EDITORS'INTRODUCTION TO CHAPTER 28

In this chapter, Jack Dempsey and Rick Van Eck contend that the explosive growth in distributed learning presents both a challenge and an opportunity for the field of instructional design. The ability of instructional designers to embrace this challenge and opportunity depends greatly on the comprehension of learning outcomes, interactions and interactivity, learning communities, and the constraints imposed by administrative restrictions or mandates in online learning. This chapter presents an overview of some of the most salient processes and issues in the development of distributed learning today.

KNOWLEDGE AND COMPREHENSION QUESTIONS

1. Distributed learning can take many forms, varying both by environment and level of implementation. Give a brief description of five different examples of distributed learning, varying your examples by environment and level of implementation.
2. Why do the authors say that instructional designers have a "window of opportunity" in distributed learning? What role does instructional design play in distributed learning? What risk do we run, as instructional designers, by not quickly embracing distributed learning? Are there any risks involved with taking a leading role in distributed learning design and development?
3. What kinds of learning outcomes may distributed learning be particularly suited to? Why? What kinds may not be well suited for distributed learning environments?
4. The authors contend that interactions are becoming more important. Answer the following questions about interactions and interactivity:
   - What is the difference between interactions and interactivity?
   - How will interactivity change with technological improvements?
   - What are the two typologies of interactions? Give an

example of each.

CHAPTER 28

DISTRIBUTED LEARNING AND THE FIELD OF INSTRUCTIONAL DESIGN

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OUR TOOLS SHAPE US

When we wrote our chapter for the first edition, we argued that instructional designers could play a critical role in guiding the development of quality online programs. Given the furious pace of innovation in all technology-driven enterprises, it is not surprising that much has changed since then. Our conception of online learning has expanded to address new technologies such as intelligent tutoring systems, learning object repositories, and virtual communities of practice. Once the exclusive purview of researchers in laboratory settings, many of these new technologies are now or will soon be mainstream. The Internet 2 initiative has become a 200 institution network with capabilities of 6.5 gigabits per second (GPS); bandwidth more than 10,000 times faster than typical broadband access (Interactions News Wire, 2004). The Next Generation Internet (NGI) initiative has completed testing and development of the next version of the Internet called the

National LambdaRail. Based on a giant ring of fiber optic cables comprised of 40 channels, each with a throughput of 10 Gigabits per second (Gbs), the combined potential of this is network for simultaneous transmission of data is 400 Gbs But this is only half the story. Internet 2 will be coupled with grid computing, which is a new protocol that allows us to distribute not just information, as the current internet does, but to distribute tasks, processes, and applications as well. This is the same concept that has allowed people to create supercomputers by hooking up multiple computers together to act as one, with processing power distributed among all the computers in the grid. The potential for collaboration over the internet will increase dramatically overnight with these applications. Moore's law (i.e., that computer processing power, or the number of transistors on a CPU, doubles every 18 months) is expected to hold true for the next few years, and network capacity has been double that rate for the last few years (Villazon, 2005). Concurrently, we can expect continual movement toward ubiquitous computing in which technology and access are everywhere, invisible, and taken for granted. The true promise of Internet 2 is that it will allow grid computing so processing tasks will be automatically distributed among available computers anywhere on the network, or grid (Villazon, 2005). We are looking at a world of information, power, and access that is highly accelerated and

exciting--a world where video conferencing will be supplemented by virtual reality and primitive forms of artificial intelligence. Although the Internet remains the prime mover, for this edition we have changed the title and, somewhat the focus, of this chapter from *online learning* to *distributed learning*, a less restrictive concept.

Have instructional designers managed to embrace the opportunities we've had, or are we falling behind? What changes will be required by these advances in technology and delivery? In this chapter, we'll address and update things that have changed, and attempt to outline some of the new challenges that exist. The essence of learning with instructional design has not changed. We use instructional design to create learning environments and products. The processes or *functional architectures*[1] involved in our work, however, are changing quickly. We will argue that it is necessary to understand and embrace changes in the functional architectures of instructional design to continue to play a meaningful role in the future of distributed learning.

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[1] By *functional architecture*, we mean the various functional entities and components involved in an instructional system and the collaborations and interactions among them. Many of these are most obviously influenced by new technologies, but changes in preferences toward social communications certainly affect the functional communications of instructional systems as frequently as, e.g., advances in cellular phone technologies.

Distributed learning requires a radical change in the professional practices of educators and trainers. Clearly, the prevalence of online learning and information access is growing exponentially (Nielson, 1999) in many areas of our society and to view it as a passing fashion is myopic. Sixty-seven percent of all adults in the U.S. have access to the Internet, with the largest increase from 2000 occurring in home internet access and use (Business Courier, 2003). And the future is clear; according to Susan Patrick, one of the authors of the National Education Technology Plan, 94% of all teens, 80% of all middle-school children, 76% of elementary students, and 50% of all pre-school children make daily use of the Internet, and children and young adults spend more time online now than they do watching television (Evaluation Institute Keynote, February, 2005).

