

## **Overview Of The Future Of Instructional Delivery Systems**

SUBJECT: Assignment #1: Overview of the Future of  
Instructional Delivery Systems

COURSE: MCTE 661 - Advanced Instructional Delivery Systems

Professor: Dr. Ronald D. McFarland, Ph.D.

Textbooks: • Beyond Calculation: The Next Fifty Years of Computing  
Denning & Metcalfe (1997)  
• Learning Networks: A Field Guide to  
Teaching and Learning Online  
Harisim, Hiltz, Teles & Turoff (HHiTT) (1995)

Student: Leanne C. Boyd

Usercode: boydl

Due date: February 5, 1998

**Actual submission date: January 27, 1998**

### **Abstract**

This paper addresses the future of instructional delivery systems, the technologies that drive these systems, and various ways that instructional systems are either evolving or crumbling in the highly competitive nature of the information structures of the new Learning Age.

Historical evidence of delivery systems is explored, with a closer look at serendipity and the part it has played in the course of events. The topic of innovation in the computing world is also highlighted. In collaborative learning environments, the active participation of learners is paramount. Team collaboration is explained with all of the ramifications of, and benefits for, learning. The role of the educator is compared in its new role as resource and group moderator, as opposed to traditional settings of authority. A final scenario explores the possible demise or reduction of traditional classroom and/or university settings, with a comparison to the benefits of the worldwide research and archival benefits of online/Internet learning.

## Overview Of The Future Of Instructional Delivery Systems

### Serendipity And The Future Of Learning

Most will confess to a deep desire to affect the future of our children in a beneficial way, with hope that our attempts will provide security, a better way of life, and even a modicum of joy or happiness — things we feel have eluded us. One of these desires is often to give them a legacy of greater knowledge or better education. The ending of the twentieth century, however, has added a new twist to this common vein of thought. In the fast-paced world of new media, new technologies, and the new Information Age, one of our most basic struggles is to somehow, ourselves, ascend an impossible learning curve in order to assimilate an overwhelming amount of information. We are pressured to achieve a slam-dunk, quick-fix, instant techno-degree — in addition to all that is already required of us — in order to HAVE a legacy to leave. We must learn anew, almost from the beginning, in order to pass it on.

In the view of this writer, we probably are the first generation to be caught in almost a "room with no exits." Our entrance came by incident of birth in a particular era of time. For most of us, the doors to achieve present professional levels opened with ease, or at least with preparation. The authors of [Learning Networks: A Field Guide to Teaching and Learning Online](#) wisely boiled down both the problem and the solution, in this apt statement: "No one can see into the future, at least not very far into the future. However, anyone can help to shape the future." (Harisim et al., 241). Each of us takes part in shaping the future. Our goal should be to see that this is done in a positive manner.

Step by step, our world is seeing a merging of all pertinent aspects of daily human life. Information begins to overlap as old knowledge is enhanced or replaced by the new, "learning" is quickly overriding meanings of "education." In fact, both of the words, "information" and

"learning," are taking on overtones of the word, "economy." We are all learning at a rapid rate that the legacy we will leave is dependent on how well we succeed in keeping pace with all of the new opportunities. It must be suggested that the new media will touch each of our lives on an increasing basis. It certainly is up to the individual whether he or she sees that as a blessing or a curse. In this sense, the aspects of our new era are little different than the blessings and curses of prior ages. Not everyone whole-heartedly embraced the printing press, lengthy trans-oceanic trips by wooden ship, the uncertain and dangerous move West in covered wagons, the advent of the steam engine, or high-powered rockets. Some even insisted that the moon walk was contrived by Hollywood theatrics and special effects. The acceptance by the majority of these "leaps for mankind," however, has been a mighty propellant for furthering education and knowledge for the youth of each era.

