INTRODUCTION TO THE FIELD OF INSTRUCTIONAL DESIGN AND TECHNOLOGY

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INTRODUCTION

The members of our group are all interested or involved in higher education. Elizabeth Clark is an adjunct English and humanities instructor at Red Rocks Community College and Westwood College. Mauricio Lujan is interested in the use of multimedia and digital video for interactive displays in museums. Carol Martin is a member of the CU Online Web Development Team at the University of Colorado at Denver and Health Sciences Center. Alex McDaniel is currently an Online Course Developer and Senior Flash Programmer for Metropolitan State College of Denver. Carmella Rodriguez is the Technical Director and Media Coordinator for the University of Colorado at Denver and Health Science Center's Colorado Alcohol Spectrum Disorders Prevention Outreach Project.

Our common interest in instructional design and technology (IDT) has led us to this class, where we will learn about current trends and issues in the field. In order to put these into perspective, we need to understand definitions and core models in IDT, as well as the history of the field, and be aware of the resources available to us: organizations, journals, blogs, and websites.

DEFINITIONS AND CORE MODELS

Exploring the definition of instructional design begins with an examination of the two terms used in the name of the field: *instruction* and *design*. Understanding these concepts provides the platform for understanding the goals of instructional designers, the field they represent, and their methods.

A solid definition of instruction, as stated by Gagne, Briggs, and Wager (1992), is ". . . a set of events that affect learners in such a way that learning is facilitated" (p. 3). This definition is important to instructional design as it highlights that instruction can be separated from the teacher. Instruction can take place through any medium or event that has an effect on learning for a student.

Design, on the other hand, is the deliberate act of creation. This denotes premeditation, planning, and analysis.

While learning can be a product of human development (as learning to walk) or can occur without instruction, the positive effects of instruction on learning are easily observed (Gagne, et

al., 1992). When combined, the terms *instruction* and *design* convey the idea that instruction is a deliberate process that promotes learning.

A comparison of terms to define the field of instructional design (ID), including educational technology (ET), instructional technology (IT), and IDT, reveals more about the philosophy of the term's users than the field itself. By nature, ID is the calculated development of instruction that fosters learning. The philosophy or strategy is revealed through the terms used to define this process.

When the instructional element is combined with, or conveys the usage of technology, the title for the field adopts technology terms. Terms such as *IT* and *ET* focus on effective usage of communication technology to help learners and instructors transfer knowledge.

While the focus of instruction shifts to the psychological learning process, the technology terms are omitted and the design terms are included. The blanket term *ID* is often used. Definitions for this field appropriately reveal the focus of those using them.

Instructional design and technology perhaps more accurately describes the broad focuses of members within the field. This term conveys the emphasis of deliberate instruction regardless of the communication medium. According to the Association for Educational Communications and Technology (AECT) (2001c), IDT ". . . is the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning."

It is apparent at first glance that most ID models take their respective roots from ADDIE (Analyze, Design, Develop, Implement, Evaluate). However, according to Irlbeck, Kays, Jones, and Sims, rapid changes in our understanding of learning has allowed the field of IDT to build on the ADDIE model to include concepts from constructivism, systems theory, interaction, information processing, and learning-centered approaches (2006). This view of ID as a more encompassing system allows for greater specialization and adaptation of instruction.

As varied learning situations or events benefit from the application of different IDT models, it is important to note that many have been developed. A few models of note are

- ARCS – a problem solving approach focusing on stimulating and sustaining students' motivation to learn (Keller, 2006).
- Dick and Carey – a methodology for designing instruction based on breaking down instructional elements into smaller, more manageable components

- Kemp Design Model – a systematic, nonlinear approach to developing instruction based on a continuous cycle requiring constant planning, design, development, and assessment (McGriff, 2001).

While the above list is by no means exhaustive, these three sample models demonstrate the wide breadth of process and application that a member of the IDT field might employ in a given situation.