As Marshall McLuhan (1989) pointed out, we shape our tools, but then our tools shape us. The nexus between computer-managed instruction, common since at least the 1960s with the PLATO system (Bitzer & Boudreaux, 1969), and the Internet, a practical tool since around 1993 with the Mosaic browser (Tauber & Kienan, 1995), fits well into the needs of those Rogers' would classify as early adopters of innovations (Jacobsen, 2000; Rogers, 1995). The capabilities we have gleaned as instructional designers from years of systematic approaches toward learning and from our early adoption of the computer as a delightful

learning tool is coming to fruition. Organizations that a couple of years ago had never contemplated instructional design are now anxious for trained designers to take a major role in renovating their instructional systems. Effective distributed learning thrives on the systematic organization of instructional materials and effective instructional strategies and technics[2]--two principle strengths of instructional design.

We have observed for some time now that in implementing distributed learning systems we have been experiencing the equivalent of the silent movie era of technological change. Just as sound was inevitable in motion pictures, richer media and more smoothly running delivery systems with few bandwidth limitations are becoming a staple of future online delivery systems. So, to continue with the metaphor, we may now be moving from silent movies to "talkies." The technology for video and audio conferencing has been used as a matter of course by early adopters and now innovators and opinion leaders. But like the corresponding move to audio from silent films, it is not yet ubiquitous or effective, particularly in higher education. Nonetheless, we will undoubtedly see highly increased use of video and audio in distributed learning in the next 3-5 years. The challenges that rural states face with rapid consolidation

[2] *Instructional technics* are activities or tactics that use technology designed or selected to reach learning outcomes. They are influenced or driven by Instructional Strategies.

of school districts and the *No Child Left Behind* teacher quality standards guarantee that such technologies will not just be limited to higher education and the corporate world, either. In terms of production, what we call distributed learning today will seem quite primitive in ten years. Likewise, instructional technology is in a nascent stage. Despite it's dramatic growth in the last 3 years, the majority of instructors, trainers, and designers have had little or no experience participating in online learning environments, much less developing learning activities for them. Although we may be comparatively impressed with the available technology, the available technology is rudimentary and underdeveloped. At this point in the development of distributed learning, instructional designers have enormous opportunities and often more responsibility than we bargained for.

WHAT IS DISTRIBUTED LEARNING?

Distributed learning is any educational or training experience that uses a variety of means, including technology, to enable learning. It can provide for intentional and incidental learning outcomes and may be separated by time, distance, or both. Distributed learning includes, but is not limited to, distance learning and online learning. Often, regardless of the location of the learning environment,

distributed learning eliminates time as a barrier to learning (Oblinger, Barone, & Hawkins, 2001). In *distance learning* the learner is typically separated in space and time with the instructor and peers. In *online learning* the learner is limited to Internet-based learning technologies. Another commonly mentioned subset of distributed learning is *eLearning*, which Clark and Mayer (2003) refer to as, "A combination of content and instructional methods delivered by media elements such as words and graphics on a computer..." (p. 311). With the changes in the internet and computing technology, the lines between these areas are rapidly becoming blurred, and may cease to exist at all in the near future.

Distributed learning may occur among people scattered across the globe or among co-workers at a single facility. What characterizes distributed learning is the use of a very flexible functional architecture that takes a variety of manifestations. *Manifestations* could include any combination of on-campus lectures, CBT training modules, online seminars, reference websites, books, DVDs, threaded discussions, videoconferences, weblogs, simulations, performance support systems, and numerous other elements by which learning is accomplished. Another attribute of distributed learning is that it may be *synchronous* (takes place "in real time"), *asynchronous*, (does not take place "in real time") or a mixture of both.

Distributed learning in academic and corporate settings

Distributed learning in academic environments include established brick and mortar institutions that have begun to branch out into online learning and virtual institutions that have never provided on-site classes. Universities now offering online learning opportunities range from those offering a few individual classes to those that have moved entire programs and degrees online. In the former case, some existing classes are often chosen and converted to an online format, often by professors who had formerly taught the class in a classroom. In the case of degree programs, universities may elect to begin by putting a few courses at a time online as described above, gradually building to a fully implemented online degree. This latter case requires a great deal more planning, organization, and resources than the former. Online degree programs usually require "virtual campuses" with a completely online registration system and a full complement of student support services such as library, bookstore, advising, and financial aid. In 2004, there were at least 263 accredited online graduate degrees in five disciplines available in the U.S. (usnews.com, 2004). Recently, there has been a marked increase in virtual universities without a traditional brick and mortar complement. Such institutions have a physical address but may have little more than that in terms of buildings, relying instead on online

resources. There are hybrids, of course, offering a limited menu of on-site courses as a supplement to their online presence. Although some academicians consider commercial virtual universities substandard, they are now gaining acceptance, with newer for-profit virtual universities getting accreditation as institutes of higher learning (e.g., Jones International University, accredited by NCATE; Walden University and Cappella University, accredited by Higher Learning Commission and North Central Association of College and Schools).