What, then, is behind this face — so often encountered — of what appears to be *fear* of the new technologies? The overwhelming amount of knowledge, delivered in manners that are increasingly more intrusive, has created a syndrome that could be called "information overload." The fear doesn't lie as much in the technical or scientific aspects of the news, but in the simple fact that there is too much to digest in any given day! Another factor is pointed out in Beyond Calculation: The Next Fifty Years of Computing: "The serendipitous nature of the . . . process that follows innovation and discovery triggers a domino effect of unexpected changes that ripple through society, reshaping it in subtle ways often not observed at the time because most of what is changed tends to be local detail." (Denning & Metcalfe, *Foreword, vix*). The key issue here is that, in prior times, the slowness of communication efforts kept local happenings from being broadcast on a widespread, or at least timely, basis. It took a long time for the grapevine or the historian to spread the information. This was "word of mouth" history in the making. Over the course of these short, twentieth-century years, communication modes that require formulas, equipment and logistics not understood by the common human, have crept up and taken over that more human (and humane?) method of storytelling.

Perhaps a good portion of the fear has to do with losing a part of our *humanness*. In Beyond Calculation, the authors point out a goal, at least for some: "We believe that our quest is to get all knowledge and information into cyberspace, indeed, to build the ultimate computer that complements 'man.'" (Denning & Metcalfe, 7). For many human beings, a goal such as this might very well not provide a legacy for our children — in learning and education — but an avenue for the total dehumanization of most aspects of life. For many, fear of technology is colored by the products of the "media generation," with cybernetics having given many people nothing more than a "Hal" for their 2001 adventure. If it can be assumed that future advancements will follow suit with the rapid rate of technological events over the past 50 years, then the "serendipitous advances in materials and microelectromechanical systems" (Denning & Metcalfe, 7) will continue. Just the terminology will give some people *fear!*

It is important to consider how *serendipity* has affected our current trends in technology and education. The book, Perspectives on Learning, touches on the works of many known and also less familiar figures. In introducing Pavlov and his dogs and the act of conditioning animals (or humans!) to behave in certain ways, the reader learns that Pavlov, as well as many scientific theorists, experienced findings that were results of serendipity, or *chance discovery*. (Phillips & Soltis, 9). The importance of this element cannot be discounted in any overview of human history or knowledge, as many of the tremendous discoveries made over the centuries have been indirect, and by chance. The solutions that have affected and will continue to affect our economy, our information, our education — our *learning* — will be "as much by discovery as by design. And we need to realize that it has always been so." (Denning & Metcalfe, 57).

One inescapable aspect of learning that we must adopt in order to give it to our youth, is that the new learning modes and methods demand resiliency and flexibility. The future of successfully embracing new methods of education, then, probably lies in the ability to change our mind-set, our attitude, when approaching the problem. For those immersed in current computing technology, a common theme is that "change and surprise are the normal state. To

expect one design to continue to work is naïve and dangerous. . .In fact, we should *expect* that our understanding is incomplete and wrong so that we can adapt to surprises." (Denning & Metcalfe, 55). The purpose of this writing is to show that this same attitude must be taken in accepting "program" advancements, overall — whether this means a computer program, or a program for future education. The newest learning quest is to be receptive to surprises!

### **Innovation and Need: A Mother For Invention!**

This bit of information may come as a surprise: "Millions of academics, students, scientists, researchers, professionals, and educators participate twenty-four hours a day, seven days a week, exchanging tens of millions of messages across the globe daily on the Internet." (Harisim et al., 10-11). These are CURRENT statistics! This astounding number of daily communications represents a powerful forum of unconstrained learning and an information exchange. It is a knowledge network. It is based on self-guided learning and growth and a quest for knowledge, skills, and information.

If we look into the reasons for the massive exchange of this type of communication, we realize that hundreds of individuals have quietly set aside any fear of the new technologies and have taken up new skills. This remarkable happening has taken place in a most unremarkable way, because all situations have centered in the local regions of individual lives. The very fact that a huge surge in communication capabilities, MUCH of which has been in educational circles, has gone largely unnoticed until recent months, gives impetus to its evidence as a tremendous learning tool. It has often been said that necessity is the mother of invention! The urgency that has appeared in education and business has created the tremendous need for fast, reliable information exchange. This step toward adding technology to the daily routine of higher learning and global economics brings us to another startling realization — that the users of the medium of email (or spreadsheets, or word processors) have been turned into programmers, just as people who learned to dial telephones (also users?) were metamorphosed into phone

operators. People began to program without their being cognizant that *that* is what they were actually doing. (Denning & Metcalfe, 48). Following this line of reasoning, we must then ask *why* so many have resisted for so long, fearful for the unknown changes that might take place, yet so receptive when the function was finally available and easy to use?

