/year; $ 20] Comparative reviews of computer hardware and general business software programs.

System. Elsevier, Inc., Journals Customer Service, 3251 Riverport Lane, Maryland Heights, MO 63043. http://www.journals.elsevier.com/system, tel: 877-839-7126, fax: 314-447-8077, journalcustomerservice-usa@elsevier.com [8/year; $ 155 indiv, $ 954 inst (print), $ 953 inst (online)] International journal covering educational technology and applied linguistics with a focus on foreign language teaching and learning.

Social Science Computer Review. Sage Publications, 2455 Teller Rd, Thousand Oaks, CA 91320. http://ssc.sagepub.com, tel: 800-818-7243, fax: 800-583-2665, journals@sagepub.com [4/year; $ 138 indiv (print), $ 225 inst (print), $ 808 inst (online),$ 898 inst (online + backfile, content through Volume 1, Issue 1/print + online), $ 988 inst (print + online + backfile)] Interdisciplinary peer-reviewed scholarly publication covering social science research and instructional applications in computing and telecommunications; also covers societal impacts of information technology.

Wireless Networks. Springer Science + Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/11276, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [8/year; $ 974 inst (print/online), $ 1,169 inst (print + online, content through 1997)] Devoted to the technological innovations that result from the mobility allowed by wireless technology.

Distance Education

American Journal of Distance Education. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/08923647, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $ 99 indiv (print + online), $ 348 inst (online), $ 398 inst (print + online)] Created to disseminate information and act as a forum for criticism and debate about research on and practice of systems, management, and administration of distance education.

Journal of Distance Education. Canadian Network for Innovation in Education, BCIT Learning & Teaching Centre, British Columbia Institute of Technology, 3700 Willingdon Ave, Burnaby, BC, V5G 3H2, Canada. http://www.jofde.ca, tel: 604-454-2280, fax: 604-431-7267, journalofde@gmail.com [at least 2/year; free] Aims to promote and encourage scholarly work of empirical and theoretical nature relating to distance education in Canada and throughout the world.

Journal of Library & Information Services in Distance Learning. Taylor & Francis Group, Customer Service Department, 325 Chestnut Street, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/1533290X, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $ 88 indiv (online), $ 99 indiv (print + online), $ 225 inst (online), $ 257 inst (print + online)] Contains peer-reviewed articles, essays, narratives, current events, and letters from distance learning and information science experts.

Journal of Research on Technology in Education. International Society for Technology in Education, 180 West 8th Ave., Suite 300, Eugene, OR 97401-2916. http://www.iste.org/jrte, tel: 800-336-5191, fax: 541-434-8948, iste@iste.org [4/year; $ 54 member, $ 200 nonmember] Contains articles reporting on the latest research findings related to classroom and administrative uses of technology, including system and project evaluations.

Open Learning. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/02680513, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [3/year; $ 138 indiv (print), $ 392 inst (online), $ 448 inst (print + online)] Academic, scholarly publication on aspects of open and distance learning anywhere in the world. Includes issues for debate and research notes.

Educational Research

American Educational Research Journal. Sage Publications, 2455 Teller Rd, Thousand Oaks, CA 91320. http://aer.sagepub.com, tel: 800-818-7243, fax: 800-583-2665, journals@sagepub.com [6/year; $ 73 indiv (print + online), $ 235 inst (print), $ 847 inst (online), $ 941 inst (online + backfile, content through Volume 1, Issue 1/print+online), $1,035 inst (print+online+backfile)] Reports original research, both empirical and theoretical, and brief synopses of research.

Asia-Pacific Education Researcher. Springer Science+Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/40299, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [4/year; $299 inst (print/online), $359 inst (print+online, content through 1997)] Reports on the successful educational systems in the Asia-Pacific Region and of the national educational systems that underrepresented.

Educational Research. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/00131881, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $231 indiv, $616 inst (online), $704 inst (print+online)] Reports on current educational research, evaluation, and applications.

Educational Researcher. Sage Publications, 2455 Teller Rd, Thousand Oaks, CA 91320. http://edr.sagepub.com, tel: 800-818-7243, fax: 800-583-2665, journals@sagepub.com [9/year; $62 indiv (print+online), $126 inst (print), $453 inst (online), $503 inst (online+backfile, content through Volume 1, Issue 1/print+online), $553 inst (print+online+backfile)] Contains news and features of general significance in educational research.

Innovations in Education and Teaching International. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106.

http://www.tandfonline.com/riie, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [6/year; $229 indiv, $751 inst (online), $858 inst (print+online)] Essential reading for all practitioners and decision makers who want to stay good practice in higher education through staff and educational development and subject-related practices.

Journal of Interactive Learning Research. Association for the Advancement of Computing in Education, PO Box 1545, Chesapeake, VA 23327-1545. http://www.aace.org/pubs/jilr, tel: 757-366-5606, fax: 703-997-8760, info@aace.org [4/year; $45 stud, $125 indiv, $195 inst] Publishes articles on how intelligent computer technologies can be used in education to enhance learning and teaching. Reports on research and developments, integration, and applications of artificial intelligence in education.