Corporate online learning environments often include an intranet (a network similar to the public internet but secure from outside access) for employees of a corporation. A great deal of training is taking place in corporate intranets. Corporate training budgets are investing billions of dollars in web-based training alone, and investments are expected to increase for the foreseeable future (Abernathy, 2001). The rationale is that it costs the company money not only to transport and house employees for out-of-town training but also to replace that employee during the training. Moreover, employees are able to get training when and where they need it instead of waiting for the next scheduled training session. Employees can log on to a company intranet and take the classes they need, when they need them. Such training is managed by Learning Management Systems (LMSs) which track who has taken

what course, at what time, and which individual objectives have or have not been met. LMSs thus allow institutions to track what their employees know or can do. This saves money and simplifies compliance issues.

Online classes may be developed in-house by corporate training departments or by outside providers who reduce course costs by leasing the same or slightly modified courses to a number of companies. From 1999 to 2003, companies who spent the most on training in general increased their budget for outside training services from 22 percent of expenditure in 2001 to 28 percent in 2002 (ASTD, 2003). This increased reliance on outside training products may partly account for the significant decrease in the number of instructional designers in these organizations, which fell from 52 in 2001 to 14 in 2002 (ASTD, 2003). At the same time, spending on distance learning technologies increased in these same organizations by 29%, indicating that more corporate training departments are looking for distance learning technologies and off-the-shelf learning (ASTD). Our opportunities as instructional designers for distance learning may lie in the development of instructional materials for distance learning vendors, rather than in the corporate market itself. Already in academia, textbook companies are beginning to market online learning development services, including hosting, development, and support. A number of

publishers offer development tools for creating websites to accompany textbooks, and offer online courses tied to existing textbooks. Many states are demanding electronic versions of textbooks themselves from the publishers, perhaps signaling a shift toward licensing rather than purchasing.

There are a host of online tools and resources that do not easily fall into the academic or corporate distributed learning categories but which nevertheless constitute distributed learning. Examples include personal websites with detailed information on different topics, research and reference tools, virtual reality sites with avatars and chat rooms where people interact in a cyber-social setting, and virtual communities of practice (VCOP). Examples of a variety of online environments are included in Table 1.

Table 28.1

Examples and Resources for Online Learning

Web-based (virtual) campuses	http://www.jonesinternational.edu/ http://www.open.ac.uk/
Learning Object Repositories	http://www.merlot.org

University Clearinghouses & Free Courses	http://www.gnacademy.org/ http://www.electroniccampus.org/ http://ocw.mit.edu/index.html
Web-enhanced campuses	http://usaonline.southalabama.edu http://sln.suny.edu/sln/public/cshome.nsf/docs/2
"Full-service" Web-based courses & Course Systems	http://www.lsal.cmu.edu/lsal/expertise/technologies/online/index.html http://cecal.humberc.on.ca/distance/index.html
Stand alone online activities	http://www.southalabama.edu/coe/idbook/ http://www.oar.noaa.gov/k12/
Course Tools and Services	www.ecollege.com www.webct.com
Electronic Books	http://www.gutenberg.org/ http://www.exemplary.net/omnimedia/bookstore.html
Reference Sources	http://www.eduref.org/ http://www.psycinfo.com
Smart tools	http://www.aproposinc.com http://www.schaudin.com
EPSSs or Wizards	http://www.epsscentral.info/

	http://openacademy.mindef.gov.sg/OpenAcademy/Learning%20Resources/EPSS/artonlin.htm
Corporate training sites	http://www.getsmartonline.com/ http://www.syberworks.com/
Intelligent Tutoring Systems	http://www.autotutor.org http://www.pitt.edu/~circle/Projects/Atlas.html
Repurposed instruction	http://builtinvacuum.com/installguides/supervalve/

THE ROLE OF INSTRUCTIONAL DESIGN IN ONLINE LEARNING DEVELOPMENT

One of the greatest challenges facing those charged with creating distributed learning is the tremendous pressure to generate that learning quickly. Given the increased expenditure on learning technologies in corporate training (ASTD, 2003), the exponential trend toward distributed learning, particularly online, in the corporate world seems to be continuing. Many in higher education are also feeling the pressure to produce better

and more distributed learning, sometimes in less time than might be allowed for a comparable traditional classroom course. More than one million students will enroll in virtual schools, and 90 percent of all four-year public schools offer online education, as do half their counterparts in private schools (Botelho, 2004). And with the $5.1 billion online learning industry growing at a 38% rate, this pressure is not likely to diminish anytime soon (Botelho, 2004). This pressure to produce distributed courseware quickly may lead some to think that there is simply no time for instructional design processes. Because there are so many people without instructional design training who are able to create stylish web sites in a relatively short period of time, some managers and administrators may come to expect the same with high-quality distributed learning materials and activities. In fact, many view the creation of online courses and web sites as the same activity! This represents both our greatest challenge and opportunity--to convey to others not only what it is that we do but why what we do is valuable. It is the nature of good design to produce effective products that do what they are intended to do. This is accomplished through a tremendous amount of up front work that is often invisible to outsiders except as extra development time. One can imagine an administrator looking at a finished product and saying “There’s nothing fancy about that site; my high-school kid could put that

together in half the time it took you." This is true, of course, but only if that kid knew exactly what to do from the beginning and had all the content outlined and organized for him or her.

