

Distance Education: An Introduction to the Discipline and the Practice

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Introduction

Distance education is a general concept that has its roots in general and adult education; embracing independent study, self-directed learning, as well as non-traditional and open education. Distance education has become possible through the use of technology, starting with print and transportation, as in correspondence education, and later with electronic communication as in educational radio, instructional television, and web-based education. Contemporary study of distance education in the United States includes developments in the late 19th century when print and modern transportation made teaching and learning at a distance possible. The field of study also comprises the application of radio, television, telecommunication satellites, cable television and the Internet to teaching and learning as the 20th century evolved. In a broad scan of the field, influences of several other practices and formal fields can also be detected that go as far back as early 17th century. These include:

- ❖ Informal apprenticeship programs, which can be traced back to the 1600's in the Colonial times.
- ❖ Discussion forums, when Benjamin Franklin organized Junto –an informal discussion group—in Philadelphia in 1727.
- ❖ Self-improvement groups, such as the Lyceum and the Chautauqua movement in the 1800's and various other adult, self-directed, continuing and extension programs that are now formalized in higher education institutions and other organizations. (Rasmussen, 1989).

Although Junto and Lyceum, for example, was conducted in-person, their formation was based on the principle of independent learning that as we will see here is an underpinning concept of contemporary distance education. The Chautauqua movement, however, expanded beyond its birth place in upstate New York, and evolved into an early form of distance teaching and learning through correspondence.

Correspondence Education

Formal accounts of correspondent education appeared in the early 1900. For example, an address made by Reverend Joseph H. Odell, D. D. delivered in November of 1910 at the dedication of the instruction building of the Correspondence Schools in Scranton Pennsylvania (1910) was titled *The New Era in Education: A Study of the Psychology of Correspondence Methods of Instruction*. Pittman (1990, 2003) presented critical historiographies of correspondence education in which he traced the origin of the field in the U. S. to 1892 when University of Chicago began offering courses by correspondence. Pittman considers correspondence study the “ancestor of all collegiate-sponsored distance education in the United States.” Edelson and Pittman (2001) posited that correspondence education developed two parallel tracks; one found its home and prospered in higher

education, and the other in the private sector. The quality of education in the commercial sector ranged from very good to outright fraudulent. The commercial or “proprietary” schools that engaged in deceptive practices damaged the reputation of distance education to the point that the federal government withdrew its financial support of students in such schools and established rules that limited the practice in the 1950’s. It was not until 2002 that the federal government began to relax such regulations. Even in higher education where correspondence education was practiced by very reputable faculty and administrators, it did not develop parity of esteem with the so-called “traditional” form of teaching and learning. This is an issue that still has not been resolved, despite the rapid growth of distance education among universities in recent years, and overwhelming research evidence that there is no “statistically significant difference” between the effectiveness of distance and face-to-face instruction.

Such elitist attitude toward distance and correspondence education reveals an aspect of the field, which was important at its inception and might become even more important in the future. Correspondence study always helped the common “man or woman” to access education, often for developing vocational and farming skills. As such, it was a democratizing trend in education. Edelson and Pittman (2001) stated:

Correspondence study, a system that allowed—even encouraged—the common man or woman to take charge of his or her own learning, and guaranteed access to all who desired it, complemented a persistent theme in American political philosophy, the glorification of the common citizen. In U.S. political history, this theme is often called ‘Jacksonian Democracy,’ after Andrew Jackson, the country’s seventh president, a noted champion of the “common man,” who urged his followers to resist intimidation by the social and political elite that had previously governed the country. Thus, correspondence study was a tool of a movement one scholar called ‘the democratization of knowledge’ (http://www.sunysb.edu/spd/dean_papers/newdelhi.pdf).

Independence of the distance learner is a major characteristic of the field, a theme to which we will return in building a theory of contemporary distance education.