According to Morrison, Ross, and Kemp (2004), the four key elements of the ID process are learners, objective, methods, and evaluation. During the course of applying most IDT models, these elements can be defined by answering the following questions:

1. For whom is the program developed? (characteristics of learners or trainees)
2. What do you want the learners or trainees to learn or demonstrate (objectives)
3. How is the subject content or skill best learned? (instructional strategies)
4. How do you determine the extent to which learning is achieved? (evaluation procedures) (Morrison, et al., 2004, p. 7)

While these key elements might look at first glance like a complete model, they are simply the basis for further planning. When incorporated into a more comprehensive design scheme or model, such as one of the models listed, they provide the foundation for effective instructional design.

Taken all together, the key elements of the models used, the focused naming convention of specialized areas within the field, and the definition of IDT demonstrate that instruction and learning are not accidents, but rather a deliberate act based on improved methodology and planning.

HISTORY OF THE FIELD

Before the 1920s, people believed that the mind was like a muscle that could be improved with exercise. Influences on educational theories and design during this period included Charles Darwin's *Descent of Man* and William James' *Principles of Psychology*, as well as the advent of World War I. In 1905, the "first school museum opened in St. Louis," and educators recognized

the importance of using films for visual instruction. The introduction of films and filmmaking led some to think that books would become obsolete.

In the 1920s, educators were interested in matching "society needs to education and connecting outcomes and instruction." Outcome-based instruction was developed during this period. Learners progressed at their own pace with minimal teacher involvement (McNeil, n.d.). In 1923 the National Education Association (NEA) created the Division of Visual Instruction (DVI). It had only two competing organizations and did not put forth any publications, nor did it have headquarters. It was mostly limited to the annual summer convention. One of its largest contributions had to do with legislation of flammable film (AECT, 2001a).

During the 1930s, the Great Depression made survival the focus. Education took a backseat. Ralph Tyler published an eight-year study relating teaching objectives to student behavior (McNeil, n.d.). During these years the DVI had to join its two competing associations. During that time it became necessary to address the growing number of colleges and universities in order to distribute mainly film and slide materials (AECT, 2001a).

World War II and the need for military training dominated the 1940s. The military needed to train thousands quickly about detailed weapons and processes. They used films and technical subject matter experts to educate. The concept of task-based training evolved from the education needs of the 1940s and World War II (McNeil, n.d.). With the end of the war came a great influx of highly trained professionals in the field of audio-visual media. The DVI's presence was felt among the higher education institutions, but the organization was still strictly non-commercial. The organization's name was changed to Department of Audio-Visual Instruction (DAVI), and its first publication was issued (AECT, 2001a).

The Soviets launched the space race with Sputnik in 1954, and B.F. Skinner was proclaiming the study of practiced learning. The 1950s "is characterized by the birth and development of Programmed Instruction," which continued in the 1960s.

During the next decade, psychologists started viewing training as a system and developed many new analysis, design, and evaluation procedures. President Kennedy focused America's attention on the moon, and the government focused on math and science education because the Russians launched the first orbiting space satellite. Major figures in the ID field included Robert Glaser, Robert Gagne, and James Finn. Terms they introduced included *task analysis* and *instructional design*, *instructional system*, and the *systems approach to designing instruction*

(McNeil, n.d.). In 1969 the name of the DAVI was changed again, this time to the Association for Educational Communications and Technology (AECT, 2001a).

The reward of the work done in the 1960s was delivered in the 1970s with the introduction of the personal computer—both IBM and Macintosh (McNeil, n.d.). Before the 1970s, the organization that had become the AECT had been primarily devoted to primary and secondary education, but during this decade there was suddenly more interest in higher education settings than there had been before (AECT, 2001a).

The explosion of technology continued through the 1980s as American businesses rapidly adopted the personal computer and instructional systems. The need for Instructional Design was apparent with computer based training (CBT) (McNeil, n.d.). Despite the beginning of the era of digitalization in the 1980s, the AECT had financial difficulties and decided in 1988 to merge two journals to create the *Educational Technology Research and Development Journal* (ETR&D). In the 1990s, Multimedia demands added to the ever-changing desktop learning environment. In 1991, the World Wide Web is developed at CERN. Three years later, the Netscape Navigator browser software was introduced, which provided an easy, point-and-click method of navigating the internet.

In the early years of the 21st century, we've seen a continuation of the constructivist approach to learning coupled with online and hybrid learning, as well as the deployment of knowledge management systems (McNeil, n.d.). In addition to these, many educators today are interested in multimedia, mobile learning, Web 2.0 applications, and multi-user virtual environments (MUVEs).