Learning Technology. IEEE Computer Society, Technical Committee on Learning Technology, 150 Androutsou Street, Piraeus GR-18352, GREECE. http://lttf.ieee.org/content/ieee-trlt, tel: (+30) 210-4142766, fax: (+30) 210-4142767, sampson@unipi.gr [4/year; $17 stud member, $64 member, $205 nonmember] Online publication that reports developments, projects, conferences, and findings of the Learning Technology Task Force.

Meridian. North Carolina State University, College of Education, Poe Hall, PO Box 7801, Raleigh, NC 27695-7801. http://www.ncsu.edu/meridian, meridian_mail@ncsu.edu [2/year; free] Online journal dedicated to research in middle school educational technology use.

Research in Science & Technological Education. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/02635143, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [3/year; $ 440 indiv, $ 2,010 inst (online), $ 2,297 inst (print + online)] Publication of original research in the science and technological fields. Includes articles on psychological, sociological, economic, and organizational aspects of technological education.

Educational Technology

Appropriate Technology. Research Information Ltd., Grenville Court, Britwell Rd, Burnham, Bucks SL1 8DF, United Kingdom. http://www.researchinformation.co.uk/apte.php, tel: +44 (0) 1628 600499, fax: +44 (0) 1628 600488, info@researchinformation.co.uk [4/year; free] Articles on less technologically advanced, but more environmentally sustainable solutions to problems in developing countries.

British Journal of Educational Technology. John Wiley & Sons, Inc., Journal Customer Services, 350 Main St, Malden, MA 02148. http://www.blackwellpublishing.com/journals/BJET, tel: 800-835-6770, fax: 781-388-8232, cs-agency@wiley.com [6/year; $ 234 indiv, $ 1,596 inst (print/online), $ 1,916 inst (print + online)] Published by the National Council for Educational Technology, this journal includes articles on education and training, especially theory, applications, and development of educational technology and communications.

Canadian Journal of Learning and Technology. Canadian Network for Innovation in Education (CNIE), 260 Dalhousie St., Suite 204, Ottawa, ON, K1N 7E4, Canada. http://www.cjlt.ca, tel: 613-241-0018, fax: 613-241-0019, cjlt@ucalgary.ca [3/year; free] Concerned with all aspects of educational systems and technology.

Educational Technology. Educational Technology Publications, Inc., 700 Palisade Ave, Englewood Cliffs, NJ 07632-0564. http://www.bookstoread.com/etp, tel: 800-952-2665, fax: 201-871-4009, edtecpubs@aol.com [6/year; $ 259] Covers telecommunications, computer-aided instruction, information retrieval, educational television, and electronic media in the classroom.

Educational Technology Research & Development. Springer Science + Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/11423, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [6/year; $ 411 inst (print/online), $ 493 inst (print + online, content through 1997)] Focuses on research, instructional development, and applied theory in the field of educational technology.

International Journal of Technology and Design Education. Springer Science + Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/10798, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [4/year; $ 505 inst (print/online), $ 606 inst (print + online, content through 1997)] Publishes research reports and scholarly writing about aspects of technology and design education.

Journal of Computing in Higher Education. Springer Science+Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/12528, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [3/year; $166 inst (print/online), $199 inst (print+online, content through 1997)] Publishes scholarly essays, case studies, and research that discuss instructional technologies.

Journal of Educational Technology Systems. Baywood Publishing Co., Inc., 26 Austin Ave, Box 337, Amityville, NY 11701-0337. http://www.baywood.com/journals/previewjournals.asp?id=0047-2395, tel: 800-638-7819, fax: 631-691-1770, info@baywood.com [4/year; $489 inst (online), $515 inst (print+online)] Deals with systems in which technology and education interface; designed to inform educators who are interested in making optimum use of technology.

Journal of Interactive Media in Education. Open University, Knowledge Media Institute, Milton Keynes MK7 6AA United Kingdom. http://www-jime.open.ac.uk, tel: +44 (0) 1908 653800, fax: +44 (0) 1908 653169, jime@open.ac.uk [Irregular; free] A multidisciplinary forum for debate and idea sharing concerning the practical aspects of interactive media and instructional technology.

Journal of Science Education and Technology. Springer Science+Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/10956, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [6/year; $1,243 inst (print/online), $1,492 inst (print+online, content through 1997)] Publishes studies aimed at improving science education at all levels in the USA.

MultiMedia & Internet@Schools. Information Today, Inc., 143 Old Marlton Pike, Medford, NJ 08055-8750. http://www.mmischools.com, tel: 609-654-6266, fax: 609-654-4309, custserv@infotoday.com [5/year; $50] Reviews and evaluates hardware and software. Presents information pertaining to basic troubleshooting skills.

Science Communication. Sage Publications, 2455 Teller Rd, Thousand Oaks, CA 91320. http://scx.sagepub.com, tel: 800-818-7243, fax: 800-583-2665, journals@sagepub.com [8/year; $178 indiv (print+online), $278 inst (print), $1,000 inst (online), $1,111 inst (online+backfile, content through Volume 1, Issue 1/print+online), $1,222 inst (print+online+backfile)] An international, interdisciplinary journal examining the nature of expertise and the translation of knowledge into practice and policy.

