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Some Historical Thoughts on the ee-Learning Renaissance

by Jack M. Nilles

The core concept of ee-learning is that the real world becomes the learning environment; in this environment, the purpose of the instructor is to help the distant and/or time-shifted student assimilate and evaluate his or her real world experiences, share them with others, and relate them to the disciplines of the academy. ee-Learning is similar to e-learning in that they both involve technological substitutes for collocation of student and instructor. They differ in focus: e-learning substitutes for the traditional, campus-oriented learning process; the focus of ee-learning is the student's non-campus environment. One of the dilemmas in structuring e-learning or ee-learning environments lies in deciding how closely they should resemble the traditional undergraduate on-campus experience. This predicament is particularly relevant when the learners are not traditional undergraduate students, as is likely to be the case in the future. In order to provide some perspective on the transition issues, I would like to review some relatively ancient history and relate it to criteria for successful ee-learning today. What lessons from the past can help shape the future?

In 1973, the National Science Foundation ([NSF](#)) awarded a grant to the University of Southern California ([USC](#)) to examine the policy implications of a telecommunications-transportation tradeoff (Nilles et al. 1974, 1976). As director of interdisciplinary program development for the university, I was the principal investigator for the project, which examined the extent to which one could substitute telecommunications technology for travel—sending around ideas instead of people. The central question was: would this trade-off work in the real world? We wanted to test the concept in one or more organizations that would have business interests in the outcomes. We reasoned that if telecommuting did not work effectively in those environments, it would not function as a broad-scale approach to reducing traffic problems. We chose two test beds for telecommuting: an insurance company in Los Angeles and USC's Interactive Instructional TV (IITV) system. The insurance company test demonstrated that, even with 1973-1974 era technology, telecommuting worked well for all parties involved. The IITV test showed similar positive results.

In what follows, I offer a historical overview of the early telecommuting-related efforts at the USC IITV system, describe the evolution of these efforts into a new model adapted to the age of the Internet, and note areas for further development in USC's current ee-learning programs. Based on this experience as well as more recent socioeconomic trends, I then outline a series of key factors that will need to be considered by institutions who seek to develop or expand ee-learning programs to meet the needs of their future students.

ee-Learning from 1974 to the Present: The Case at USC and Beyond

USC's School of Engineering constructed the IITV system in 1972, patterning it after a system at Stanford University ([Exhibit 1](#)). The system used all of the available Instructional Television Fixed Service (ITFS) channels in the Los Angeles area to broadcast instructional video to an array of ground stations in the region. These stations were located either in facilities of large high-tech companies, available only to employees of those companies, or in regional access facilities open to all. By 1976, twelve IITV centers operated in the Los Angeles region; two of them were located in regional business centers, and ten in corporate offices.

Although the NSF project focused on demonstrating the efficacy of telecommuting, our surveys of IITV system students at USC and Stanford provided a valuable validity check. Most of the IITV students were ee-learners; they had full-time jobs and were working toward graduate engineering degrees entirely off-campus. Their real world experience directly connected to their academic work, and they proved to be as effective in their studies as their on-campus counterparts (Nilles et al. 1974). Many students said that the ability to use IITV was a crucial part of their motivation to continue their studies (Nilles et al. 1974). It is

important to note that none of these students was a recipient of a deliberate ee-learning curriculum; rather, the traditional curriculum was adapted to the students' learning needs via electronic delivery of content.

Almost three decades later, in 2000, as broadband Internet access became more ubiquitous, USC's IITV system converted to Internet webcasts and changed its name to the Distance Education Network ([DEN](#)). The DEN has now expanded to the point where 30 different Masters of Science degrees are available entirely online; the network serves roughly 1,200 graduate students—most, if not all, of them ee-learners by adaptation if not by intent of the faculty. The rest of the university has begun its technology-enhanced-learning evolution as well, although most of this initiative comprises a mixture of on- and off-campus learning ([Exhibit 2](#)). USC is making a concerted effort to have coursework and Web-based interactivity available throughout the university in the very near future; by Fall 2006, two portable media facilities and fourteen fully equipped fixed-media rooms were available for use in graduate and non-degree programs among the professional schools and the college. In short, the university is serious, if cautious, about expanding the scope of its e-learning options and developing ee-learning opportunities.

That's the good news. The bad news is that the potential for this new life-situation-based learning is just beginning to be developed. There is still little focus on developing a curriculum oriented toward off-campus, experiential learning for other than the professional schools. True ee-learning elements tend to be found primarily in engineering and business. The reason is simple: Most of the engineering and business students in the current offerings are at the graduate level, and most have full-time jobs or other substantial demands on their time. Frequent commutes to campus are onerous or impossible for them. They have specific educational goals and are experienced enough to be able to adapt the available curriculum to these goals. The expansion of ee-learning opportunities into other fields (such as accounting, social work, or education) have yet to be pursued at USC, even as the demand for such opportunities is very likely to grow in the future.