Even in the cases of electronic mail between educator and student, spreadsheets in business or university, or complicated coding that runs a city — we are not just "writing programs but adding intelligence to everything around us." (Denning & Metcalfe, 44). There is a fundamental change going on in the personality of computing. The very role of the computer is changing, in the world. A global communications medium has been created. It is the mainstay of digital "connectedness" among computing agents all over the world. "We are also deploying bits of intelligence throughout the infrastructure." (Denning & Metcalfe, 51). Bit by bit, or byte by byte, computers "train" themselves in small ways. . . "[t]he computers themselves are direct agents in the process of innovation." (Denning & Metcalfe, 46).

Are there any limits to this inconceivable growth, this *hypergrowth*? Beyond Calculation puts forth the concept that the pace of change is limited only by our ability to innovate. Over and over in the course of history, it is found that the marketplace often fosters the innovation needed, usually to supply a solution to a necessity. (Denning & Metcalfe, 44, 46). This is highly true in times of war or other chaotic human situations. It is also especially true when it comes to providing a convenience in society. Recent times have shown that a desire for convenience is a potent driving force in consumer electronics. The advent of equipment such as VCRs, CD-ROM players, and wall-sized television is nothing less than miraculous, yet it is so commonplace that modern children see these instruments as just another part of the furniture. The Internet is multiplying drastically and offers data rates that have never been imagined. It seems logical to guess that in the future, conventional communications media such as television, radio, and print will merge in a mighty mixture of integrated "news-casting." Add to this the two greatest networks of our twentieth century — the telephone network and the Internet — and the twenty-

first century citizen will be able to utilize the most astounding electronic distribution system of all time. (Denning & Metcalfe, 40-42).

### **The Homely Computer: Hot Item For Tomorrow's Learning**

In a recent interview with *BusinessWeek*, Bill Gates, *Mr. Microsoft*, himself, said "I'm a big believer that this is the Information Age and that the PC as it evolves is the tool of the Information Age. The word 'PC' will be under some stress because there will be all these new [devices]." (Hamm, 1998). As is true for the previously mentioned electronic devices, the future won't hold major, "face-lift" transformations for the computer we know today. All of these devices, and probably most particularly the computer, will continue on *evolutionary* pathways. The computer will continue to be measured by the number of operations that can be executed per each instruction. The "homely computer" was built as a simple processor-memory structure and it will change as innovation dictates. One major natural adaptation will be "the multitude of nearly zero-cost, MicroSystem (system-on-a-chip) computers customized to particular applications." (Denning & Metcalfe, 11). The online environment is already mirroring this as true, with articles abounding on the status and future of chips in the marketplace. These zero-cost MicroSystems will lead, 50 years from now, to computers having at least one hundred thousand times more power than those of today. The cost, however, of computers similar to those commonly in use today, will be one-tenth of their present prices in only *ten years*. (Denning & Metcalfe, 6, 12).

What has caused this flourishing of technical urgency? According to Bill Gates, anyone involved in the new technologies is projecting out five to ten years from now, prophesying what they can begin to create *now* that will become more valuable as *the Internet becomes more mainstream*. He claims that no one would be doing any of this if it didn't appear that the Internet would get a lot more embedded in society than it is even today. (Hamm, 1998).

This has tremendous meaning for those involved in education. The recent advent of online courses, schools, training, and universities is only the tip of the iceberg. The enhancement of computers and other electronics could bring such an integrated interface that comparison with today's models (miraculous in their own right) isn't even possible. An interface such as this would provide comprehensive communication capabilities via a computer; but, much more than that, it could provide the means and metaphor to enable humans to communicate with one another as individuals and as groups. It would also provide a line of communication with any other computer resource — worldwide. The preceding explanations concerning history and possible futures for computing in general, thus leads us here: a primary goal in the new media and the new arena for learning **MUST** be "an interface as a virtual and comprehensive front door to all educational resources, human and archival." (Harisim et al., 248-249). Without this as a goal, none of the chaos involved makes much sense.