Social Science Computer Review. Sage Publications, 2455 Teller Rd, Thousand Oaks, CA 91320. http://ssc.sagepub.com, tel: 800-818-7243, fax: 800-583-2665, journals@sagepub.com [4/year; $138 indiv, $225 inst (print), $808 inst (online),$898 inst (online+backfile, content through Volume 1, Issue 1/print+online), $988 inst (print+online+backfile)] Interdisciplinary peer-reviewed scholarly publication covering social science research and instructional applications in computing and telecommunications; also covers societal impacts of information technology.

TechTrends. Springer Science + Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/11528, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [6/year; $ 146 inst (print/online), $ 175 inst (print + online, content through 1997)] Targeted at leaders in education and training; features authoritative, practical articles about technology and its integration into the learning environment.

T.H.E. Journal. PO Box 2166, Skokie, IL 60076. http://www.thejournal.com, tel: 866-293-3194, fax: 847-763-9564, thejournal@1105service.com [9/year; free] For educators of all levels; focuses on a specific topic for each issue, as well as technological innovations as they apply to education.

Information Science and Technology

Canadian Journal of Information and Library Science. University of Toronto Press, Journals Division, 5201 Dufferin St, Toronto, ON, M3H 5 T8, Canada. http://www.utpjournals.com/cjils, tel: 416-667-7777, fax: 800-221-9985, journals@utpress.utoronto.ca [4/year; $ 55 stud (online), $ 100 stud (print + online), $ 90 indiv (online), $ 140 indiv (print + online), $ 160 inst (print)] Published by the Canadian Association for Information Science to contribute to the advancement of library and information science in Canada.

E-Content. Information Today, Inc., 143 Old Marlton Pike, Medford, NJ 08055-8750. http://www.econtentmag.com, tel: 800-300-9868, fax: 609-654-4309, custserv@infotoday.com [10/year; $ 119, free to qualified applicants] Features articles on topics of interest to online database users; includes database search aids.

Information Processing & Management. Elsevier, Inc., Journals Customer Service, 3251 Riverport Lane, Maryland Heights, MO 63043. http://www.elsevier.com/locate/infoproman, tel: 877-839-7126, fax: 314-447-8077, journalcustomerservice-usa@elsevier.com [6/year; $ 327 indiv, $ 2,611 inst (print), $ 1,610 inst (online)] International journal covering data processing, database building, and retrieval.

Information Services & Use. IOS Press, Nieuwe Hemweg 6B, 1013 BG Amsterdam, The Netherlands. http://www.iospress.nl/html/01675265.php, tel: +31 20 688 3355, fax: +31 20 687 0039, info@iospress.nl [4/year; $ 140 indiv (online), $ 616 inst (print), $ 560 inst (online), $ 728 inst (print + online)] An international journal for those in the information management field. Includes online and offline systems, library automation, micrographics, videotex, and telecommunications.

The Information Society. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/01972243, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [5/year; $ 219 indiv, $ 533 inst (online), $ 609 inst (print + online)] Provides a forum for discussion of the world of information, including transborder data flow, regulatory issues, and the impact of the information industry.

Information Technology and Libraries. American Library Association, Subscriptions, 50 E Huron St, Chicago, IL 60611-2795. http://www.ala.org/lita/ital, tel: 800-545-2433, fax: 312-944-2641, subscription@ala.org [4/year; free] Articles on library automation, communication technology, cable systems, computerized information processing, and video technologies.

Information Today. Information Today, Inc., 143 Old Marlton Pike, Medford, NJ 08055-8750. http://www.infotoday.com/it, tel: 609-654-6266, fax: 609-654-4309, custserv@infotoday.com [10/year; $ 97] Newspaper for users and producers of electronic information services. Includes articles and news about the industry, calendar of events, and product information.

Internet Reference Service Quarterly. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/WIRS, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $ 102 indiv (online), $ 109 indiv (print + online), $ 248 inst (online), $ 283 inst (print + online)] Discusses multidisciplinary aspects of incorporating the Internet as a tool for reference service.

Journal of Access Services. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/WJAS, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $ 93 indiv (online), $ 102 indiv (print + online), $ 248 inst (online), $ 283 inst (print + online)] Explores topics and issues surrounding the organization, administration, and development of information technology on access services and resources.

Journal of the American Society for Information Science and Technology. John Wiley & Sons, Inc., Journal Customer Services, 350 Main St, Malden, MA 02148. http://onlinelibrary.wiley.com/journal/10.1002/(ISSN)1532-2890, tel: 800-835-6770, fax: 781-388-8232, cs-agency@wiley.com [12/year; $ 2,889 inst (print/online), $ 3,533 inst (print + online)] Provides an overall forum for new research in information transfer and communication processes, with particular attention paid to the context of recorded knowledge.