Educational Radio

With the advent of broadcasting, the federal government issued the first educational radio license to the Latter Day Saints' University of Salt Lake City in 1921. The University of Wisconsin and the University of Minnesota also received licenses to establish educational radio stations in 1922 (Saettler, 1990). Levenson (1945) listed a series of evaluation studies conducted by Ohio State University and The University of Wisconsin as early as 1931 to demonstrate the effectiveness of radio in learning. The number of studies listed and the variety of research questions posed are indicative of the ubiquity and popularity of the use of radio in education. For example, research questions ranged from the "relative effectiveness of short and long sentences," to "the value of repetition in the presentation of different types of material," to development of new instrument of evaluation. (pp. 192-197).

Similar to correspondence education, an important aspect of early educational radio was supporting the farmers. Beginning in 1914 the U. S. Department of Agriculture developed a network of extension education activities for the farmers through state agricultural colleges. Radio became a natural medium for agricultural extension

education in many states that had vast amounts of land dedicated to farming. By 1925 the federal government acknowledged the importance of providing information and education via radio to farmers and called for providing specific frequencies within the broadcast band for radio stations serving agricultural communities (Department of Commerce, 1925). One such radio station, for example, was KKSU. Kansas State Agricultural College began experimenting with radio broadcasting as early as 1901 as a weather reporting station. On December 1, 1924 KKSU became the first educational radio station in Kansas pioneering the broadcast of spoken words and music in the state. (<http://www.oznet.ksu.edu/kksu/history.htm>).

By the 1930's the U. S. Department of Education had also an active role in educational radio. Laine (1939) depicted the thriving scene of educational radio by describing the various programs sponsored by the U. S. Department of Education at the national level, and the many state supported programs. Subjects of these radio broadcasts ranged from science and history to issues related to civil rights. Titles of some of the programs were *Let the Freedom Ring*, *Trial by Jury*, *Free Assembly*, *Women's and Children's Rights*, and *Free Press*. In addition, the U. S. Department of Education had made agreements with the National Broadcasting Company (NBC) and The Columbia Broadcasting System (CBS) for producing and broadcasting a variety of programs with educational content. Such programs were as diverse as music education to those containing religious themes.

This broad range of programs brought to fore one of the major criticisms of the definition of the use of mass media in education. Willey, and Young (1948) in their study of the use of radio in elementary education reported two contending schools of thoughts. Some educators, such as W. W. Charters, Director of the Bureau of Educational Research of Ohio State University offered a more expansive definition of educational radio:

An educational program is one which raises the standards of taste, increases the range of valuable information, or stimulates the audience to undertake worthwhile activities. (p. 17).

Others, according to Willey and Young (1948), had a more limited interpretation of the definition of educational radio and thought that a program is educational if it is produced for such expressed purpose. This controversy has not been settled; even now that educators have access to media that are much more powerful than radio. Other similar issues were also critically analyzed by Willey and Young (1948) that still linger on and we have not been able to resolve them yet. These could be summarized in the following points:

- ❖ Listening to radio develops “intellectual passivity.”
- ❖ Radio is a one-way means of communication.
- ❖ It is hard to adjust instruction by radio to the “capacity of the individual pupil.”
- ❖ Listening to radio is less effective than face-to-face communication due to lack of the speaker's “facial expressions and gestures.”
- ❖ Broadcast times are hard to adjust to class schedules.
- ❖ Programs are produced by radio artist and financiers, and not by educators.
- ❖ Programs are not based on school curriculum.
- ❖ “Too many teachers have had to work too many hours at too many chores. We cannot expect them to assume the labor of producing or using radio broadcasts without time allowance and without proper training.”

Variations of these issues will emerge as we will discuss the evolution of distance education, and the introduction of new media in its practice.

Educational Television

Iowa State University applied to the Federal Communication Commission (FCC) for an educational television (ETV) license in 1945, and became the first ETV broadcaster in the world, as it commenced televising educational programs in 1950. (Saettler, 1990). Jim Finn a pioneer in the field of educational technology conducted one of the first studies on educational television in 1953. Finn's study was followed by a number of research projects which provided a rich array of results about educational television.