Unless the goal, the gift to the end user, is as dynamic as the medium, we would be left with what it has been accused of being: an expensive, time-consuming toy. In the future, what will the medium consist of? Beyond Calculation states that "[t]he speed of light will become the dominant factor in the design of new protocols." (Denning & Metcalfe, 39). As consumers, as users of future learning environments, we should expect nothing less dramatic! But, "[t]his dynamic timing and sequencing is almost impossible to explain in a comprehensible manner by using plain linear text." (Harisim et al., 250).

In other words, *how can this be put into words?* This example is offered:

"Xerox, showing a brave commitment to the next generation, invests a lot in its Palo Alto Research Center, which is famous for consistently churning out big, futuristic thoughts. One PARC researcher, Ralph Merkle, has figured out that current chip-etching technologies are soon to be exhausted and nanotechnology will be needed to fill the gap. 'You're going to have to start to build them an atom at a time,' Xerox spokesman Jeff Simek says. 'Theoretically, it's probably not going to be required until 2015, so [Merkle] has a few years to work on that.'" (Kretkowski,

1998). This — an offering to the next generation — seems to be a "cure-that-is-worse-than-the-symptoms" solution! Seeing the sequential order of this thinking, any of us will next ask, "What is smaller than an atom?" We can only hope that the next generation of learners will provide the innovation when the necessity becomes "un-ignorable!"

### **The Lowly Student: Not Lowly Or A Novice Anymore!**

Once a person begins to understand the terminology, platforms and protocols of today and perhaps tomorrow, the implications for education begin to surface. Already, early online learners are finding that "the freedom to work virtually independent of location [is] exhilarating." (Denning & Metcalfe, 37). Network learning *is* education without borders! Network learners will be active participants in the learning process. Together with experts and peers, "geography" will never again be an issue. The online learner will never again be a passive recipient, and the concept of who is a teacher and who is a learner will become more fluid. Curriculum will become more interdisciplinary and integrated, with bonds between practice and theory becoming more common. (Harisim et al., 273).

This new arena of learning has nothing to do with classic approaches of traditional Computer Aided Instruction (CAI). These new learning systems are not intended for a limited number of experts to provide training material for huge masses of unknown students. There is a great need for systems that will allow individual teachers to hand-craft their learning material, molded to a distinct course, one designed for a very individualized type of student. Finally, this environment will allow the student to take on the role of instructor or mentor, for the enrichment of the total course. The perfection of such an interface will allow for a resulting ease of use of the tools, creating *independence* for the users. These conditions are *primary* concerns for future learning environments. (Harisim et al., 250-251).

As Harvard's Business School revamped their information technology infrastructure, recently, promoting the independence of users was a primary goal. The Information Technology

(IT) staff designed the new campus intranet for ease of use so that they could turn over management to the users and *actually reduce IT staff*. (Horgan, 1998). It would appear that active participation not only strengthens learning (Harisim et al., 29), but it also is very cost-effective! The student placed in such an environment will never again be taken as a novice. He or she will no longer be just viewers or simple Email communicators. Instead of just consuming intellectual property, they will be able to *create* and *manage* it, as well. (Denning & Metcalfe, 10).

There are many excellent examples that have already been initiated, which show the trends of future learning environments. The Computer Supported Intentional Learning Environment (CSILE), of Ontario, Canada, is one. Notes entered by learners into the communal database are contributions to a collective knowledge-building effort. The notes are not addressed to the teacher, as in conventional class discussion. Instead, students are urged to address issues, problems, and arguments. The center of attention in CSILE's communal database *is* the collective knowledge. Evaluations of the program indicate that "students greatly surpass students in ordinary classrooms on measures of depth of learning and reflection, awareness of what they have learned or need to learn, and in understanding of learning itself." (Harisim et al., 49-50).

As we ponder the excellence of such a program, we can evaluate future trends. The online environment is unique in many ways. Learning curves are exceeded daily, for instance, in arenas of simulation modes of training. And, it certainly cannot be ignored that children learn much from electronic games. In a survey, similar results were shown for online graduate students, who helped in identifying benefits in learning provided by the computer platform.