Journal of Database Management. IGI Global, 701 E Chocolate Ave, Suite 200, Hershey, PA 17033-1240. http://www.igi-global.com/journal/journal-database-management-jdm/1072, tel: 866-342-6657, fax: 717-533-8661, cust@igi-global.com [4/year; $ 245 indiv, $ 695 inst (print/online), $ 1,000 inst (print + online)] Provides state-of-the-art research to those who design, develop, and administer DBMS-based information systems.

Journal of Documentation. Emerald Group Publishing Inc., Brickyard Office Park, 84 Sherman Street, Cambridge, MA 02140. http://www.emeraldinsight.com/loi/jd, tel: 617-945-9130, fax: 617-945-9136, america@emeraldinsight.com [6/year; inst prices vary] Focuses on theories, concepts, models, frameworks, and philosophies in the information sciences.

Journal of Interlibrary Loan, **Document Delivery & Electronic Reserve**. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/1072303X, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [5/year; $ 125 indiv (online), $ 132 indiv (print + online), $ 468 inst (online), $ 535 inst (print + online)] A forum for ideas on the basic theoretical and practical problems regarding all aspects of library resource sharing faced by planners, practitioners, and users of network services.

Journal of Library Metadata. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/19386389, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $ 99 indiv (online), $ 104 indiv (print + online), $ 295 inst (online), $ 337 inst (print + online)] A forum for the latest research, innovations, news, and expert views about all aspects of metadata applications and information retrieval in libraries.

Instructional Design and Development

Human–Computer Interaction. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/07370024, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $ 110 indiv, $ 917 inst (online), $ 1,048 institution (print + online)] A journal of theoretical, empirical, and methodological issues of user science and of system design.

Instructional Science. Springer Science + Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/11251, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [6/year; $ 990 inst (print/online), $ 1,188 inst (print + online, content through 1997)] Promotes a deeper understanding of the nature, theory, and practice of the instructional process and the learning resulting from this process.

International Journal of Human–Computer Interaction. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/10447318, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [12/year; $265 indiv (print), $ 277 indiv (print + online), $ 2,090 inst (online), $ 2,389 inst (print + online)] Addresses the cognitive, social, health, and ergonomic aspects of work with computers. It also emphasizes both the human and computer science aspects of the effective design and use of computer interactive systems.

Journal of Educational Technology Systems. Baywood Publishing Co., Inc., 26 Austin Ave, PO Box 337, Amityville, NY 11701-0337. http://www.baywood.com/journals/previewjournals.asp?id=0047-2395, tel: 800-638-7819, fax: 631-691-1770, info@baywood.com [4/year; $ 489 inst (online), $ 515 inst (print + online)] Deals with systems in which technology and education interface; designed to inform educators who are interested in making optimum use of technology.

Journal of Technical Writing and Communication. Baywood Publishing Co., Inc., 26 Austin Ave, PO Box 337, Amityville, NY 11701-0337. http://www.baywood.com/journals/previewjournals.asp?id=0047-2816, tel: 800-638-7819, fax:

631-691-1770, info@baywood.com [4/year; $132 indiv (online), $139 indiv (print+online), $489 inst (online), $515 inst (print+online)] Essays on oral and written communication, for purposes ranging from pure research to needs of business and industry.

Journal of Visual Literacy. International Visual Literacy Association, Dr. David R. Moore, IVLA Executive Treasurer, Ohio University, 250 McCracken Hall, Athens, OH 45701. http://www.ivla.org/drupal2/content/journal-visual-literacy, tel: 740-597-1322, jvleditor@ohio.edu [2/year; $30 student, $55 indiv, $75 inst] Explores empirical, theoretical, practical, and applied aspects of visual literacy and communication.

Performance Improvement. John Wiley & Sons, Inc., Journal Customer Services, 350 Main St, Malden, MA 02148. http://www3.interscience.wiley.com/journal/112729556, tel: 800-835-6770, fax: 781-388-8232, cs-agency@wiley.com [10/year; $95 indiv (print/online), $105 indiv (print+online), $453 inst (print/online), $544 inst (print+online)] Promotes performance science and technology. Contains articles, research, and case studies relating to improving human performance.

Performance Improvement Quarterly. John Wiley & Sons, Inc., Journal Customer Services, 350 Main St, Malden, MA 02148. http://www3.interscience.wiley.com/journal/117865970/home, tel: 800-835-6770, fax: 781-388-8232, cs-agency@wiley.com [4/year; $65 indiv, $256 inst (print/online/print+online)] Presents the cutting edge in research and theory in performance technology.

Training. Lakewood Media Group, PO Box 247, Excelsior, MN 55331. http://www.trainingmag.com, tel: 877-865-9361, fax: 847-291-4816, ntrn@omeda.com [6/year; $79, free to qualified applicants] Covers all aspects of training, management, and organizational development, motivation, and performance improvement.

Learning Sciences

International Journal of Computer-Supported Collaborative Learning. Springer Science+Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/11412, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [4/year; $566 inst (print/online), $679 inst (print+online, content through 1997)] Promotes a deeper understanding of the nature, theory, and practice of the uses of computer-supported collaborative learning.

