CHAPTER 25
THE FUTURE OF INSTRUCTIONAL DESIGN

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Editors’ Introduction
In this chapter, Kent Gustafson describes some broad political, economic, social, and technological trends in the United States and internationally that are likely to affect (and in several cases have already begun to affect) the field of instructional design. The implications of these trends are then discussed.

The author suggests that as a result of these trends, those in the field of instructional design will need to focus more attention on a variety of activities. These activities include creating new instructional design tools, designing interactive learning environments, paying more attention to organizational change, engaging in policy analysis, recruiting a more diverse group of individuals into the profession, and changing how instructional designers are trained.

Application Questions

1. Using the example from the chapter as a model, write a new learning objective that would reflect the possible influence cognitive science research, such as brain mapping, might have on the instructional design process. Compare your response to others in your learning group.

2. Describe how nanotechnology could be used to improve a specific job or task with which you are familiar.

3. Working with a group, brainstorm ways in which education and training are likely to change in the next thirty years. List these changes. Next to each change, list the impact that the change could have on the processes of learning.


Knowledge and Comprehension Questions
1. According to the author, why is a PEST analysis useful in examining future directions in the field of instructional design?
2. Of the many political, economic, social, and technological trends identified in the first section of this chapter, identify the three that you think are likely to have the greatest impact on the field of instructional design. Explain why you feel this way.
3. Examine each of the categories of implications described by the author (e.g., performance improvement, ID tools). Identify the three implications that are most likely to have a major impact on your professional career. Explain why you feel this way.

New trends that are beginning to appear, and even some that are already well established, can be useful guides to predicting probable future directions in any field, instructional design (ID) being no exception. Expanding one’s analysis beyond specific issues of current concern to the field allows consideration of forces that are not typically discussed within the literature but that are often more influential in the long run. One way to look into the future is by doing a PEST (political, economic, social, and technological) analysis. PEST analysis is a form of systems analysis that provides a structure for examining elements from the larger system of which they are a part. In the present case, ID is a subsystem of a larger system that includes political, economic, social, and technological trends that will affect its future. This chapter begins with a section describing a number of important general and specific PEST trends, which is followed by a section discussing their implications for the future of ID.

By necessity, this analysis of PEST is limited to only a few trends that I believe will have a particularly significant impact on ID. You might find it informative to do a PEST analysis tailored to your own environment as a means for examining your own or your organization’s unique future.

Important PEST Trends

Political Trends
Among powerful political trends is increasing public demand for accountability of both educational and corporate organizations. This is both a national and an international trend that is increasingly demonstrated by new laws or regulations and backed by fines and lawsuits such as those of OSHA related to workplace safety. A second political trend is high-level international cooperation among countries as witnessed by the European Community, G-8, ISO 9000 standards, and joint actions against brutal and repressive governments. A third powerful trend is the worldwide move toward more democratic forms of government that will require more educated populations to be sustainable. Another trend of particular interest in the United States is the growing number of serious competitors to colleges and public schools in the form of corporate universities and proprietary K–12 schools that are making an appearance and beginning to gain clients and advocates.

Economic Trends
One of the most significant economic trends is the concentration of commercial activity into a small number of very large international corporations through mergers and acquisitions such as are occurring in the automobile, financial, and petroleum sectors. A notable parallel trend is the creation of a large number of new jobs by small start-up companies, especially in the high-tech arena. Of particular interest to instructional designers is that some of the more exciting start-ups now are in the training development sector. A third trend is the central role information technology is playing in increasing productivity. A fourth trend is workers becoming much more mobile, including routinely moving across international borders. Both mobile and long-term workers need to be more highly trained, adapt readily to changing conditions, and learn quickly without requiring long periods of training or retraining. Workers who do not have these skills will be trapped in low-wage jobs and be frequent victims of unemployment. Three additional economic trends are shorter product life cycles, increased niche marketing, and customized products and services. These will all require shorter design-to-production times and far better customer support for companies to be successful in the future.