ORGANIZATIONS AND JOURNALS

There are many resources, including several professional organizations and journals, available for people interested in IDT in higher education.

Organizations

Association for Educational Communications and Technology—The mission of the Association for Educational Communications and Technology (AECT) is to "is to provide international leadership by promoting scholarship and best practices in the creation, use, and management of technologies for effective teaching and learning in a wide range of settings"

(AECT, 2004). "The goal of AECT is to facilitate human learning through the systematic development, utilization, and management of learning resources, which include people, processes, and media in educational settings" at all levels and in many fields.

AECT's headquarters are in Washington, D.C. The organization's scope is international, and it is represented in all 50 states in the U.S.A. The use of the terms "international leadership" and "professional activities" in the constitution is a clear indication that the AECT is primarily dedicated to its members who are already active in the field, but it is also invested in those the will be. It now organizes a festival for students around the world where they can present their class projects, as well as a competition for graduate students where they can present their instructional designs. Currently the AECT has ten divisions, including Design and Development, Multimedia Production, and Research and Theory. It also holds regularly scheduled conferences and publishes a variety of books and periodicals (AECT, 2001b).

The Sloan Consortium—Funded by the Alfred P. Sloan Foundation, the Sloan Consortium (Sloan-C) is an association of institutions and organizations providing online education. It purpose "is to help learning organizations continually improve quality, scale, and breadth of their online programs, according to their own distinctive missions, so that education will become a part of everyday life, accessible and affordable for anyone, anywhere, at any time, in a wide variety of disciplines." Though most members are institutions of higher education and private-sector organizations in the United States, it is possible to join Sloan-C as an individual. Sloan-C offers its members various publications, conferences, and workshops, including sessions leading to an online teaching certificate (Sloan-C, 2007b).

Journals

Educational Technology Research and Development—The AECT publishes *Educational Technology Research and Development* (*ETR&D*) (http://www.aect.org/Intranet/Publications/index.asp), which contains academic papers on both the theoretical and applied research. This means that there is as much emphasis on the *why* as there is on the *how*. By development what is meant is namely the planning, applying, evaluating and managing of these technologies (AECT, 2005b).

In an article relating their experience designing a computer support system for multimedia curriculum development in Shanghai, Wang, Nieveen, and Akker (2007) suggest that

a professional environment is not in a different class from a learning situation. Because there are very different levels of education throughout the city, they had to cater to different socio-cultural and demographic sectors, which is key in education.

International Journal of Instructional Media—The *International Journal of Instructional Media* (*IJIM*) (http://www.adprima.com/ijim.htm) publishes articles on "applying the various distant learning strategies and instructional media to the learning process. Articles discuss *specific* applications and techniques for bringing the advantages of a particular instructional medium to bear on a complete curriculum system or program" (ADPRIMA, 2007).

In a recent article titled "Learning with Multimedia: Engaging Students in Constructivist Learning" Mai Neo (2007) relates how second-year students in an interactive multimedia class "design[ed] and [built] a multimedia project using the appropriate tools as a course project" (p. 149).

Interpersonal Computing and Technology Journal—Also published by AECT, *Interpersonal Computer and Technology Journal* (*IPCT-J*) (http://www.aect.org/Intranet/Publications/index.asp) focuses on "on computer-mediated communication, and the pedagogical issues surrounding the use of computers and technology in educational settings" (AECT, 2005b).

In an article titled "Analysis and Design of an E-learning Model for Organizational Excellence and Versatility," Kumar (2004) presents "an e-learning framework with analysis and design considerations that instructional designers, e-learning content developers and multimedia producers situated in educational, commercial and corporate settings can leverage upon in producing efficacious e-learning models aligned to the learner outcomes, needs and skill-sets."

International Journal of Technology and Design Education—The *International Journal of Technology and Design Education* (http://www.springerlink.com/content/0957-7572) has many comparative studies. It is interesting because it focuses on the relationship of technology with science among other things.