The crafting of an instructional message that is customized to the environment, learners, domain, and mode requires the complex application of scientific and artistic principles. When we have done our job, the end result is a product that is effective and easy to use, but which consequently shows no outward sign of the effort that went into it. It is our responsibility to educate clients and school administrators about the value of good design. This may be difficult since the advantages (e.g., better student learning, accountability, or the reputation of the school or business) may be invisible in the short term. Nonetheless, if we do not embrace this challenge, we run the risk of abdicating the design of online learning to those who master the tools of creation and ignore the science of learning. It can be argued that artful instructional designs in online learning depend greatly on the designer's comprehension of learning outcomes, interactions and interactivity, learning communities, and constraints imposed by administrative restrictions or mandates. To varying degrees, being able to apply or evaluate "artistic" skills (e.g., graphic design principles) can be a critical part of the development process.

Given the established trend in corporate and educational venues of adopting outside training, and the increasing interest in customized learning and learning objects, one way we may be able to address the “need for speed” without sacrificing quality is through the development of learning objects and reusable content. Learning objects are individual components of learning material that can be aggregated or disaggregated to form instructional units of varying size. Objects in theory can be any size, but are most commonly at the objective, module, or unit levels, as the larger the object, the lest re-usable it is.

The impetus for learning objects arises from the recognition that instructional designers often duplicate each other’s work when developing new training. For example, training on soft skills like sales is done thousands of times a year in as many different environments. While philosophy and approach to these skills certainly varies with the organization, product, and time in which it is being developed, there are also a striking number of similarities in sales techniques overall. It would be great if we could re-use content we or others created earlier. The problem is that while some of the training could be repurposed, it is aggregated at the course unit, meaning that the prerequisite skills are enmeshed in the overall training unit, with no easy way to extract them for use elsewhere. Learning objects solve this problem by providing a means of not

only creating separate objects, but also of identifying what those objects are and how they relate to the content and larger domain. The means of creating this identification, or metadata, can theoretically take any form, and prior to 1999, organizations were developing their own ways of doing this. But in order to truly harness the power of learning objects, it quickly became clear that these competing models and standards would result in inter-organizational re-usability but no intra-organizations re-usability. In other words, what was developed in one organization could never be used elsewhere. The call went out for one model and set of standards that could be adopted by all.

The most widely known and accepted model for this process in distributed and computer-based learning is called the Shareable Content Object Reference Model, or SCORM (http://www.adlnet.org). SCORM is an emerging set of standards for creating and identifying learning objects for use in distributed and computer-based learning. SCORM arose from the Department of Defense's Advanced Distributed Learning (ADL) initiative. The DoD was charged with working with other federal agencies and the private sector to establish a set of standards. SCORM 1.0 was released in 2000, and SCORM 2004 was released in 2004 as the final working version of the standards and model. All government contractors who develop training must adhere to

this model, and most learning management systems implement it now. Understanding how to develop content to this standard thus is a necessity for doing business as well as a good way for instructional designers to shorten development time of new learning without sacrificing quality.

LEARNING OUTCOMES

Rich online environments require a wealth of interaction. Human interaction, skillfully designed into almost any learning environment, provides for the richest learning experiences--ones that go beyond simple acquisition of knowledge. As Merrill (1997) and others have suggested, information is not instruction. Two of the most useful conceptual frameworks in instructional design, the Nine Events of Instruction (Gagne, 1985) and the ARCS model (Keller, 1983) are as appropriate for online learning as they are for other media. The Nine Events of Instruction and the ARCS model focus on instructional strategies and motivational strategies respectively. In addition, Sweller's Cognitive Load Theory as it relates to the design of electronic learning systems is particularly useful for designing media-rich computer-mediated learning (Kalyuga, Chandler & Sweller, 1998; Sweller, 1988; Sweller, van Merrienboer & Paas, 1998).

Probably because of Gagne's neo-behaviorist approach to classifying learning outcomes, some educators (e.g., Gillespie, 1998) dismiss systematic design of instruction out of hand. In

our view, this may be due to a lack of understanding of the origins and possible uses of these models. Neither Gagne's Nine Events of Instruction nor Keller's ARCS model specifies the nature of the instructional strategies or how the theory used influences those strategies. Rather, these models provide a framework by which instructional designers can examine course topics in intentional learning environments. A book by Kruse and Keil (2000) provides a worthwhile discussion of this area and examples of the use of these instructional and motivational frameworks in online environments. More recently, a delightful book by Iverson (2005) gives a number of creative and practical examples of techniques which may be strategically grounded in Gagne's and Keller's frameworks.