One student expressed it this way: "Yet, I'm still here. Know why this is better than TV — the anticipation of a good show, great cast of character, fast-moving plot, thought-provoking and, like a serial, the end is not in view." (Harisim et al., 28). Some reviewers have likened this to an actual addiction. This writer admits to having a clear response to electronic information. It is difficult to shut down the computer when a small voice prods you into believing that the next page will hold such meaningful information! And, the next page, and the next . . .

### **Reluctant Academics: Tradition Is Alive And Well**

One observation often made is that the world of academics is often the most reluctant to accept the new technologies. Since the most significant technological goal for the success of learning networks is the development of integrated interfaces and a complete collection of tools for instructor and students, this reluctance is very difficult to understand. Many of these changes in learning modes are revolutionary in their delivery, they are firmly rooted in distributed learning communities and multiple cross-references — and these are the traditional and powerful principles of scholarship! In our modern setting, these principles are being expressed in new and powerful ways through hypermedia and the development of global networks. It is the *technology* that is revolutionary, and not that the principles of scholarship found in our culture have changed or been abandoned. (Harisim et al., 248-249).

As universities feel the pressure to control costs, improve quality, focus more directly on customer needs, and respond to competitive pressures, those in education **MUST** come to realize that information technology has the potential to solve many of these problems. It can change the roles of students and faculty, facilitate more learner-centered, personalized education, save money through improved business processes and distance education, and expand the scope and content of curriculums. (Horgan, 1998). In an ironic twist, many of these details are also cited by those opposed to integration of IT in academia.

"We are skeptical of the growth of distance learning as a catch-all," said Mark F. Smith, assistant director of government relations for the American Association of University Professors. He indicated that professors are concerned that distance learning could erode the traditional campus undergraduate learning experience, which is, in his opinion, based on live interaction between students and professors. He sees the online environment as only a "useful tool to improve access and delivery of course material to non-traditional students." According to Smith, the crux for assessing distance learning projects would be, among other things, to preserve the faculty's traditional role in curriculum development and assure that academic freedom remains

intact even in the electronic classroom. Finally, he cited such issues as the extra workload for professors in working long-distance has yet to be examined closely. (Mendels, 1998). This, perhaps, of all the research for this writing, embodies the sheer essence of a non-fact-based assessment and response to such critical issues. Those who understand the complexities of new technologies also appear to have a more realistic, or less biased, understanding of the traditional course environment, where there is usually a clear division of work and authority between the "student" and the "teacher." *Learning*, as opposed from the passive act of being a student, is usually a solitary activity (one initiated and carried out only by the student).

Collaborative learning, the watermark of the online environment, changes the entire nature of the teaching/learning pathway and the relationship between teacher and student. Each member of this collaborative team will be required to put extra effort into a superior environment and its superior result. . .an examination of current trends and increasingly large resource sites should indicate that the workload has increased for *both* student and teacher. This is not a question that needs to be examined deeply in order to understand the reasons why extra effort is necessary. The increased speed and economic demands have increased, therefore, for learners and workers to compete in this "new set of global rules," it should be expected that all levels of life will experience the same incremental increase in demands on their abilities.

It must be noted that the above-mentioned element of *fear* has again presented its face. If, in the collaborative atmosphere of online learning, the educator becomes "less of an authority figure and more a resource and facilitator for the learning activities of the group" (Harasim, et al., 30-31), then it is logical to assume that, for some, the loss of "control" or authority over the student is something to be feared. The educator in the future online classroom setting will be called upon to present far more self-organization than is needed in traditional settings, for this huge system to function. (Denning & Metcalfe, 37). It will require the same levels of self-organizing activities for the online learner. This factor alone will require much more work from teacher and student, alike.