Kumata (1960) summarized the results of research conducted on educational television in the late 1950's. This comprehensive review of data-based research literature clearly indicated the importance of learner traits in learning from television. These studies were pursued at a time that media research in the US was primarily interested in media attributes, such as size of the screen, effectiveness of color, placement of captions and other similar low-level variables. Attention to media attributes in this period was, in part, a continuation of the media studies, which were conducted in various branches of the US armed services during and after World War II to ascertain the effectiveness of mediated instruction at a time that instructors were not readily available to provide critically needed training.

Kumata (1960) listed the following learner traits as "prime" factors in learning from instructional television, and not "in the fact of TV transmission." In summary, these were:

1. Audience Motivation. "Superiority of TV is reported more often in voluntary audience situations than in captive audience situations."
2. Subject matter preparation and integration into a teaching process.
3. Audience Intelligence. "TV seems to affect intelligence levels differently but exactly how has not been shown."
4. The mode of presentation. "TV or face-to-face has no differential effect upon retention of the subject matter."
5. Interaction with teacher. "...gives students reassurance and greater willingness to undergo the television experience."
6. Attitude toward TV and toward subject matter. Negative attitude towards the medium has no effect on learning achievements; however, it might affect selection and future use of television for learning.
7. Adult Learners. Popularity of educational television among adult learners indicates that "adult credit courses such as those offered in Chicago may carry the educational television station" as a viable financial enterprise.

These relatively early findings are remarkable in light of what media researchers showed during the next two decades. Researchers, including Salomon and Snow (1970); Snow and Salomon, (1968); Salomon (1969, 1971); Cronbach and Snow (1977); Snow, Federico, and Montague, (1980) conducted a series of studies based on

the idea that if learner traits are paired with the right treatment attributes (mediated or otherwise), instruction could lead to the control and prediction of learning outcomes. Aptitude-treatment interaction (ATI) clarified several issues related to cognition and mediated instruction. It also revealed the potentially unlimited combinations of cognitive states with media variables, thus defying parsimony and closure in explaining the impact of media on learning. In 1985 Clark and Salomon presented a comprehensive review of research in media and teaching and called this phenomenon “*confounding variables*.”

Snow summarized the strengths and weaknesses of ATI research in the following as quoted in Kearsley (1994).

1. Aptitude treatment interactions are very common in education.
2. Many ATI combinations are complex and difficult to demonstrate clearly, and
3. No particular ATI effect is sufficiently understood to be the basis of instructional practice.

I will revisit these ATI studies to understanding the *complexity* of learning at a distance and will explain the use of system dynamics method for understanding this complexity, while developing the contemporary theoretical foundations of distance education.

In 1967, Chu, and Schramm, researchers at Stanford University examined 207 studies involving 421 separate comparisons of Educational TV and conventional classroom instruction.

- ❖ In 308 observations (73% of the studies) they found no statistically significant difference in learning achievement.
- ❖ 63 studies (15%) reported television instruction to be superior, and
- ❖ 50 studies (12%) reported conventional education to be better.

Wilbur Schramm did a follow up study in 1975, which included analysis of achievement data on students in primary, secondary, and post-secondary education, in different subject matters. His analysis showed while there were no statistically significant difference among subject matters taught, younger children learned more from television than older ones. Wetzel, Radtke, and Stern (1994)

Since the rapid expansion of instructional television in the 1950's and the ascendance of social science research after the Second World War, comparing distance education with the so-called face-to-face education has been a favorite subject of education researchers. In the 1960s, Wilbur Schramm conducted studies which compared instructional television (ITV) with classroom instruction. Also, Schramm (1962) summarized the results of more than 400 “scientifically designed and statistically treated comparisons of ITV and classroom teaching” (p. 66). He concluded: “we can say confidently that students learn from it, and that they learn fast and efficiently” (p. 66). Furthermore, “the conclusion has been ‘no significant difference’ between learning from television, and from classroom teaching” (p. 66).