The Internet and its environs are saturated with opportunities for incidental learning outcomes. More than any other medium, the Internet allows for serendipity in acquiring or expanding knowledge. This may be online learning's most powerful and unexplored feature. Without question, incidental learning on the Internet is a rich area for systematic exploration and research by university faculty, corporate R&D groups, and graduate students. What we learn parenthetically is often the spark that fires a burning interest in more sustained learning activities. Conceptual approaches such as constructivism and situated learning address incidental learning

more steadfastly than what some individuals refer to as "objectivist" learning approaches, such as the Dick and Carey model (1990).

Often, however, the instructional designer's job is to arrange for intentional learning outcomes. Basic instructional design skills expected in the marketplace are the ability to use taxonomies of learning outcomes such as Bloom's (1956) or Gagne's (1985) and to conduct an analysis to achieve intentional learning outcomes. The methodology required for classifying learning outcomes and conducting learning or instructional analysis is well established and taught in a number of the leading instructional design texts in our field as are other basic skills such as learner analysis, criterion-referenced assessment, and formative evaluation of instructional materials. In general, it should be noted that the Internet in its current incarnation is more useful for teaching cognitive outcomes. Given the existing technology, it is generally less useful for direct instruction of psychomotor skill development or attitudinal change (with the possible exception of the blogging phenomenon). Designers may expect these limitations to become less restrictive in the next decade as technology and bandwidth continue to evolve.

INTERACTIONS AND INTERACTIVITY

Interactions are often confused with interactivity on the Internet, but it is useful to consider them separately. According to Wagner (1994), interactions involve behaviors where individuals and groups directly influence each other. Conversely, interactivity tends to focus on the attributes of the technology system. For example, threaded discussion in an online course would mandate interactions among learners. Similarly, effective stand-alone computer-based training generally features a highly interactive learning environment. What interactions and interactivity have in common in a learning environment are that both contribute to active learning, both tend to be oriented toward expressed or implied goals, and neither was commonly used in the same instructional piece before the Internet.

As a result of our familiarity with computer-based training in its many guises (CAI, CAL, CMI, etc.) and our psychological foundations in programmed instruction (Kulhavy & Wager, 1993), instructional designers have been leading proponents of interactivity. For somewhat the same reasons, courseware developers in our field have been less concerned with interactions, particularly interactions among learners. As the Internet has emerged as the leading tool of distributed learning, this has changed. Some authors even contend that “focusing on real-time, technologically enabled interactivity as

a defining attribute of distance learning is an artifact of the past" (Wagner, 1997; p. 21). Although we do not agree with the absoluteness of this statement, interactions clearly have found a safe haven in online learning. Even so, the increasing availability of broadband access to the Internet--60% of all online users have it, (Villazon, 2005)--is allowing for interactivity to return as a practical option for online learning. As both interactivity and interaction can promote active learning processes, it seems foolish to dismiss the power of interactivity out of hand. Consider the current limitations in lab courses or ID courses that rely on CBT development tools like Authorware, Director, or Toolbook; with the advent of distributed computing and screen sharing collaboration software over IP, it will soon be possible to teach synchronous courses like this that require intensive one-to-one mentoring and support during application.

Nevertheless, as many creative instructional designs give emphasis to socially active learning, interactions will become an even more central force in courseware development. Because interactions are so central a part of many online learning environments, it is useful to understand typologies of interactions. Two functional typologies consist of interactions as agents or interactions as outcomes. Three types of interactions are suggested by Moore (1989). These are

interactions that occur (1) between the learner and the instructor, (2) among learners, or (3) between learners and the content they are trying to master. This schema does not consider the intended outcomes of these interaction categories and therefore provides only general information about the learning environment to an instructional designer. Wagner (1997) approaches interaction types in a more serviceable fashion by considering the outcomes of interactions. Wagner's interactions refer to outcomes that emphasize the communicability of educational experiences. These include interactions that increase participation and communication, refer to events of instruction (e.g., interactions to receive feedback or enhance retention and transfer), support metacognition, encourage team development, emphasize discovery and exploration, and provide for clarification and closure. Wagner's effort to emphasize outcomes that include, but are not limited to, specific learning outcomes, reflects the increasing importance of social interaction in instructional courseware development as it has been accelerated by the phenomenon of online learning.

THE ONLINE ENVIRONMENT AS A LEARNING COMMUNITY

Although often viewed as an isolating experience, the paradox in online learning is that learners sitting alone in front of a computer monitor may actually be satisfying their human need for community (DiPetta, 1997). In addition to the

expansion of technological capabilities, the phenomenal rise in virtual or online communities has been attributed to the disintegration of traditional communities around the world (Rheingold, 1993). Online or virtual communities may also be effective vehicles to improve learning overall. According to the American Society of Trainers and Developers (ASTD), 70% of what an employee needs to know to do their job is learned outside of formal training, and virtual communities of practice (VCOPs) are a good way to capture tacit knowledge (Kaplan, 2002). These VCOPs play a critical role in higher education as well as institutions move toward completely online degrees (Haythornthwaite, Kazmer, & Robins, 2000).