In the marketplace of the future, we will see an increasing demand for the experience, knowledge and teachings of "experts." The issue of tenure versus credentials has been a long-standing subject for debate within educational circles. This writer sees that the changed learning environment, from the very delivery systems to the software and the educators, will be in a constant state of being upgraded. A long-term consequence that is anticipated will be a greater freedom of entry to "educators" who will come from the areas of expertise that are needed in any given situation. Because of the level of competition within industry and education, the persons chosen to deliver instructional material in any particular topic, will be chosen more for their abilities and performance, than for their credentials. (Harisim et al., 247). This is a drastic change from traditional academia, and one that certainly might make today's educators nervous. This manner of choosing instructors, however, can only prove to be beneficial for the learner who anticipates learning state-of-the-art material, delivered directly from professionals in the field.

### **The Information Society: Tradition Will Kill You**

Bill Gates recently stated that "This is the world's most competitive business. The products we have today will be worthless four or five years from now. We've always been in a very competitive [environment] but it's clearer today than ever." (Hamm, 1998). The computer world traditionally has been one of the most competitive fields, with trademark and patent held tightly secure. The issues have been debated, the products and ideas bartered and sold and stolen. The interesting side issues of the global network have created new security topics that also are being bartered and sold and stolen. Today's learner is launched into the many benefits of such a quick-moving scenario, but with the expectations that they, too, soon will enter the battlefield. The interesting thing about Internet and new technology topics is that the environment that supports the archived material for learning also supports the material for problem-solving, as well as discussion and forum avenues for the learner to explore and ferret out his or her own answers. This, in the writer's opinion, is an invaluable asset to the learning of applicable skills

and also the execution of these skills in a worldwide market. In this manner, it is a unique aspect, never found before in the world of education. It immediately places the learner in a "real-life" situation, even while he or she is still simply studying in any given area. The impact of this form of instant access is being recognized by many educational institutions.

For instance, Governor Pete Wilson of California has had a proposal before the State Legislature, for \$12 million over the next three years, to boost the "California Virtual University" project. This is one of a number of new projects around the country that are beginning to use the Internet and other current technologies to deliver post-high school coursework to college-age and older students. (Mendels, 1998). Similar projects have also begun in high schools and even at elementary school levels.

Information technology remains in a unique propinquity, however. Recent studies suggest that traditional budgeting cycles and financial planning just doesn't work for information technology. The *key challenge* still remains financial planning, but it has undergone many changes as people and institutions have worked with actual programs. There are descriptive factors to IT that are not experienced by other aspects of business or educational life, propelled by the sheer numbers of students, themselves. Even schools that are amply funded and able to buy the best equipment and software find that they are overpowered by the short life span of technology, with needs for constant upgrades and maintenance. The demand for state-of-the-art methods and means by students, as they are increasingly well-informed, has accelerated. Some of these much-needed resources include actual network infrastructure such as servers, wiring, and devices; computing devices such as laptop computers, multimedia workstations, software that is often discipline-specific, Web development tools; electronic classrooms and labs; platforms for electronic mail; and an astounding array of media equipment for conferencing, calendaring; videoconferencing, and groupware products. (Horgan, 1998). The costs, the volumes, are enormous. It seems obvious that institutions, as individual entities seeking modern solutions, have little hope of carrying such heavy financial burdens, alone.

In a recent *Forbes* article, Peter Drucker, renowned management consultant and writer, prophesied the end of the university as we know it: "Universities won't survive. . . Such uncontrollable expenditures, without any visible improvement in either the content or quality of education, means that the system is rapidly becoming untenable. . . Already we are beginning to deliver more lectures and classes off campus via satellite or two-way video at a fraction of the cost." (Horgan, 1998). Many sources, including some from within the cloistered walls, are beginning to echo these sentiments.

In Learning Networks, there is a disturbing scenario painted concerning the issue of the death of the university system. Chapter 11, titled *Epilogue: Email from the Future*, is an imaginary, yet uncomfortably possible, newsletter from the futuristic *World Association of College, University, and Public School Educators*. It is called the *Uninet Times* and it is dated in May of 2015. The article is entitled "New Jersey Closes Two-Thirds of Its County College System." Because the number of students attending college online had now become larger than the number attending local institutions, the state government was cutting funding and moving faculty from two-thirds of the schools into the remaining one-third. Electronic courses had become so financially competitive that even the state's top universities such as Rutgers and NJIT, were suffering. The matter was urgent, even critical, with "marginal tuitions" eating into enrollments. The issue was placed on the agenda for the next governor's conference. Yet, there was *little outcry* from local communities. (Harisim et al., 283-284).