In an article published this year, Petrina, Feng, and Kim (2007) looked at many components of our education. It was interesting how recreational means such as arcades were listed. What is presented in the article are different methods for studying cognition and technology. In the section titled "How Adults Learn," the authors explain that there is a "redistribution" when students go from secondary to higher education and that there we still rely

on some guidance (manuals, programs, etc.).   They also discuss learning at work where and explain that in lifelong learning there is ". . . an assumption that learning about, through and for technology has its own reward; motivation is invested in the technology."

>   ***Teachers College Record***—The *Teachers College Record* (http://www.tcrecord.org/) publishes scholarly articles on a wide variety of topics, including adult education, higher education, and technology (TCRecord, 2005).

>   In a 2005 article titled "Methods for E-Learning: A Concept Paper and Action Plan," Ellen B. Mandinach (2005) examined "the characteristics of e-learning that make it unique and traces some of the emerging trends in the field. The article then [discussed] evaluation methodologies that might be potentially informative in the examination of how e-learning is beginning to affect teaching and learning processes" (p. 1814).

BLOGS AND WEBSITES

>   Members of our group have many different interests in the IT domain, including online and hybrid education, multimedia technology, mobile learning, Web 2.0 applications, and multi-user virtual environments (MUVEs). The following websites, blogs, podcasts, and videocasts are valuable resources for educators interested in these areas.

Online and Hybrid Education

>   Several members of our group are involved in online education: Elizabeth started developing and teaching online courses in 2001 for Westwood College, Carol is a member of the CU Online Web Development Team at the University of Colorado at Denver and Health Sciences Center, and Alex is an Online Course Developer and Senior Flash Programmer for Metropolitan State College of Denver.

>   Our group is also interested in learning about the best design options and technology for a course in a hybrid or blended learning environment. By definition a hybrid course reduces face-to-face "seat time" so that learners can pursue additional teaching and learning activities online. To be successful, a hybrid course requires careful pedagogical redesign.

>   **The Sloan Consortium's Effective Practices Site**—The editors of Sloan-C's effective practices site (http://www.sloan-c.org/effective/index.asp) collect and share effective online education practices in five areas: student satisfaction, access, learning effectiveness, faculty

satisfaction, and cost effectiveness. Two free downloads are available on the site: "Synthesis of Sloan-C Effective Practices" and "Relationships between Interaction and Learning in Online Environments" (Sloan-C, 2007a).

      Online Learning Update—Providing three news items daily, *Online Learning Update* (http://people.uis.edu/rschr1/onlinelearning/blogger.html) is a blog edited by Ray Schroeder of the University of Illinois at Springfield (Schroeder, 2007).

      Corporate eLearning Strategies and Development—In his blog *Corporate eLearning Strategies and Development* (http://elearndev.blogspot.com/), Brent Schlenker (2007) explores "the crossroads of technology and learning." In recent posts, he has discussed the iPhone and the future of mobile learning, Elluminate's vRooms, and the importance of blogs and bloggers.

      Blended Learning: Research Perspectives—Sloan-C's website *Blended Learning: Research Perspectives* (http://www.blendedteaching.org/) "collects and shares resources for educators and administrators involved with blended and hybrid learning" (Sloan-C, 2006).

      Teach Online: **Hybrid**—This review of hybrid course design (http://teachvu.vu.msu.edu/public/hybrid/intro/) "was written as part of Patricia Banyas' DMAT (Digital Media Arts and Technology) MA Production Thesis in the Department of Telecommunication, Information Studies, and Media at Michigan State University. Ms. Banyas also works as a producer for the Virtual University Design and Technology group at Michigan State University" (Banyas, 2005).

      "Sharing Ideas about Using Hybrid Methods in Distance Teaching and Learning"— In a post (http://eduspaces.net/ricklillie/weblog/140785.html), Rick Lillie (2006) shares his own experience using hybrid methods in distance teaching and learning. His research has focused on developing hybrid technology to enhance the online learning experience. Lillie was a presenter at the 18th Annual WCET Conference in Portland, Oregon in November 2006.

      Interviews with Ike Eberstein and John Reynolds—In this podcast (https://learningforlife.fsu.edu/ctl/archive/indexMore3.cfm), FSU Sociology professors Ike Eberstein and John Reynolds (2007) discuss their redesign process for an introductory sociology course at Florida State University. The Sociology hybrid project replaced half the traditional classroom time with online learning activities. The Sociology hybrid course was nominated for a Blackboard Greenhouse Exemplary Course award.