If constructivism has one true champion in circumstance, it is the shared construction of learning assignments--an inherently social activity. Many online course developers are coming to see the information they incorporate as less of a product (permanent in the sense of a textbook) and more of a process of a learning group in action among an increasing array of learning options and shared experiences. Research on the benefits of learners as designers, peer tutoring, and collaborative design indicates that this emphasis on process vs. product in online learning design may be one of the unanticipated strengths of developing online instruction and training (Dede, 1995). Participation and creativity not

available in conventional classes are becoming commonplace in well-designed online environments (Abrami & Bures, 1996). Properly structured group guidelines, such as those suggested by Palloff and Pratt (1999, p. 115), describe how teams are structured and led, what authority the team leader has, what responsibilities other members of the team assume, how team projects are graded, and the role of the instructor in arbitration. These are the rules of the social game. These make learning communities eminently viable.

THE INSTRUCTIONAL DESIGNER'S ROLE ON THE DEVELOPMENT TEAM

Although some distributed learning environments are designed and implemented by individuals (particularly at universities) most require teams of individuals to accomplish online learning development activities. In addition to an instructional designer, the cast of characters typically includes a project manager, subject-matter experts, editors, graphic designers, a system manager, legal counsel, programmers, instructors, technical writers, client representatives, evaluators, and marketing specialists. The roles and responsibilities of these team members are well detailed in a number of books and periodicals (Driscoll, 1998; Hall, 1997; Kruse & Keil, 2000; Thach & Murphy, 1995). An instructional designer has the primary responsibility of making sure the

online program accomplishes the learning goals--in essence, that it teaches what it's supposed to teach.

The production of distributed courseware is similar to other educational media efforts. In the best situations, needs assessment and task analysis establish the need for and the goals of the distributed courseware. Once the goals are established, the instructional designer addresses assessment issues and creates the overall design, which includes the processes of instructional, learner, and environmental analyses. Usually, a treatment (a detailed narrative description of the project to be used for planning, development, production, and evaluation) is developed and discussed with the client and production specialists. Along with other team members, the designer brainstorms and develops instructional and motivational strategies, contributes to the design of the graphical interface, and prepares a general lesson diagram. Often, the instructional designer will prepare a complete storyboard for the program. Thorough storyboards include sequencing, branching, and general flow of progress of the program. The storyboard also describes the types of media, specifies texts, and illustrates graphics and photos using rough drawings or screen shots, videos, narration, and other audio. From the point that the storyboard enters production, the instructional designer begins the process of quality control (review and revision) and may

pilot test the courseware on the target group (formative evaluation). In addition, instructional designers frequently work on the development of the online courseware in many of the other team roles, from project manager to programmer. For obvious reasons, instructional designers with collateral skills, such as graphic design or subject-matter expertise, are more valuable to the development group.

ADMINISTRATIVE ISSUES

When we talk about the learning environment, we tend to focus on the instructional environment alone, forgetting that the learning environment includes non-instructional elements as well. When learners are on-site, they not only have immediate access to the instructor and their peers for course-related questions, they also have access to other organizational resources. In the corporate setting, such resources might include supporting materials that cannot be supplied electronically and mentors and co-workers outside the class. Employees who do not have prerequisite information in an on-site course may easily get (or be provided) a book or manual for reference, or they may ask a co-worker they know outside of class to help explain a concept.

Those who participate in online (i.e., off-site) training may not have as easy access in some regards. So, it is worthwhile for any organization to ask what the primary cost-

benefit factors of online learning environments are. A study funded by the Canadian government's National Centre of Excellence in Telelearning in 1999 attempted to respond to this by focusing on six case studies of online courseware (Greengard, 1999). Using several kinds of cost data, these researchers identified three main areas of benefits. These were performance-driven benefits (learning outcomes, student satisfaction, instructor satisfaction, and return-on-investment), value-driven benefits (access, flexibility, and ease of use), and value-added benefits (reduced traffic and parking needs, spin-offs of new products and services, and increased revenue generation). Clearly, these benefits could be negatively as well as positively assessed (Bates, 2000, Bates & Bartolic, 1999).