This increase in demand can be anticipated due to a number of socioeconomic changes that have made telecommuting a vital option for broader segments of the public. Rising housing prices have forced many younger families to move farther from work and school (cf. Pisarski 2006). In most large cities, traffic congestion has spread far beyond the two daily "peak hours" of the 1970s. Commute times in Los Angeles in 2006 were 50% to 100% greater than in 1974—or even more—in almost any daytime period. As noted by one study, "The average annual delay for persons using motorized travel in the peak periods in the 85 urban areas studied climbed from 16 hours in 1982 to 47 hours in 2003" (Shrank and Lomax 2005, 2). A number of factors, including dwindling oil resources, growing global demand for oil, unrest in the oil-rich Middle East, and the possibility of global-warming taxes, are likely to push fuel prices past the \$3.00 per gallon that drew such vociferous complaints in 2005. Consequently, the demand for replacing the trip from home to work or campus with telecommunications has expanded and intensified.

In 1974, there were probably a few thousand [telecommuters](#) worldwide, most of them in the U.S. Based on my own (Nilles [2000](#)) and [European](#) surveys, I expect that by the end of 2007 there will be at least 34 million teleworkers in the U.S. and as many elsewhere in the world. In order to adjust to this major shift in our working environments, institutions of higher education will need to adopt ee-learning programs that provide more flexible means of instruction and professional development.

ee-Learning Requirements

As it was for the pioneering IITV students, the campus in ee-learning is the workplace or home, or both. If we view education as a service to be delivered to paying customers, then what are the essential services of ee-learning as determined by customer demand? At least the following factors should be considered.

Face-to-Face Interaction

In the past, a prime criterion for selecting home-based telecommuters or international teleworkers was their level of need for frequent face-to-face (F2F) interaction; the higher the need, the less qualified the candidate

was for this type of work. However, in our initial telecommuting project, we learned that the human need for F2F communication is easily transferable to other environments. Our comparative surveys of telecommuters and their non-telecommuting colleagues show that the importance of F2F communication diminished with time for the telecommuters, who gradually transferred some of their desire for F2F interaction from their now-invisible office mates to family, neighbors, and community groups (Nilles 1990, 1993). This finding has been reinforced many times since 1973, yet it remains a fundamental tenet of most businesses—and most purveyors of undergraduate education—that frequent F2F interaction is an absolute requirement for success. In fact, F2F interaction can sometimes be a hindrance rather than a help to the business at hand; hence the popularity of e-mail between occupants of adjoining cubicles. One of the components of productivity often mentioned by telecommuters and ee-learners is increased freedom from interruptions.

My experiences in a variety of organizations lead me to conclude that F2F interaction is most necessary in stressful or very uncertain situations, where the limited nonverbal cues enabled by technology are insufficient. Such situations include sensitive negotiations, project organization and review meetings, and other cases where clearer role or goal definition is needed or where a message needs clarification. However, these situations normally occupy just a small portion of a normal work year. Routine interaction for information transfer can be accomplished by several different modes of telecommunication.

Exception Handling

One of the keys to successful telecommuting is to change the central management technique from "management by walking around" to management by exception. That is, the telemanager and telecommuter agree on the work to be done, the tools and skills needed to perform it, the schedule, and the performance criteria. The telecommuter's job is then to perform as agreed, wherever she may be or whenever he does the work. The telemanager's job is no longer concerned with watching daily activity. Instead, the telemanager focuses on making sure the telecommuter has the necessary tools and skills and dealing with the occasional problems the telecommuter encounters. Otherwise, the management job is to get out of the way. In programming, this task is called exception handling.

Similarly, in ee-learning, the basic information distribution can be handled by written materials and by recorded or webcast lectures. This leaves the professor and teaching assistants free to concentrate on the exceptions, the issues that are still unclear in the students' minds, rather than wasting valuable time on the basics. The effectiveness of both student and teacher increases, and the student, in effect, gets customized training even in a nominally mass-lecture environment. In this way, the ee-learning environment also prepares students to be teleworkers in the future.

Connections

The first thing students notice upon graduation from college is that the real world is not arranged, nor does it behave, like the academy. The world is not structured into a neat set of disciplines to be addressed sequentially. On the contrary, everything is all mashed together, occurring seemingly all at once. Everything is connected to everything else. Students may have learned calculus, history, creative writing, and psychology, but what's often missing is a working knowledge of the interrelationships between these areas.