This scene appears bleak, yet, in the opinion of this writer, it also seems that the acceptance by the communities indicated that services rendered by local facilities had already been replaced by a *superior system of delivery*. Students were still learning, and the lack of debate over school closures indicated that solutions had already been found. Jumping back to our present day, it is imperative that we consider our current methods of delivery. Such prophesies of doom as the one just given, are perhaps more like early warning signals — indicators of the need to change, rather than to end, current modes of higher education. (Horgan, 1998).

### **The Process Of Making The Complex Simple**

New educational delivery systems will undoubtedly mirror the image and needs of the individuals they serve. That has been the trend and there is no reason to see it change. The online learning environment is a very personal challenge, individualized to the finest detail. The delivery systems are part of that very package. They have been the foundation of the success of the individualizing of education. This is a far cry from the decades of "theater-in-the-round" lecture halls, with 500 students grouped in widening circles of seating, with a professor in the Shakespearean center, too small to be seen, and only heard because of acoustics and a microphone. Isolated student and generically-delivered message. . .the only practical assessment methods have been in the drill-and-practice variety (some would say drill and kill). "It seems clear that the next fifty years will see radical changes in almost every aspect of life, and above all in the relationship between the individual and the institution. Most institutions will cease to exist in their present form." (Denning & Metcalfe, *Foreword*, x).

If, ultimately, the goal is to educate students and faculty to be able to function effectively with technology in the 21<sup>st</sup> century (Horgan, 1998), then it is probably true that existing institutions will be altered in such a way that they *will have ceased to exist* as we currently know them. The other side of that particular coin is found in the shadows of history and mythology. Call it the Phoenix. . .that entity that will rise up and undoubtedly, shine.

The very nature of computing might be encapsulated in this thought: "One way to characterize problem solving is as the process of making the complex simple. . .[r]ather than proving programs correct, we must make them simple enough to understand." (Denning & Metcalfe, 48-49). As the nature of instructional delivery systems takes more solid form, as the learning environment and instructional delivery systems of the new media evolve, we will see this principle in action. . .taking a complex situation and making it simple enough to understand.

This is the essence of a radically superior human/computer interface — and an open door to untold adventures in learning.

## References

Denning, Peter J., & Metcalfe, Robert M. (1997). Beyond calculation: The next fifty years of computing. New York: Copernicus/Springer-Verlag New York, Inc.

1. Bell, Gordon, & Gray, James N. Chapter 1: *The revolution yet to happen*.
2. Cerf, Vinton G. Chapter 2: *When they're everywhere*.
3. Frankston, Bob. Chapter 3: *Beyond limits*.
4. Hamming, R.W. *How to think about trends*.

Hamm, Steve. (1998). *Gates on bullies, browsers -- and the future*. Telephone interview with Bill Gates, Microsoft, Inc.: January 9, 1998. BusinessWeek: McGraw-Hill Companies Inc. [Online]. Available: <http://www.businessweek.com/premium/03/b3561005.htm>

Harasim, Linda, Hiltz, Starr Roxanne, Teles, Lucio, & Turoff, Murray. (1995). Learning networks: A field guide to teaching and learning online. (3<sup>rd</sup> printing, 1997). Cambridge, Massachusetts: MIT Press.

Horgan, Barbara H. (1998). *Transforming higher education using information technology: First steps*. Microsoft, Inc.: Microsoft in Higher Education — Vision. [Online]. Available: <http://www.microsoft.com/education/hed/vision.htm>

Mendels, Pamela. (1998). *California Governor plans major push to increase online education*. Cybertimes: The New York Times Company. Issue: Jan. 8, 1998. [Online]. Available: <http://www.nytimes.com/library/cyber/week/010898california.html>

Kretkowski, Paul D. (1998). *When the future is now*. Wired News: HotWired. Issue: Jan. 9, 1998. [Online]. Available: <http://www.wired.com/news/news/business/story/9567.html>

Phillips D. C., & Soltis, Jonas F. (1991). Perspectives on learning (2nd ed.). New York: Teachers College Press.