After Schramm arrived at this conclusion many other researchers have compared classroom instruction to distance education. Wetzel, Radtke, and Stern (1994) scientists at the Naval Personnel Research and Training Center in San Diego, California have summarized the results of comparative studies until the mid 1990s. A more recent example is a study conducted by Johnson, Aragon, Shaik, and Palma-Rivas (2000). Researchers in this study compared learning outcomes of an online course with a similar course taught face-to-face. The study concluded that “there was no difference between the two course formats in several measures of learning outcomes” (Johnson et al., 2000, p. 29). Invariably, comparative studies of distance education and classroom instruction show “no statistically significant difference.” Another recent meta-analysis of 19 studies out of an original pool of 700, which met the carefully selected criteria of authors, Machtmes and Asher (2000) confirmed previous conclusions that “there does not appear to be a difference in achievement between distance and traditional learners” (p. 43).

Early researchers also studied the attitude of students and teachers towards television. Both faculty and students showed more favorable attitude towards teaching and learning via television, once they had experience in teaching a course via TV, or taking a course on TV. In general, students preferred to be in a conventional classroom, but favored a TV course, if the classroom was a large lecture hall. Among students, according to Wetzel, Radtke, and Stern (1994) "relevant factors are the extent of personal contact with the instructor and quality of instruction."

By early 1970's there was considerable evidence that the medium of communication is not as much of a factor in distance teaching and learning as the quality of instruction, and provision for two-way synchronous, or asynchronous communication between students and instructors. Sesame Street, for example, was a carefully designed and produced educational television program. It also remains to be the most widely evaluated television program ever. Evaluation results indicated that youngsters exposed to Sesame Street had a clear advantage in learning elementary reading, writing, math, and social skills over those who were not exposed to the program, or had less exposure to it.

The Telecommunications Revolution

In 1962, a beach ball sized communications satellite called Telstar carried the picture of then Vice President Lyndon Johnson from Vermont to Europe (Bittner, 1980). This simple broadcast heralded the era of commercial satellite broadcasting. Previously, Arthur C. Clark the British scientist had demonstrated that if a satellite is placed at 2,300 miles above the equator it would orbit in synch with the earth's rotation. Later placing geostationary satellites in orbit, such as the Intelsat series, were sponsored by the U. S. based international corporation COMSAT. These satellites provided continuous signals from a broadcast source to viewers in a vast area of coverage or “footprint,” such as the continental United State. After the defense and intelligence communities, news organizations, commercial broadcasters and educators were the first beneficiaries of these new telecommunication systems.

In the 1980's telecommunication satellites were numerous, powerful, and relatively affordable for educators to take advantage of them. No longer could the reach of educational television be limited by the power of one local transmitter. Educators could uplink to telecommunication satellites and transmit their programs to the continental

United States and beyond. Availability of satellites was a boon to educational television in both K-12 and higher education. Many schools could schedule courses, for example, in foreign languages, math and science for which they had no qualified teachers, or no strong local demand to retain a full time teacher. Students with particular needs gained access to a variety of programs including advanced college placement courses.

Colleges and universities also reached beyond their immediate geographical locations and provided programs to students thousands of miles away in the U. S. and elsewhere in the world. The satellite also brought universities together to form consortia and cooperate in developing and presenting courses to students. The increased availability of telecommunication satellites, prompted experimental use of satellite-based instructional television in Alaska, American Samoa, Colorado, the Appalachian Mountain region, the heartland (The University of Mid-America), and the Eastern United States in the 1970's, and throughout the 1980's. These and other institutions grouped together to develop consortia for offering programs to adult learners beyond their campuses. A prime example is the National Technological University (NTU), which started by the association of 28 universities, and now includes more than 50 institutions. Originally, NTU was formed to offer engineering courses to corporate employees throughout the country. Now it offers more than 1400 courses including an MBA program. (<http://www.ntu.edu/home/aboutus.asp>).

The Public Broadcasting Service also extended its activities to bring new learning opportunities to K-12 students as well as to adult learners throughout the country via the satellite. Colleges and universities throughout the country used the services of the PBS Adult Learning Services (ALS) which beamed telecourses via the satellite to more than 1500 participating institutions (Zigerell, 1991). Between 1981 to 1989 courses were presented to 1.3 million students in institutions of higher education which participated in the ALS through paying a licensing fee.

