

Chapter Eight

Responding to a Revolution

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In the late 1970s a revolution began that changed the world. Computers, previously owned only by large corporations and government agencies, had become available through universities. Nancy Roberts first realized the potential of computers in education while doing her doctoral research in Sue Friel's fifth grade classroom in the Lexington, Massachusetts Public Schools. She introduced students to a computerized system dynamics ecology model, as a game. The students' goal was to save the world. Nancy took their worksheet information, entered their data on punch cards, and submitted them to the Boston University (BU) mainframe computer for processing. Her young students responded enthusiastically and Nancy's passion and vision for technology in education were ignited.

Early Computers: Potential and Growth

In 1975 both Nancy Roberts and Sue Friel joined the faculty of Lesley College. Sue managed to procure two terminals for the undergraduate school's mathematics room, connected by telephone lines to the BU mainframe.

In the summer of 1978 Roberts taught Lesley's first educational computer course. She and her husband had convinced Digital Equipment Corporation (DEC) to donate a PDP 11 to Lesley. The DEC had four terminals and a server, demonstrating the concept of time-sharing. With a class of 12 students, three could work at each terminal. The course consisted of an introduction to the BASIC (Basic All-purpose Symbolic Instruction Code) computer language, developed at Dartmouth; DYNAMO, the system dynamics simulation language, and Logo, both created at MIT. Jim Slattery, Director of the Lesley Library, agreed to pay \$2,000/year for the annual maintenance fee. The computer was housed in a converted closet on the second floor of the library.

Teachers, computers, prejudice, and Lesley College

By Lois Galt
Special to The Christian Science Monitor
Cambridge, Mass.

Here is the problem: You have a generation of students who, as adults, will need to know how to use computers as surely as they will need to know how to read and write.

And you have a generation of teachers, few of whom know how to use a computer and many of whom are wary of computers, seeing them as the domain of mathematicians or the source of billing errors.

How do you open up those teachers to the educational possibilities of computers? How do you get them to jump the technological generation gap so they can teach their students how to use computers without passing on any of their own prejudices?

The first step is to cure them of their fears and prejudices, according to Nancy Roberts, the director of a new program in computers and education at Lesley College in Cambridge, Mass.

And the best way to do that is to let teachers fiddle with computers for a few hours to see "just the fun of it all," Dr. Roberts said. Lesley gives teachers that chance to fiddle at conferences and one-day seminars.

A few hours won't make them experts, she said, but it may change their attitudes and whet their appetites.

"The main thing they can learn is that the



For those who want to nibble a little longer the Lesley College offers a variety of graduate courses, and for those who want something to chew on, Lesley started a master's degree program last fall.

and science.

She was motivated to learn more about computers after she saw how well using computers with students with learning disabilities worked.

portant even if they don't come back for more training, Dr. Roberts said.

If computers are not to be just another educational fad, teachers will have to accept them and be involved in making them work.

Christian Science Monitor, March 30, 1981

MIT donated six electronic mail accounts to Lesley. The accounts were on the MIT network, Bitnet, "Because It's There Net," a forerunner of the Internet. Marie Gannon, on the library staff, mastered email and file sharing and taught Nancy and other account owners. Email was accomplished through a hook up using the telephone lines and worked amazingly well. Words emerged letter by letter on the display screen and connections were dependent on telephone lines.

By the end of the decade computers became widely available in small and affordable versions known as "personal computers." Never before had the average person had access to a tool that, as Apple co-founder Steve Jobs promised, will "harness the power of the computer for the individual." Perceiving the possibilities for education, and the challenge of educating teachers to use computers in their classrooms, the Computers in Education Masters degree program at Lesley College was established in 1980.

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How do you open up those teachers to the educational possibilities of computers? How do you get them to jump the technological generational gap so they can teach their students without passing on any of their own prejudices?

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Educators flocked to introductory seminars and left feeling empowered and enthused about using computers in their classrooms. "We give them a taste and hope they come back for more," said Richard Carter, then a graduate student at MIT and one of the instructors of the introductory one-day seminars. Those interested in more in-depth study enrolled in the degree program. Karen Gremley, Angie Ferris, and Maureen Yoder were among the first graduates, and all had become members of the program's faculty by 1983.

In 1981 the faculty assembled a lab of Apple computers on the second floor of the library, then located on the quadrangle. In 1984 the lab and the growing software collection moved to a larger space in the renovated basement of the library, and were overseen by Ricky Carter until 1990. Additional growth, a need for office space and a work area for students, resulted in the renovation of the library's fourth floor, where everything was located until the creation of the Information Commons in 2009.