Social Trends
In the United States in particular, but also in many other countries, society is rapidly becoming much more diverse. Diversity of ethnic origin is already well established, but lifestyles, family and social structures, and religious practices also are becoming more diverse. Balancing the power that diversity brings to a society against its potential to drive wedges between groups that see themselves as competing for resources, social acceptance, cultural recognition, and control over their destinies is an enormous social challenge. The ability to maintain and cherish the diverse cultures of the world, as we now are beginning to cherish our biodiversity, is another important item on the global social agenda. Failure to accommodate the growing diversity will result in widespread instability while also impoverishing the human condition.

Technological Trends
Technological trends are numerous, and some that I put in this category might surprise you. Doubling of computer power every eighteen months will continue as far into the future as it is reasonable to project. Thus in less than ten years, today’s most powerful desktop computers will be like the Apple IIe of the 1980s. The cost per unit of computer power and of digital storage will continue to plummet. We are rapidly moving to an all-digital world in which all important data will be stored, retrieved, manipulated, and distributed electronically. Digital technology capability already exceeds social and political ability to cope with it, and the gap will expand rapidly.
Digital technology is an excellent example of how PESTs do not stay confined neatly in the four categories. For example, the meaning of copyright and intellectual property rights, how to deal with violent and pathological content on the Internet, and what it means to be technologically literate are all "new" questions brought on by advances in digital technology. An increasing number of communications channels, the rapidly increasing bandwidth of those channels, and wireless technology for instant communication almost anywhere in the world are other examples of important technological trends. "Intelligent" software will become more common and will begin to deliver on some of the earlier exaggerated promises of artificial intelligence and expert systems researchers.

Other important technological developments are taking place in the biological and medical sciences. Computer chips based on living organisms, direct connection of technology with the human nervous system, and fundamental research on brain functioning, genetics, and chemical modification of behavior are all rather scary trends to think about, but they will have an impact on human learning and performance. And they are closer to implementation than most of us realize. The only question becomes "Who will guide and influence when and how they are used?"

Implications for Instructional Design

Performance Improvement

These trends have several important implications for ID. One general implication is that ID must continue to focus on improving human performance and move away from creating teaching and learning environments as the ultimate goal. Society wants human competence as measured by performance. Certainly, learning is an important milestone on the route, and teaching will continue to be part of the way to accomplish learning, but ultimately, it will be performance that counts. A related issue is finding ways to raise the performance of a much wider range of people than ever before. Historically, the benefits of ID have been directed at those who are already well educated and motivated to succeed. However, instructional designers can no longer limit themselves to the settings in which there has been the most success to date. If we are to contribute to preparing large numbers of people around the world for democracy and for maintaining a reasonable standard of living, our ID processes must become "better, faster, and cheaper."

ID Tools

One answer to "better, faster, cheaper" is to concentrate more efforts on tool building and less on tool using. The number of instructional designers is far too small to directly develop instruction for all those in need. To leverage their skills, instructional designers must create a wide array of analysis, design, development, evaluation, and management tools that others can use to help themselves. These tools should range from the simple to the complex, be usable by people with varying degrees of ID skill, and be applicable in many different settings. Tools are also needed to facilitate translation of existing instruction into different languages and for different cultures to avoid the negative affects on indigenous cultures by the global dominance of English. This is a very sizable challenge, but those of us in the English-speaking world should not, and cannot, assume that everyone else needs to learn our language and accept our culture to reap the benefits of ID.

Evaluation Methods

In this era of growing social and economic accountability, better measurement of performance and improved documentation of claims that ID can help people to acquire valued capabilities such as higher-order thinking skills, problem-solving skills, and team skills will be required. Greater attention to a variety of forms of evaluation will be essential. Embedded assessment, situational evaluation, more valid measurement of attitudes, on-the-job appraisal, return on investment, and value-added analysis are areas that will become more important and will require additional research, development, and application. Psychometricians who possess these skills will be in great demand, particularly for large-scale ID projects.