Another telecommunication system which grew rapidly in the 1980's was cable television. Originally developed in 1948 simultaneously in Oregon and Pennsylvania (Bittner 1980), cable was to extend the reach of the local TV signals to rural areas, and urban terrain with tall buildings, that would block the TV signal altogether, or bounce it to create a "ghost" in the picture. By the 1980's the coaxial cable used by most cable companies was augmented by fiber optic lines that were immensely more conducive to carrying multiple channels. Also, TV satellites made it possible to import the signals of stations from far away to the head-end of a cable system and offer a rich array of programming to customers. A combination of these "super stations" as well as satellite-based "cable" news and sports stations such as CNN, and ESPN created enough market demand to make cable television ubiquitous in urban and even some rural areas today.

Cable television industry, in its inception, was regulated by local municipalities, which gave the companies a franchise to operate in their communities, as well as by the federal government. As such, many local communities demanded and received channels on these systems that were dedicated to education and public service. Many universities and colleges developed close collaborations with their local cable companies and use the dedicated channels for educational cablecasting.

The ordinary telephone also played an important role in making both satellite, and cable-based educational television popular. Students could call in their questions to instructors who were broadcasting live in studios and make the broadcast interactive. This “two-way audio, one way-video” format became very popular and gave rise to videoconferencing which has become a standard mode of using video in education.

As the 21st century was approaching, telecommunication went through another revolutionary cycle, this time with a full shift in its nature. Since radio signals were discovered, and wires were employed to carry electric pulses, communications were in an analog mode. Leading companies, such as AT & T had been using computers to translate analog signals to digital since the 1960’s. But it was not until the mid 1990’s that phone lines were gradually enabled to carry digital signals for the consumer on a large scale. The computer and the telecommunication nexus also made it possible to compress information and use available bandwidth to carry unprecedented amount of information on ordinary phone and cable lines.

But the system that truly transformed distance education and brought it from its usual peripheral position to the center stage was the Internet.

The Internet

A system that could interconnect computers on-demand was in the works for defense related purposes since the 1960’s. But, it was not until the mid 1990’s that the National Science Foundation (NSF) provided access for schools, universities and the libraries to the Internet. Educators gained a powerful means for teaching and learning, which was radically different with previous electronic media and print used in correspondence education.

Arrival of networked computing to higher education, the place of work, K-12 schools, and even homes did not come a moment too soon. Towards the late 1980's, and in early 1990's families, institutions, societies, and relations among nations were going through rapid change. Novel solutions were required to meet the demands of the changing social institutions.

In recent years, a confluence of dramatic changes in the US economy technological innovations, and historic international developments propelled distance education from its usual peripheral position to the center of attention in various institutions. Distance education, or elearning, the name that corporate America has ascribed to it, is now estimated to be a multibillion-dollar industry. A more careful analysis of these changes is in order here to show how distance education is related to global social and economic events in further understanding its *complex* nature.

As the 20th century was expiring, three events occurred which had a dramatic effect on the fate of distance education in the US:

1. Maturation of information technology,
2. End of the Cold War and
3. Recession of the early 1990’s.

In fact these three events were inter-related. As the end of the Cold War seemed close, the US government reduced its military procurement, leading to massive layoffs of scientists, engineers, mid-level managers and other highly skilled workers in the defense industry. This created an economic recession effectively emptying the coffers of the states from California to Maine, and Alaska to Alabama.

The maturation of information technology also aggravated this situation. Hundreds of businesses and industries realized that they could become leaner by replacing mid-level managers with information systems, thus placing the front-line worker in closer communication to the top-level decision maker. In the early 1990's hardly a day went by without newspapers across the country announcing the "down-sizing," "right-sizing," or "re-engineering" of a major corporation. These euphemisms simply meant hundreds of thousands of layoffs, reduced tax revenues for the states, and decreasing resources to respond to social needs.