Noninstructional concerns may be even more significant in an academic environment where online coursework aimed at a degree or advanced certification tends to occur for greater periods of time and with somewhat less structure. Online students do not have ready access to the entire host of student support services that students who attend classes on campus do. This is especially apparent when we consider that one of the main benefits of asynchronous learning is the ability to “attend” class at odd hours—hours that the school is not open. Services such as financial aid, registration, bursar's office, career counseling, academic advising, and others often cannot be

fully utilized by distance education students. For example, how do students clear a financial hold on their records on short notice, handle any paperwork that requires signatures, receive (non-electronic deposit) financial aid, peruse a thousand company profiles contained at career services, or receive in-depth career exploration and planning from 200 miles away? These are just a few of the issues in student services; dilemmas with student development (e.g., social interaction of living in a dormitory, stopping in to the counseling center, career exploration, etc.) present even more challenges for online learning. What is important is that organizational policies address these infrastructure issues in a systematic fashion and either construct a "grow-your-own" virtual campus or contract the construction of these services to one of the increasing number of companies who specialize in this area (e.g., eCollege™ and BlackBoard™). The two most critical components of the educational infrastructure are the merging of the virtual campus environment with existing systems and high-quality 24/7-student "help desk" availability. Because a myriad of add-on software products can be accessed within most online course tool environments, the quality of the educational infrastructure and help desk are more critical to the success of an online learning system than specific pedagogical features available within those systems. In other words, a robust virtual campus with a really

useful help desk is more critical to the long-term success of online components of distributed learning than the particulars of the course tools themselves.

OUR WINDOW OF OPPORTUNITY: THE EMERGING ROLE OF INSTRUCTIONAL DESIGNERS

As has been suggested by many authors for a number of years(e.g., Baldwin, 1998; Young, 1997), supplementing or replacing lectures with an online interactive learning experience requires more skill than most educators possess at present. A number of authors, including Turoff (1997), suggest that institutions should be accrediting educators as well as programs. His point is well taken. Candidly, veteran instructional developers working with competent subject-matter experts would likely develop a more effective distributed course than most university professors or experienced trainers. Professors and content-specialist trainers with little or no formal training in delivering instruction are especially mystified at the prospect of organizing an online course.

Of course, this returns us to the familiar question of how we can support the voracious demand for distributed learning without sacrificing quality (i.e., instructional design). We discussed how learning objects can help speed the development process, and how we have to educate others about the vital role that ID can play in quality distributed learning.

One solution may lie in the oft-overlooked field of human performance technology. As instructional designers, we recognize that not all problems we encounter will be solved by training or instruction. Among the tools at our disposal when training is not deemed necessary are Electronic Performance Support Systems (EPSS). This term was first coined by Gloria Gery (1991) in her book by the same name. She defined an EPSS as

“...an integrated electronic environment that is available to and easily accessible by each employee and is structured to provide immediate, individualized on-line access to the full range of information, software, guidance, advice and assistance, data, images, tools, and assessment and monitoring systems to permit job performance with minimal support and intervention by others."

EPSSs are usually knowledge management or decision making support systems, but their definition and purpose has grown over time. Bill Miller (1996) broadens their definition:

“An electronic performance support system is any computer software program or component that improves employee performance by either reducing the complexity or number of steps required to perform a task (process simplification), providing the performance information an employee needs to perform a task, or providing a decision support system that enables an employee to

identify the action that is appropriate for a particular set of conditions."

Electronic Performance Support Systems (EPSSs), specifically, one type of EPSS called an authoring tool, present one solution to this problem. Authoring tools help bridge the gap between experts and learning technology. Most coach a subject matter expert (SME) through question and answer process and translate his or her knowledge into a pedagogically effective form that the target learning technology can use.

Authoring tools for intelligent tutoring systems have been in existence for some time (e.g., Murray, 1998; Macias & Castells, 2001; Toole & Heift, 2002). These tools commonly take advantage of a fully developed expert module and provide maximum flexibility and choice for the script designer (Murray, 1999).

The key to these systems is the manner in which they support and encourage the development of content by SMEs according the needs of the tools and pedagogy. These tools use a series of questions and examples to help the learner map what they know as SMEs to what is needed by the technology or, in this case, the instructional designer. We can design authoring tools that help guide and coach the SME through the process of developing content for online learning environments. The tools itself becomes a manifestation of a design approach, with the pedagogy embedded in the tool and process. By asking a series of

questions about the content, the desired outcomes, and the strategies used in traditional instruction, we can help map what the SME has traditionally done onto the processes, procedures, and tools that can best support them in a distributed learning environment. We must first, of course, have an idea of what kinds of structures and pedagogy we can support in the given online environments, but by focusing our (IDers) attention on these issues rather than on the one-by-one design AND development of distributed learning, we are able to embed some of our expertise in tools that allow others to at least begin to develop online courses that will be effective. Authoring tools may not be able to entirely replace instructional designers, but they can begin to address the bottleneck of expertise we now face in developing distributed learning, and there is evidence that these tools not only reduce development time, but do so while ensuring a higher level of quality than would be possible if the SMEs were to develop on their own, as is often the case in distributed learning (e.g., Van Eck, Adcock, Sussarla, and the TRG, 2005).