Journal of the Learning Sciences. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/10508406, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $93 indiv, $860 inst (online), $983 inst (print+online)] Provides a forum for the discussion of research on education and learning, with emphasis on the idea of changing one's understanding of learning and the practice of education.

International Journal of Science Education. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandfonline.com/tsed, tel: 800-354-1420, fax: 215-625-2940 subscriptions@tandf.co.uk [18/year; $1,346 indiv, $3,973 inst (print), $4,541 (print+online)] Special emphasis is placed on applicable research relevant to educational practice, guided by educational realities in systems, schools, colleges and universities.

Libraries and Media Centers

Collection Building. Emerald Group Publishing Inc., Brickyard Office Park, 84 Sherman Street, Cambridge, MA 02140. http://www.emeraldinsight.com/loi/cb, tel: 617-945-9130, fax: 617-945-9136, america@emeraldinsight.com [4/year; inst prices vary] Provides well-researched and authoritative information on collection maintenance and development for librarians in all sectors.

Computers in Libraries. Information Today, Inc., 143 Old Marlton Pike, Medford, NJ 08055-8750. http://www.infotoday.com/cilmag/default.shtml, tel: 609-654-6266, fax: 609-654-4309, custserv@infotoday.com [10/year; $100] Covers practical applications of microcomputers to library situations and recent news items.

The Electronic Library. Emerald Group Publishing Inc., Brickyard Office Park, 84 Sherman Street, Cambridge, MA 02140. http://www.emeraldgrouppublishing.com/el.htm, tel: 617-945-9130, fax: 617-945-9136, america@emeraldinsight.com [6/year; inst prices vary] International journal for minicomputer, microcomputer, and software applications in libraries; independently assesses current and forthcoming information technologies.

Government Information Quarterly. Elsevier, Inc., Journals Customer Service, 3251 Riverport Lane, Maryland Heights, MO 63043. http://www.elsevier.com/locate/govinf, tel: 877-839-7126, fax: 314-447-8077, journalcustomerservice-usa@elsevier.com [4/year; $213 indiv, $865 inst (print), $866 inst (online)] International journal of resources, services, policies, and practices.

Information Outlook. Special Libraries Association, Information Outlook Subscriptions, 1700 Eighteenth Street, NW, Washington, DC 20009-2514. http://www.sla.org/access-membership/io, tel: 703-647-4900, fax: 1-202-234-2442, magazine@sla.org [12/year; $40 stud member, $114 member] Discusses administration, organization, and operations. Includes reports on research, technology, and professional standards.

The Journal of Academic Librarianship. Elsevier, Inc., Journals Customer Service, 3251 Riverport Lane, Maryland Heights, MO 63043. http://www.elsevier.com/locate/jacalib, tel: 877-839-7126, fax: 314-447-8077, journalcustomerservice-usa@elsevier.com [6/year; $505 inst] Results of significant research, issues, and problems facing academic libraries, book reviews, and innovations in academic libraries.

Journal of Librarianship and Information Science. Sage Publications, 2455 Teller Rd, Thousand Oaks, CA 91320. http://lis.sagepub.com, tel: 800-818-7243, fax: 800-583-2665, journals@sagepub.com [4/year; $115 indiv, $209 inst (print), $752 inst (online), $836 inst (online+backfile, content through Volume 1, Issue 1/ print+online), $920 inst (print+online+backfile)] Deals with all aspects of library and information work in the United Kingdom and reviews literature from international sources.

Journal of Library Administration. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/01930826, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [8/year; $248 indiv (online), $275 indiv (print+online), $922 inst (online), $1,054 inst (print+online)] Provides information on all aspects of effective library management, with emphasis on practical applications.

Library & Information Science Research. Elsevier, Inc., Journals Customer Service, 3251 Riverport Lane, Maryland Heights, MO 63043. http://www.elsevier.com/locate/lisres, tel: 877-839-7126, fax: 314-447-8077, journalcustomerservice-usa@elsevier.com [4/year; $655 inst] Research articles, dissertation reviews, and book reviews on issues concerning information resources management.

Library Hi Tech. Emerald Group Publishing Inc., Brickyard Office Park, 84 Sherman Street, Cambridge, MA 02140. http://www.emeraldinsight.com/loi/lht, tel: 617-945-9130, fax: 617-945-9136, america@emeraldinsight.com [4/year; inst prices vary] Concentrates on reporting on the selection, installation, maintenance, and integration of systems and hardware.

Library Hi Tech News. Emerald Group Publishing Inc., Brickyard Office Park, 84 Sherman Street, Cambridge, MA 02140. http://www.emeraldinsight.com/loi/lhtn, tel: 617-945-9130, fax: 617-945-9136, america@emeraldinsight.com [10/year; inst prices vary] Supplements Library Hi Tech and updates many of the issues addressed in-Department in the journal; keeps the reader fully informed of the latest developments in library automation, new products, network news, new software and hardware, and people in technology.

Library Journal. Media Source, Inc., 160 Varick Street, 11th Floor, New York, NY 10013. http://www.libraryjournal.com, tel: 800-588-1030, fax: 712-733-8019, LJLcustserv@cds-global.com [20/year; $102 indiv] A professional periodical for librarians, with current issues and news, professional reading, a lengthy book review section, and classified advertisements.