Concurrently, state supported systems of higher education in the US were looking at increasing enrollments. The sons and daughters of "baby-boomers" were reaching college age towards the end of the 1980's, creating the baby-boom echo, a demographic reality predicted to extend until 2008. The Chancellor of the California State University system, the largest institution of higher education in the U.S. with a total enrollment exceeding 250,000 students, estimated that the system could expect a 10 per cent annual increase in student population. This would require that the state build a mid-size campus every year for the next 10 years. Increased enrollments, and lack of resources, prompted the state governors to look for alternatives in a more cost-effective system of higher education.

By the mid 1990's business and industry had demonstrated the effectiveness of information technology to improve efficiency. In June of 1997, Allen Greenspan, Chairman of the Board of the US Federal Reserve asserted that the convergence of "once-in-a-life-time" events powered by the new information technology had fundamentally changed the fabric of the US economy. Initiatives to use information technology in higher education were now well underway. Thus the economic consequences of the end of the Cold War, and emergence of the new information technology mainstreamed distance education in higher education.

This was not the first time that social events had affected distance education and its wide acceptance and popularity in the US. In 1969, amid wide spread social turmoil, the Corporation for Public Broadcasting, and the Public Broadcasting Service were established to make better use of television in education. Partially in response to a growing realization of the poor state of education --characteristic of impoverished inner cities-- new programs were developed to provide pre-school as well as in-school resources to children. During the 1970's, Sesame Street and The Electric Company demonstrated how television programming directed to children and young adults could be a catalyst for change, innovation, and adoption of technology, both at home, and in many schools throughout the US. In an international conference, presenting a paper titled *Educational Television in the United State*, Hitchens (1978) said: "Those two series literally revolutionized the way in which Americans view broadcast television, and its employment in education."

The interaction of these historic elements serve to illustrate that distance education is a *complex* concept that is affected by myriad inter-related factors, ranging from international political events, to economic paradigm shifts and technological developments.

A Critique of Distance Education in the 20th Century

Although the scientific study of television in education did not start until the 1950's, and the systematic and scholarly study of distance education as a discipline began only in the 1960's (Holmberg, 1989), the field is grounded in ideals of independence, and individual responsibility in learning. These ideas, in turn, were based on the new political thoughts of freedom and democracy that were brewing in North America in the 1700's that led to the current socio-political system of the United States. Distance education, although is practiced around the world, has a distinctly America flavor which is at odds with social forces that are elitists and non-democratic, and those that tend to centralize power in the hands of the few to limit the independence of the learner.

The practice of distance education in modern times, also, came about as the result of the ubiquity of the printing press, rapid transportation and the postal service. As such, it was an outcome of modernization of the economy at the turn of the 20th Century. However, while the 20th century was characterized by modernization, and industrialization, the objective of distance education is to defy the limitations of space and time. These are essentially post-modern ideas that emerged as theoretical possibilities in the early 20th century. But, it was not until the 1990's that digitization of communication and the computer-telecommunication nexus became ubiquitous and made learning anywhere, anytime a practical possibility. As such, distance education as envisaged by pioneers, such as Charles A. Wedemeyer (1981) is a post-modern idea and is suited for full development and maturation in the 21st century. The fact that distance education remained a peripheral practice in higher education, K-12 schools, and business and industry throughout the last century could be explained in that it does not easily fit in social institutions that are based in modern practices within industrial structures. The mechanical paradigm that is the basis of modernism and industrialization promotes time-based, and space-based practices. Thus, schools, and universities are organized around set calendars, and most of them, with a few recent exceptions, still require the physical presence of the learner in a specific location. Distance education, however, is a post-modern idea which strives for learning anytime, anywhere (Wedemeyer, 1981).

Looking into the Future

We are in the midst of exciting, and far reaching changes in education that is challenging the industrial structure of educational institutions, and offering freedom, and responsibility to the learners. As we look today, educators can define and design effective and robust teaching and learning systems that would be responsive to the needs of students close and afar. This is a major transformation in education in our time. Distance education, as shown here is composed of technological and social components that evolve in time. To understand how distance education is developing as we enter the 21st century, it should be studied within a paradigm that enable us to identify its myriad

components, and inter-relationship among those components as these components, and their interrelationships evolve and change in time. For this reason, and to understand the complex nature of distance education in its post-modern interpretation, we turn to the theory of systems.

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