Brick and mortar institutions such as universities and resident training centers, in particular, are feeling the heat. Universities, perhaps for the first time, are finding themselves vulnerable to direct competition from private industry. At the same time the demand and reward structures for instructional

designers are increasing. In the big picture, organizing information and procedures has become more associated with production and less with service. Thus, designers are seen as a more critical to the needs of organization than in earlier years.

What do we have to do to take advantage of our opportunities in distributed learning? First, we make sure that those whose job roles and responsibilities are identified as instructional designers are actually competent. Not all instructional designers need master's degrees to develop courseware or programs. After all, neither Steve Jobs nor Bill Gates needed an MBA to be successful corporate executives. Yet, just as many ill-prepared businesses fail through ignorance of effective business practices, many individuals without formal training in instructional design will fail through ignorance of effective instructional practices. University instructional design programs often do a creditable job preparing professional instructional designers. Even so, both new instructional design students and working professionals should demand that ID programs frequently update courses and content to reflect the changes in technology and instructional theory.

Secondly, we should certify instructional designers much as interior designers or architectural designers are certified. This is an idea that has been considered for some time (Bratton,

1991; Dempsey & Rasmussen, 1995). Certification in certain minimum instructional design skills would at least suggest that an individual instructional designer has a basic level of competence in the field. As certification requirements tend to drive professional schools, it would also assure that university programs do not neglect basic instructional design skills in the pursuit of the latest fashions in educational psychology. Although there is little widespread consensus in the field about standards for certification, there are proposed standards (e.g., the IBSTPI and the National Council for Accreditation of Teacher Education, or NCATE, and the Association for Educational Communications and Technology, or AECT standards) that could form the base for such certification efforts. Standards and certification are one of the hallmarks of a profession rather than a trade, and we should get serious about these discussions.

Just as it is important for instructional designers to receive a good basic education in the field, it is critical for them to continue that education. Those of us who have been in the field for some time realize the limitations of the education we received. Developments in technology are constantly upping the ante. How do we expect our skills to stay current without continuous retraining? University instructional design and continuing education programs should take on the task of preparing CEU programs for designers, just as they now do for

nurses, lawyers, classroom teachers, and other professionals. Ideally, a certification process and recognition of continuing education would be best, but if a certification movement fails to roll out (as is likely), a consortium of schools in the field or a national association could take on the task of requiring, or at least recognizing, continuing education coursework.

Lamentably, instructional designers have an identity crisis. For various reasons our graduate programs, which tend to teach similar content, are referred to by a myriad of names: instructional design and development, instructional systems, instructional technology, instructional psychology, educational technology, and so forth. It is no wonder that non-practitioners do not know what we do! A common terminology is instructional design technology (connoting both the system of knowledge and educational software/hardware of popular parlance). Outside of our immediate field, however, both industry and academia seem to have accepted the term "instructional designer" when referring to what most of us do on the job. Recognition is no small thing. On an acronymic level common to online learning organizations, IDers (instructional designers) are sufficiently different from ITers (information technologists) to avoid confusion. ITers (instructional technologists) are not.

Learning environments are more complex and more demanding of skilled individuals than ever before. Times are good in this

field because the field in which we labor is increasingly difficult to plow. More complex instructional technologies, such as direct instruction via the Internet, are relatively new and mystifying. The newness will pass, however. If instructional designers are not seen as highly useful to the course development process, we will see decreases in demand and remuneration just as sharp as the increases in the first few years of this decade.

What makes instructional designers more valuable than before? Like designers in other fields, our job is simply to create order in the environment in which we labor. Just as an architectural designer's job is to work with clients to create order out of disparate elements of a building, an instructional designer's job is to work with clients to create order in a learning environment. Metaphorically, at least, it's that simple. Pelton (1996) theorized that newer fields of study go through a ritualistic process whereby the new discipline is viewed with contempt, then skepticism, then grudging acceptance, and finally anointment. Partially as a result of online learning, instructional design is entering the grudging acceptance stage. Whether or not we reach the stage of anointment that fields such as computer science have attained depends not only on our ability to more firmly establish our

professional identity, competence, but also how we adapt to change.

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APPLICATION QUESTIONS

1. Given that distributed learning in an academic environment can range from distributed resources used to support a “face to face” class to a completely asynchronous distributed course taught in a virtual university, what do you think academic learning will look like 15 years from now? Will all learning be distributed learning? Why or why not?
2. Assume you have been hired as a consulting instructional designer to help an international corporation set up a virtual training network. Describe what steps you would take and what questions you would ask in evaluating the feasibility of this and in developing your proposed system.
3. Using the Internet, find 10 examples of distributed learning. Try to find examples of each of the following (one example may fit within several of the categories):
    - Corporate distributed learning
    - academic distributed learning
    - Distributed resource support
    - hybrid classes
    - virtual classes
    - distributed learning based at physical locations
    - distributed learning via virtual institutions
    - For profit distributed learning

- free distributed learning
- skills-based training (e.g., computer skills training)
- knowledge-based learning (e.g., WWII history, introduction to psychology, etc.)