Library Media Connection. Linworth Publishing, Inc., PO Box 204, Vandalia, Ohio 45377. http://www.librarymediaconnection.com/lmc, tel: 800-607-4410, fax: 937-890-0221, linworth@linworthpublishing.com [6/year; $69 indiv] Journal for junior and senior high school librarians; provides articles, tips, and ideas for day-to-day school library management, as well as reviews of audiovisuals and software, all written by school librarians.

The Library Quarterly. University of Chicago Press, Journals Division, PO Box 37005, Chicago, IL 60637. http://www.journals.uchicago.edu/LQ, tel: 877-705-1878, fax: 877-705-1879, subscriptions@press.uchicago.edu [$27 students (online), $ 49 indiv (print), $ 48 indiv (online), $ 54 indiv (print + online), inst prices vary] Scholarly articles of interest to librarians.

Library Resources & Technical Services. American Library Association, Subscriptions, 50 E Huron St, Chicago, IL 60611-2795. http://www.ala.org/ala/mgrps/divs/alcts/resources/lrts/index.cfm, tel: 800-545-2433, fax: 312-944-2641, subscription@ala.org [4/year; $ 100 print, $ 95 online, $ 105 print + online] Scholarly papers on bibliographic access and control, preservation, conservation, and reproduction of library materials.

Library Trends. Johns Hopkins University Press, PO Box 19966, Baltimore, MD 21211-0966. http://www.press.jhu.edu/journals/library_trends, tel: 800-548-1784, fax: 410-516-3866, jrnlcirc@press.jhu.edu [4/year; $ 80 indiv (print), $ 85 indiv (online), $ 163 inst (print)] Each issue is concerned with one aspect of library and information science, analyzing current thought and practice and examining ideas that hold the greatest potential for the field.

Public Libraries. American Library Association, Subscriptions, 50 E Huron St, Chicago, IL 60611-2795. http://www.ala.org/pla/publications/publiclibraries, tel: 800-545-2433, fax: 312-944-2641, subscription@ala.org [6/year; $ 65 indiv] News and articles of interest to public librarians.

Public Library Quarterly. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/WPLQ, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $ 138 indiv (online), $ 148 indiv (print + online), $ 425 inst (online), $ 486 inst (print + online)] Addresses the major administrative challenges and opportunities that face the nation's public libraries.

Reference and User Services Quarterly. American Library Association, Subscriptions, 50 E Huron St, Chicago, IL 60611-2795. http://rusa.metapress.com/content/l74261, tel: 800-545-2433, fax: 312-944-2641, subscription@ala.org [4/year; $ 25 student, $ 60 member, $ 65 nonmember] Disseminates information of interest to reference librarians, bibliographers, adult services librarians, those in collection development and selection, and others interested in public services.

The Reference Librarian. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/wref, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $ 297 indiv (online), $ 324 indiv (print + online), $ 1,202 inst (online), $ 1,374 inst (print + online)] Each issue focuses on a topic of current concern, interest, or practical value to reference librarians.

Reference Services Review. Emerald Group Publishing Inc., Brickyard Office Park, 84 Sherman Street, Cambridge, MA 02140. http://www.emeraldinsight.com/loi/rsr, tel: 617-945-9130, fax: 617-945-9136, america@emeraldinsight.com [4/year; inst prices vary] Dedicated to the enrichment of reference knowledge and the advancement of reference services. It prepares its readers to understand and embrace current and emerging technologies affecting reference functions and information needs of library users.

School Library Journal. Media Source, Inc., 160 Varick Street, 11th Floor, New York, NY 10013. http://www.slj.com, tel: 800-595-1066, fax: 712-733-8019, sljcustserv@cds-global.com [12/year; $ 89 indiv] For school and youth service librarians. Reviews about 4,000 children's books and 1,000 educational media titles annually.

School Library Monthly. Libraries Unlimited, Inc., PO Box 291846, Kettering OH 45429. http://www.schoollibrarymedia.com, tel: 800-771-5579, fax: 937-890-0221, schoollibrarymonthly@sfsdayton.com [7/year; $ 55 indiv] A vehicle for distributing ideas for teaching library media skills and for the development and implementation of library media skills programs.

School Library Research. American Library Association and American Association of School Librarians, Subscriptions, 50 E Huron St, Chicago, IL 60611-2795. http://www.ala.org/aasl/slr, tel: 800-545-2433, fax: 312-944-2641, subscription@ala.org [annual compilation; free online] For library media specialists, district supervisors, and others concerned with the selection and purchase of print and non-print media and with the development of programs and services for preschool through high school libraries.

Teacher Librarian. The Scarecrow Press, Inc., 4501 Forbes Blvd, Suite 200, Lanham, MD 20706. http://www.teacherlibrarian.com, tel: 800-462-6420, fax: 800-338-4550, admin@teacherlibrarian.com [5/year; $ 62 indiv] "The journal for school library professionals"; previously known as Emergency Librarian. Articles, review columns, and critical analyses of management and programming issues.