Multimedia

Some members of our group are interested in learning about how to use interactive multimedia and video in their course design that will provide the highest impact on their learners.

Penn State MTO Repository—This repository (http://tlt.its.psu.edu/mto/), which is maintained by Pennsylvania State University, contains several multimedia teaching objects (MTOs) that are downloadable and useable as a teaching resource. The MTOs are considered modular digital resources and include animations, Flash, 3D visualization, and others (Pennsylvania State University, 2007).

The Business of Online Video—The subjects of daily posts on this blog (http://blog.streamingmedia.com/) include "the online video industry, business trends & analysis, market data & research as well as the online video business models in the media & entertainment, broadcast, advertising & enterprise industries" (Rayburn, 2007).

"**Multimedia for Educators: October 2005 Roundup"**—In this podcast (iTunes Store > Multimedia for Educators > Mathew Mitchell), Mathew Mitchell (2005) discusses several recent audio products and provides brief reports on web browsers, multimedia software, etc.

"**Interactivity in Multimedia Learning"**—This videocast (http://blip.tv/file/262034) was originally recorded in June of 2003 by Richard Mayer (2003), "a professor in the psychology department at UC Santa Barbara. Professor Mayer's research interests are in educational and cognitive psychology. His current research involves the intersection of cognition, instruction, and technology with a special focus on multimedia learning and problem solving."

Mobile Learning

In addition, members of the group are interested in learning more about mobile learning and designing courses for its technology.

"**Optimizing Web Applications and Content for iPhone"**—The guidelines on this web page (http://developer.apple.com/iphone/designingcontent.html) will help the developer "prepare web content and design a website or web-based application for iPhone" (Apple Inc., 2007b).

"**Mobile Learning: Adobe Captivate Content on Video iPod Devices"**—This tutorial (http://www.adobe.com/devnet/captivate/articles/ipod.html) shows how to use Adobe Captivate to provide content for students' mobile devices (Fleischer, 2007).

"**Designing Web Content for the iPhone**"—Available only to Apple developers, this podcast (http://www.apple.com/itunes/store/) talks about developing content for the iPhone (Apple Inc., 2007a).

Web 2.0 Applications

Members of our group are also interested in the educational potential of Web 2.0 applications.

Syndicating Learning: Web 2.0 Connecting the Learning Community—This page, created by Ray Schroeder (n.d.), includes links to various resources on the web related to "Web 2.0" in several categories:

- Definition of Web 2.0
- Web 2.0 in education
- Blogs
- Wikis
- Podcasting
- Additional Web 2.0 applications
- Views of the future

Read/Write Web—Founded and edited by Richard MacManus (2007), *Read/Write Web* (http://www.readwriteweb.com/) "is a popular weblog that provides Web Technology news, reviews and analysis." Contributors have recently written about Google's custom search engine, future web trends, micro-blogging tools, among many other topics.

Ning in Education—Created by Steve Hargadon (2007) using Ning's online social networking service, *Ning in Education* (http://education.ning.com/) is a "social network for those using the Ning social networking platform in education."

College 2.0—Created by Eduardo Peirano (2007) and also using Ning, *College 2.0* (http://college2.ning.com/) is a social network for educators interested in "Online Learning and Web 2.0 in Higher Education, social network with blogs, forums and RSS feeds."

"MySpace, Facebook and Other Social Networking Sites: Hot Today, Gone Tomorrow?"—This article (http://knowledge.wharton.upenn.edu/) talks about social networking in an environment compared to hanging out in a mall. Social networking sites are

powerful, but that power might be fleeting because users can easily switch from one popular site to another (Fader, 2006).

      "**Social Networking in Plain English"**—This video (http://www.commoncraft.com/video-social-networking) "is for people who wonder why social networking web sites are so popular" (Lefever, 2007).

      "**MoSoSo Experts Panel: MOKO, Twitter, JuiceCaster"**—This podcast (http://mobilemessaging2.com/2007/08/06/mososo-experts-panel-moko-twitter-juicecaster-podcast/) "features 3 MoSoSo experts who employ different mobile technologies including SMS, Java clients, WAP and even web assisted social networking to enable connections and sharing among mobile subscribers" (Jones, 2007).