Anything, Anywhere, Anytime Instruction

Another general implication of several of the trends is that instructional designers must be able to deliver on the promise of "anything, anywhere, anytime" instruction. One way this will happen is through new forms of distance education that take full advantage of the multiple channels and wide bandwidth that are becoming available. Other than for social and recreational purposes, there will be little need to move people to the instruction as moving instruction to people becomes more common. Instructional design will be essential to the success of this distant, and often time-shifted, learning. However, schools and colleges will continue to exist for a variety of reasons and will likely make more use of instructional designers so as to make their courses more attractive to students who are becoming more demanding consumers.

Immersive, Interactive, Adaptive Learning Environments

Learning environments that are immersive, interactive, and adaptive to individual learners will become a reality in the next decade. Low-cost three-dimensional visualizations, walk-around virtual environments, and voice/touch interaction are but a few of the technologies that will revolutionize how people of all ages learn and work. This will further blur the distinction between learning and performance. We have just begun the journey into exploring these new forms of performance building, and much exciting research and development remain to be done.

Electronic Performance Support Systems

Electronic performance support systems (EPSS) are an emerging example of how learning and performance are being blended into a single environment. In the future, expert instructional designers will be expected to know how to build a wide variety of EPSS and in some
cases complement them with on-line or short formal learning experiences. Many challenging research and development opportunities exist to explore how knowledge of brain function, advances in hardware and software technology, knowledge management, and systems requirements for specific situations can be blended into EPSS that are invisible to the user. An excellent example of an EPSS that is largely invisible to the user is the tax preparation software now used by many to prepare their U.S. federal and state income tax returns. Most users don’t examine any of the underlying tax regulations guiding the decisions and calculations being made by the software and have no desire to become experts in preparing their returns. All they care about is getting the return done quickly and accurately.

**Alternative ID Processes**

Adaptations of the ID process and alternatives to it will become common in the future. This is not to suggest that classic ID will disappear. Quite the contrary is true. Classic ID does work and has a proven track record of accomplishments in selected settings (see Chapter 2, “What Is Instructional Design?”). However, like virtually all design processes, it is not appropriate or useful for all situations. As designers respond to an ever-widening array of needs and conditions, an expanded set of design and development processes will be required. Redesign of existing instruction also will become more common, since totally original design often is too expensive and takes too long, especially when the need is for revision of already effective instruction. Three alternative processes (rapid prototyping, concurrent engineering, and formative experiments) will become more widely used in the future. Additionally, we will come to value more highly the artistic and aesthetic input into design that draws not from science, but from the creative imagination of gifted artists.

Rapid prototyping is a widely accepted process for creating application programs in computer science (Connell & Shaffer, 1989). The term is usually used to signify either that a prototype is built very early in the project or that a prototype will be subject to a sequence of quick and iterative revision cycles, as in designing a user interface via interactive usability testing. Connell and Shaffer identify five forms of prototypes: throwaway, quick and dirty, detailed design, non-functional mock-ups, and evolutionary. Each is appropriate for different conditions that can range from brainstorming novel concepts to identifying needs, to comparing alternative design options, to building additional components of the final program as resources become available. Although rapid prototyping has proven to be an effective design process, it does carry several potential risks, increasing clients and developers not understanding the process, endless revisions, and complex project management requirements.