Media Technologies

Broadcasting & Cable. NewBay Media, LLC., 28 E. 28th St, 12th Floor, New York, NY 10016. http://www.broadcastingcable.com, tel: 800-554-5729, fax: 712-733-8019, bcbcustserv@cdsfulfillment.com [47/year; $ 169 indiv] All-inclusive newsweekly for radio, television, cable, and allied business.

Educational Media International. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/09523987, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $ 170 indiv, $ 605 inst (online), $ 691 inst (print + online)] The official journal of the International Council for Educational Media.

Historical Journal of Film, **Radio and Television**. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/01439685, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $ 511 indiv, $ 1,351 inst (online), $ 1,544 inst (print + online)] Articles by international experts in the field, news and notices, and book reviews concerning the impact of mass communications on political and social history of the twentieth century.

International Journal of Instructional Media. Westwood Press, Inc., 118 5 Mile River Rd, Darien, CT 06820-6237. http://www.adprima.com/ijim.htm, tel: 203-656-8680, fax: 212-353-8291, PLSleeman@aol.com [4/year; $ 225 indiv] Focuses on quality research on ongoing programs in instructional media for education, distance learning, computer technology, instructional media and technology, telecommunications, interactive video, management, media research and evaluation, and utilization.

Journal of Educational Multimedia and Hypermedia. Association for the Advancement of Computing in Education, PO Box 1545, Chesapeake, VA 23327-1545. http://www.aace.org/pubs/jemh, tel: 757-366-5606, fax: 703-997-8760, info@aace.org [4/year; $ 45 stud, $ 125 indiv, $ 195 inst] A multidisciplinary information source presenting research about and applications for multimedia and hypermedia tools.

Journal of Popular Film and Television. Taylor & Francis Group, Customer Service Department, 325 Chestnut Street, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/01956051, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $ 77 indiv, $ 203 inst (online), $ 232 (print + online)] Articles on film and television, book reviews, and theory. Dedicated to popular film and television in the broadest sense. Concentrates on commercial cinema and television, film and television theory or criticism, filmographies, and bibliographies. Edited at the College of Arts and Sciences of Northern Michigan University and the Department of Popular Culture, Bowling Green State University.

Learning, **Media & Technology**. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/17439884, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $ 610 indiv, $ 2,055 inst (online), $ 2,349 inst (print + online)] This journal of the Educational Television Association serves as an international forum for discussions and reports on developments in the field of television and related media in teaching, learning, and training.

Media & Methods. American Society of Educators, 1429 Walnut St, Philadelphia, PA 19102. http://www.media-methods.com, tel: 215-563-6005, fax: 215-587-9706, info@media-methods.com [5/year; $ 35 indiv] The only magazine published for the elementary school library media and technology specialist. A forum for K-12 educators who use technology as an educational resource, this journal includes information on what works and what does not, new product reviews, tips and pointers, and emerging technologies.

Multichannel News. NewBay Media, LLC., 28 E. 28th St. 12th Floor, New York, NY 10016. http://www.multichannel.com, tel: 888-343-5563, fax: 712-733-8019, mulcustserv@cdsfulfillment.com [47/year; $ 249 indiv] A newsmagazine for the cable television industry. Covers programming, marketing, advertising, business, and other topics.

MultiMedia & Internet@Schools. Information Today, Inc., 143 Old Marlton Pike, Medford, NJ 08055-8750. http://www.mmischools.com, tel: 609-654-6266, fax: 609-654-4309, custserv@infotoday.com [5/year; $ 50 indiv] Reviews and evaluates hardware and software. Presents information pertaining to basic troubleshooting skills.

Multimedia Systems. Springer Science + Business Media, PO Box 2485, Secaucus, NJ 07096-2485. http://www.springer.com/journal/00530, tel: 800-777-4643, fax: 201-348-4505, service-ny@springer.com [6/year; $ 770 inst (print/online), $ 924 inst (print + online, content through 1997)] Publishes original research articles and serves as a forum for stimulating and disseminating innovative research ideas, emerging technologies, state-of-the-art methods, and tools in all aspects of multimedia computing, communication, storage, and applications among researchers, engineers, and practitioners.

Telematics and Informatics. Elsevier, Inc., Journals Customer Service, 3251 Riverport Lane, Maryland Heights, MO 63043. http://www.elsevier.com/locate/tele, tel: 877-839-7126, fax: 314-447-8077, journalcustomerservice-usa@elsevier.com [4/year; $165 indiv, $ 1,657 inst (print), $ 1,658 inst (online)] Publishes research and review articles in applied telecommunications and information sciences in business, industry, government, and educational establishments. Focuses on important current technologies, including microelectronics, computer graphics, speech synthesis and voice recognition, database management, data encryption, satellite television, artificial intelligence, and the ongoing computer revolution.

Professional Development

Journal of Digital Learning in Teacher Education. International Society for Technology in Education, Special Interest Group for Teacher Educators, 180 West 8th Ave., Suite 300, Eugene, OR 97401. http://www.iste.org/jdlte, tel: 800-336-5191, fax: 541-302-3778, iste@iste.org [4/year; $ 32 member, $ 200 nonmember] Contains refereed articles on preservice and in-service training, research in computer education and certification issues, and reviews of training materials and texts.