Multi-User Virtual Environments

      Recently many educators have become interested in using MUVEs like Second Life, which "is a 3-D virtual world entirely built and owned by its Residents" (Linden Research, Inc., 2007c) for teaching, networking, and professional development.

      SL Educators—The SL Educators (SLED) e-mail list (https://lists.secondlife.com/cgi-bin/mailman/listinfo/educators) "is for educators interested in or currently using Second Life." The list provides an opportunity for [educators] to communicate with each other, to find new colleagues and to share . . . experiences using Second Life for education" (Linden Research, Inc., 2007a).

      Second Life Education Wiki—The *Second Life Education Wiki* (http://www.simteach.com/wiki/index.php?title=Second_Life_Education_Wiki) is "Linden Lab's official resource for educators in Second Life." This site includes information on programs for educators; institutions and organizations in Second Life; competitions; press, blogs, and presentations; mailing lists and forums; in-world groups; academic research; classroom management and lesson plans; teaching resources; and educational locations in Second Life (Linden Research, Inc., 2007b).

      MUVE Forward—Created and maintained by Chris Duke (2007), *MUVE Forward* (http://muveforward.blogspot.com/), is a blog about real life education in Second Life.

      Second Life in Education—Jo Kay and Sean FitzGerald's (2007) *Second Life in Education* wiki (http://sleducation.wikispaces.com/) provides "an overview of the educational

possibilities of virtual worlds, in particular Second Life." In the wiki, they "document a detailed list of Educational Uses of Second Life, provide a range of useful resources for educators, and link to a range of handy Second Life online resources."

CONCLUSION

The Horizon Report, prepared by The New Media Consortium (2007) and the EDUCAUSE Learning Initiative, "describes the continuing work of the NMC's Horizon Project, a research-oriented effort that seeks to identify and describe emerging technologies likely to have a large impact on teaching, learning, or creative expression within higher education." The Horizon Advisory Board identified, "through a careful analysis of interviews, articles, papers, and published research," six trends that are "most likely to have a significant impact in education in the next five years" and ranked them in order of priority:

1. "The environment of higher education is changing rapidly."
2. "Increasing globalization is changing the way we work, collaborate, and communicate."
3. "Information literacy increasingly should not be considered a given."
4. "Academic review and faculty rewards are increasingly out of sync with new forms of scholarship."
5. "The notions of collective intelligence and mass amateurization are pushing the boundaries of scholarship."
6. "Students' views of what is and what is not technology are increasingly different from those of faculty."

The report focuses on "six areas that will have significant impact on college and university campuses within the next five years" (pp. 3-4):

- User-created content, including blogs, photostreams, wikis, and machinima clips
- Social networking
- Mobile phones
- Virtual worlds (MUVEs)
- New scholarship and emerging forms of publication
- Massively multiplayer educational gaming (p. 6)

Given how fast new technology is developing and how strong its influence is likely to be in higher education, it is crucial that all educators at this level become more knowledgeable about IDT, its terminology, models, history, and resources.

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There are two views for the definition of technology. Traditionalists view it as the systematic application of science to practical problems. A more contemporary view is that technology is the application of knowledge so that it can be built from one generation to the next (Braudel in Seels & Richey, p. 7). The second view is not synonymous with integration, although it certainly does have implications for integration, but in a systematic way. As such, technology includes tools, processes Design: During the design phase, instructional designers take everything they learned during the analysis phase and start planning and structuring the content. This includes the project's learning activities, exercises, assessments, visual design, and interface design. The document produced during this phase of development detailing all these decisions is called a storyboard and serves as a blueprint for the course. Development: The development phase is where instructional designers take the storyboard they created in the design phase and actually create the activities, exercises, graphics, et The terms instructional design, instructional technology, learning experience (LX) design, curriculum design, and instructional systems design (ISD), are sometimes used interchangeably. Below are a few instructional design definitions from various sources: Instructional Design Definitions. "Instructional Design is the systematic development of instructional specifications using learning and instructional theory to ensure the quality of instruction. It is the entire process of analysis of learning needs and goals and the development of a delivery system to meet those needs. It includes development of instructional materials and activities; and tryout and evaluation of all instruction and learner activities." Source