Concurrent engineering involves an interdisciplinary team in designing the new product or procedure along with any accompanying training in its operation, repair, or sale. For example, a financial institution that decides to design a new financial transaction procedure might organize a team of accountants, legal and tax experts, users of the procedure, managers of those users, customers, trainers, and instructional designers who would all be directly involved from the very beginning of the project. Each constituency would be treated as an equal partner in all aspects of design and implementation of the new process. Concurrent engineering thus helps to avoid the problems associated with “over-the-wall” design.

wherein accountants might design a system and pass it to legal experts, who make some changes, and send it back for review and resubmission to the legal group for another review. Eventually, it is passed to tax experts, who do the same, and so on, until the resulting process looks like the proverbial camel. After the procedure is “finalized” (but is still subject to additional last-minute changes during and after implementation), the instructional design and training groups must help users and others become competent and comfortable with its use.

Concurrent engineering helps to avoid the challenge of trying to design effective instruction, for what is inherently an ineffective and inefficient procedure in the first place. According to Hartley (1992), there are several pitfalls to using concurrent engineering, but the process has been demonstrated to increase usability and acceptance and reduce incompatibilities between training and the product or procedure.

Designing by means of Formative Experiments (Newman, 1990) or Developmental Research (van den Akker, 1999) is somewhat similar to prototyping except that the “prototype” is fully implemented in the actual setting, and the results are evaluated. Revisions are then made before the next implementation of the system. As a result of the implementation, new goals may also emerge that result not just in improving what exists, but perhaps also in making major additions (and/or deletions) to it. Formative experiments can be directed toward solving real problems or identifying new possibilities over time through systematic application of research methods coupled with planned manipulation of the learning environment. Newman describes how formative experiments were used to study and guide the coevolution of technology and the classroom environment in schools that were implementing desktop computers for student use. By studying both the intended and unplanned uses and outcomes from computer use, significant changes were made in the role computers played in the classroom and in the subject matter taught.

**Alternative Learning Theories**

Advances in learning theory also have implications for designing instruction. The early history of ID is grounded in behavioral and cognitive psychology, though never to the degree claimed by its critics. Social learning theory, cooperative learning theory, and many ideas that constructivists are now popularizing can be found in the work of earlier ID authors (e.g., Barlow, 1967). Nonetheless, important conceptual work is currently taking place that has implications for ID. Brent Wilson (1996), among others, has done a nice job of thinking about how constructivism can contribute to ID practice. Also, the interest in cognitive tools (Jonassen & Reeves 1996), particularly as related to new technology, opens additional possibilities for how to design exciting and engaging learning environments. Open-ended learning environments (Land & Hannafin, 1997) that permit learners more control over how and what they learn also deserve attention from instructional designers. Similarly, microworlds and other exploratory environments (Rieber, 1996) appear to have potential for facilitating acquisition of higher-order thinking and problem-solving skills, although more research and development are needed before their effective design can be predicted. Each of these areas has its zealots who make unrealistic and unsubstantiated claims for their benefits, but that is no reason to discount their value. It seems unrealistic to assume that anything as complex as human learning can be explained by any single theory.
Organizational and Individual Change/Diffusion and Adoption of Innovations

The areas of organizational and individual change and diffusion and adoption of innovations will become increasingly important to instructional designers as the number, size, and scope of development projects increase. Unfortunately, there are many examples of well-developed modules, courses, and products that were never implemented, were implemented in a manner that resulted in their “failure,” or were discontinued after limited use even if they were initially successful. Failure on the part of instructional designers to consider diffusion and adoption issues and lack of understanding of the dynamics of organizational and individual change are often the source of these results. Instructional designers must become more skilled both in designing instruction so as to facilitate its acceptance and adoption and in taking into account how the conduct of development efforts affects organizational and personal change. The growing body of literature on organizational development (Torr & Dealtry, 1998) and diffusion and adoption of innovations and change management (Rogers, 1995) should be required reading for all instructional designers.