Journal of Technology and Teacher Education. Association for the Advancement of Computing in Education, PO Box 1545, Chesapeake, VA 23327-1545. http://www.aace.org/pubs/jtate, tel: 757-366-5606, fax: 703-997-8760, info@aace.org [4/year; $ 45 stud, $ 125 indiv, $ 195 inst] Serves as an international forum to report research and applications of technology in preservice, in-service, and graduate teacher education.

Simulation, Gaming, and Virtual Reality

Simulation & Gaming. Sage Publications, 2455 Teller Rd, Thousand Oaks, CA 91320. http://sag.sagepub.com, tel: 800-818-7243, fax: 800-583-2665, journals@sagepub.com [6/year; $ 156 indiv, $ 1,159 inst (online), $ 1,275 inst (online + backfile, content through Volume 1, Issue 1)] An international journal of theory, design, and research focusing on issues in simulation, gaming, modeling, role-playing, and experiential learning.

Special Education and Disabilities

Journal of Special Education Technology. Technology and Media Division, JSET, PO Box 3853, Reston, VA 20195. http://www.tamcec.org/jset, tel: 703-709-0136, fax: 405-325-7661, info@exinn.net [4/year; $ 100 indiv, $ 260 inst] Provides information, research, and reports of innovative practices regarding the application of educational technology toward the education of exceptional children.

Telecommunications and Networking

Canadian Journal of Learning and Technology. Canadian Network for Innovation in Education (CNIE), 260 Dalhousie St., Suite 204, Ottawa, ON, K1N 7E4, Canada. http://www.cjlt.ca, tel: 613-241-0018, fax: 613-241-0019, cjlt@ucalgary.ca [3/year; free] Concerned with all aspects of educational systems and technology.

Computer Communications. Elsevier, Inc., Journals Customer Service, 3251 Riverport Lane, Maryland Heights, MO 63043. http://www.elsevier.com/locate/comcom, tel: 877-839-7126, fax: 314-447-8077, journalcustomerservice-usa@elsevier.com [18/year; $ 2,880 inst] Focuses on networking and distributed computing techniques, communications hardware and software, and standardization.

EDUCAUSE Review. EDUCAUSE, 4772 Walnut St, Suite 206, Boulder, CO 80301-2536. http://www.educause.edu/er, tel: 303-449-4430, fax: 303-440-0461, er-subs@educause.edu [6/year; $ 39 indiv (print), free online] Features articles on current issues and applications of computing and communications technology in higher education. Reports on EDUCAUSE consortium activities.

International Journal on E-Learning. Association for the Advancement of Computing in Education, PO Box 1545, Chesapeake, VA 23327-1545. http://www.aace.org/pubs/ijel, tel: 757-366-5606, fax: 703-997-8760, info@aace.org [4/year; $ 45 stud, $ 125 indiv, $ 210 inst] Reports on current theory, research, development, and practice of telecommunications in education at all levels.

The Internet and Higher Education. Elsevier, Inc., Journals Customer Service, 3251 Riverport Lane, Maryland Heights, MO 63043. http://www.elsevier.com/locate/iheduc, tel: 877-839-7126, fax: 314-447-8077, journalcustomerservice-usa@elsevier.com [4/year; $ 98 indiv, $ 588 inst (print), $ 590 inst (online)] Designed to reach faculty, staff, and administrators responsible for enhancing instructional practices and productivity via the use of information technology and the Internet in their institutions.

Internet Reference Services Quarterly. Taylor & Francis Group, Customer Services Department, 325 Chestnut St, Suite 800, Philadelphia, PA 19106. http://www.tandf.co.uk/journals/titles/10875301, tel: 800-354-1420, fax: 215-625-2940, subscriptions@tandf.co.uk [4/year; $ 102 indiv (online), $ 109 indiv (print + online), $ 248 inst (online), $ 283 inst (print + online)] Describes innovative information practice, technologies, and practice. For librarians of all kinds.

Internet Research. Emerald Group Publishing Inc., Brickyard Office Park, 84 Sherman Street, Cambridge, MA 02140. http://www.emeraldinsight.com/loi/intr.htm, tel: 617-945-9130, fax: 617-945-9136, america@emeraldinsight.com [5/year; inst prices vary] A cross-disciplinary journal presenting research findings related to electronic networks, analyses of policy issues related to networking, and descriptions of current and potential applications of electronic networking for communication, computation, and provision of information services.

Online Searcher. Information Today, Inc., 143 Old Marlton Pike, Medford, NJ 08055-8750. http://www.infotoday.com/online, tel: 609-654-6266, fax: 609-654-4309, custserv@infotoday.com [6/year; $ 139 indiv] For online information system users. Articles cover a variety of online applications for general and business use.

Index

M. Orey, R.M. Branch (eds.), *Educational Media and Technology Yearbook*,
Educational Media and Technology Yearbook 39,
DOI 10.1007/978-3-319-14188-6

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