Interdisciplinarity is an absolute requirement of an ee-learning curriculum, even—or especially—in the professional schools. This requirement is usually forcefully imposed upon potential and active ee-learners by their work environments. Morton-Clark (2006), in his report of how a RAF pilot obtained her MBA in Iraq, provides a graphic example of this. Hence, interdisciplinarity is likely to be a major component of ee-learner's demand for education. The key to meeting this demand is to provide a curricular ensemble with all the necessary ancillary components: the hows—such as communication skills, marketing, psychology, economics, and accounting fundamentals—and the whys—such as philosophy, history, ethics, and the arts. The growth of ee-learning programs will therefore need to be managed hand-in-hand with the growth of e-learning in disciplines not directly affiliated with business or other professional degree programs; there will

need to be a synergy between both of these growth trends in order for ee-learning programs to flesh out and diversify the learning experiences they provide to students.

Details versus Concepts

The professional schools have had a long-running battle over the demand for certain detailed skills versus the need for meta-skills such as recognizing well-designed programs or developing thorough and effective business plans. A central issue in curriculum design is which skills need to be added to the curriculum in order to optimize the student's learning experience—and to what depth should that learning go? The winning approach has been the idea that learning how to think is more important than learning the specific procedural skills desired by potential or actual employers. Learners need both core thinking skills for long-term career survival and the ability to adapt to new procedural skills desired by employers. Most professional schools provide a mixture of both.

At the same time, the work skills/education tension is likely to increase in ee-learning situations, where students are immersed in the immediate demands of employers as they learn a profession. As the pace of change increases along with global connectivity, the requirement to learn a specific skill or technique often takes priority over the need to develop an understanding of where that skill fits in the big picture. This is the case for daily living as well as the workplace. Consequently, there is a constant battle between learning skills (the hows) and learning their uses (the whys).

Yet this issue may be seen more realistically not as an obstacle to ee-learning programs, but rather as an intrinsic question that academic administrators will need to negotiate with the professional sectors they serve. Finding the right balance between details and concepts in the evolving ee-curriculum will require a greater degree of sustained input from organizations in the business world, the applied sciences, medical institutions, and other fields. The requirements for ee-learning degree and professional certificate programs will need to be reassessed on a regular basis through institutional partnerships between the academy and the private sector, and regular feedback provided by the students themselves will need to be assessed more carefully to ensure that the curriculum is properly aligned with the proficiencies that their professions demand. On this level, the growth of ee-learning will only gain proper focus and direction through collective efforts that overcome the structural divide that too often persists between academic practice and the professional world outside the academy.

Conclusion: What's Next?

In the 1970s, one of our key concerns was the rate of spread of computer literacy among students. Today, a concern is the rate of spread of e-literacy among faculty. The average American teenager or professional-level office worker grew up watching TV and is fully conversant with computers, iPods, the Internet, instant messaging, e-mail, chat rooms, Voice-over-Internet-Protocol (VOIP), and all the other technological wonders that may still mystify many faculty members. The customers of ee-learning are largely already adapted to the necessary infrastructure and are already familiar with creating their own online content; it may be a different story for providers.

Yet the significant changes we have seen in the professional world suggest that educational providers will need to do more as well. In the 1960s and 1970s, when I was a "rocket scientist" in the aerospace industry, job or employer switching every three or four years was commonplace; not so in most other employed-for-life industries. Today, the idea that one would hold the same job or work for the same employer for one's entire career has become an anachronism, even in Japan, where it was once a given. Similarly, the processes of product development have clearly become much more fast-paced, diversified, and dynamic with the growth of new technologies. Manufacturing has developed from Henry Ford's "any color you want it, as long as it's black" to a variety of one-of-a-kind, customized products. Consequently, the demand for continuing, customized learning, any time, any place, is accelerating.

It is no longer a question of whether the academy should experiment with ee-learning; it is a requirement for survival in the near future. Increasing travel restrictions mean the world is becoming more isolated physically just as it is becoming more interconnected electronically; global networking now connects international teams who never meet in the real world. Formidable alternatives to traditional education are also becoming more common; new online educational opportunities are developing in a variety of places, from certification programs for certain skills to alternatives to traditional academic degree programs. Universities must prepare, and like USC, many are preparing their students to cope with these changes and to successfully guide themselves and others through what clearly will be interesting times.

There remains the problem of the edifice complex: all of the on-campus buildings adorned with the names of affluent benefactors. What will be their fate when expansion of university infrastructures comprises widely distributed networks instead of buildings? In the 1970s, we considered the potential impacts of telecommuting on central cities. I made a few speeches about the need for developers to consider transforming downtown office edifices to multi-use structures: offices, retail, and residential spaces. These speeches were generally met with scorn by the large developers. Now, of course, downtown LA is being revitalized by . . . guess what? How will the university campuses change?

The future is education any time, any place. Evolution is real.

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