Policy Analysis and Action Research

As was mentioned earlier in this chapter, ID is not having the major impact on many organizations for which it has the potential. Although some of this shortcoming is due to lack of attention to change processes and change management, a more profound reason is lack of attention to, and engagement in, policy analysis and action research of the types that could influence decision makers. For example, ID is having very limited influence on public schools. The rapid introduction of hardware technology into schools is not being accompanied by systematic planning for its use or evaluation. Politicians and school decision makers who are promoting computers and other technology are doing so without the benefit of thoughtful analysis of how such technology might best be used and for what purposes. Policy studies and action research (Stringer, 1996) that bring to bear the analysis, design, and evaluation tools and skills of ID could help to avoid many wasteful expenditures while providing the public, politicians, and educators with realistic expectations and guidance. The failure of instructional designers to become engaged with such efforts limits both their potential for major societal influence and their ability to obtain new resources. Future expansion of the ID field depends on some of its members engaging in policy analysis and action research while ensuring that the results of their work are widely disseminated.

Diversity

Another societal issue of concern is the relative lack of diversity of the membership in the ID profession. Although women have been successful in entering the field, ethnic minorities are seriously underrepresented. Ethical considerations alone make a sufficient case for why this condition needs to be changed, but there are practical considerations as well. When a large and growing segment of the population is not represented in any discipline, the ability of that discipline to influence politics and practice is similarly diminished. Those who have no stake in a process have no reasons to endorse and support it, whether they are legislators, corporate officers, school board members, teachers, or trainers. Unless ID practitioners reach out and actively recruit minorities, they will find less and less people willing to even listen to what they have to say.

Research in Brain Function, Genetics, and Chemistry

Although the implications for ID in particular (and for learning and performance in general) are unclear at the moment, developments in brain research, genetics, and chemistry need to be monitored. For example, with the new completed mapping of the entire human genetic code (see the Human Genome Project at http://www.orml.gov/TechResources/Human_Genome), experimentation will begin on how different combinations of genes affect intelligence, learning, and memory. Although it seems unlikely that genetic codes will completely explain these phenomena, there is every likelihood that major breakthroughs will occur and be followed by attempts to modify those codes, perhaps first in animals but inevitably later in humans. It is certainly in the interest of the ID field for some of its members to become actively engaged in projects with researchers in these fields so as to add insights to their research and to communicate the results to ID practitioners. For their part, ID practitioners are advised to listen to what is being said, whether they like it or not. Advances in science do not depend on one’s individual preferences.

Training of Instructional Designers

All of the implications described above share one common implication related to the initial preparation and continuing education of instructional designers. Traditionally, most designers receive their initial training in a formal preparation program, usually at the graduate level, at a college or university. Completion of the program often, but not always, involves a short internship in the “real world.” Continuing education thereafter usually consists of self-organized reading, conference attendance, and discussions with colleagues. Additionally, all designers are usually considered to be more or less equivalent, although some are clearly more skilled than others are, but no formal career ladder exists.

In the future, initial preparation, continuing education, and career opportunities are likely to be much different. First, initial ID preparation programs in colleges and universities will move to the undergraduate level, the graduate level being reserved for more advanced study. Fieldwork, internships, large course projects involving real development as part of a team, and increased emphasis on enhancing performance, not just learning, will become the norm. Employers will have increased involvement with, and influence on, these programs. To meet their need for ID expertise, some employers may establish their own preparation programs for post-baccalaureate employees. Career tracks requiring different levels of skill and experience such as those that are beginning to appear in some large companies will become common. Therefore entry-level designers will need to continue to learn new skills if they desire to move up the career ladder. The demand for distance learning opportunities, EPSIL tools to assist instructional designers to increase their skill, and formal and informal courses, workshops, and other venues also will expand.
Conclusion

In conclusion, the field of ID will look very different in the future than it does today. Over the last three decades, there have been many incremental changes in theory and practice. Rather, exciting new opportunities are arising that will remake the field and draw many more people into the profession. The potential for national and international influence on all segments of society has never been greater. The only question is whether those who are currently in the field can adapt quickly enough or will lose these opportunities to others. The window is there. Will it be used simply to look out on a changing world, or will we leap out, with all the attendant risks, and join in the action?

References