Eileen Barnett, a 1989 Computers in Education graduate, became the Educational Software Coordinator and later the Director of the Microcomputer Center. Eileen cultivated relationships with software companies, formulated agreements for site licenses, negotiated donations of software and initiated a software review center for educators. The center became a



Ricky Carter teaching with Apple 2E

thriving resource for faculty, students, alumni and local teachers. Many became computer specialists in their schools and leaders in their districts. Now, with the availability and power of the Internet, online resources have replaced the software collection.

Collaborating Organizations; Gatherings of Like Minds

From the very beginning, people in the Greater Boston area interested in educational computing were invited to Lesley College. An informal interest group developed that included people from organizations such as Bolt, Beranek and Newman (BBN), Technical Education Research Centers (TERC), Terrapin, MIT, the Boston Computer Society and the Lexington Public Schools. The group established the Computers in Education Resource Coalition (CERC), which from 1979-1993 published a newsletter and helped Lesley run an annual one-day conference. At the first conference in 1979, Ricky explained a computer math game called, *Go Fish*. *Go Fish* was an early example of using a computer to provide a visual representation, or model, of a mathematical idea. The player tried to catch a fish by dropping a line down from a boat. If the depth was wrong, the program replied “too deep” or “too shallow” with a line on the screen representing the fishing line. Simulating a laboratory, it allowed a learner to try out a hypothesis, receive immediate feedback, and then modify his or her idea. In 1979 this was revolutionary.

At the second computer conference, in 1980, program faculty provided “hands-on” sessions with a variety of donated machines including Apples, Pets, TRS-80s and Lesley’s DEC. The profits from these computer conferences were used to purchase additional Apple computers for the Lesley program.

As discussed later, Lesley had launched a national Computer and Education outreach program in 1980. So, in addition to the conferences in Cambridge, four-day residential conferences were held in Colorado and Wyoming from 1985 to 1999, bringing current students and graduates from across the country together for an intensive series of workshops and courses.

In 1989 and 1994, Lesley was the sponsoring organization for the National Educational Computer Conference (NECC) in Boston, the largest gathering of educational technology speakers, participants and vendors in the country. The 1994 NECC, held at the newly rebuilt Hynes Auditorium, attracted over 8,000 participants.

The CERC and Lesley collaborations resulted in awards of several National Science Foundation (NSF) and Department of Education grants. These grants greatly increased Lesley’s national reputation.



NECC Conference Committee 1994

A Pioneering Masters Degree Program

In 1980 Sue wrote a proposal to require a 2-credit computer literacy course for every undergraduate, one of the first courses of its kind in the country. At the same time, Sue and Nancy, with the help of CERC, developed a 33-credit masters degree program. George Miller, then Vice President of the Undergraduate School, and Dick Wylie, then Dean of the Graduate School, gave the faculty six months to prove the viability of the program.

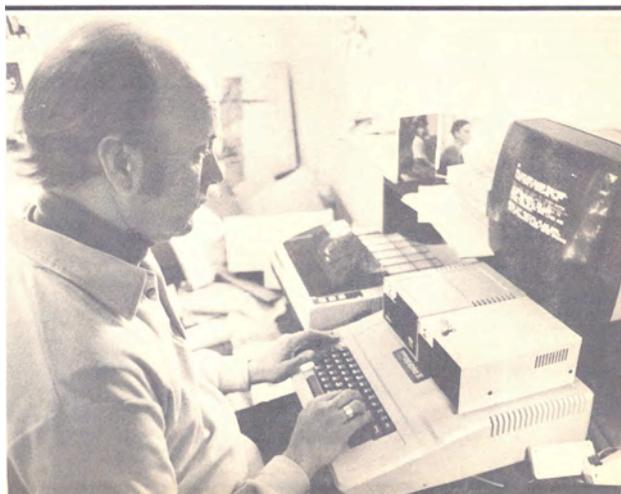
The Lesley Graduate Program and the member organizations of CERC had a common view on the impact computers would make in the schools. Computers “will help human creatures understand better how it is that we learn and think. . . The introduction of microcomputers into the formal educational environment . . . means an internal, institutional realignment of the educational culture over the coming years” (Polidori, 1983, p. 4). “Quite possibly, the role of the teacher, particularly as it pertains to the use of advanced technologies in the classroom, may change from repository of all knowledge to that of group leader in charge of mutual learning activities” (p. 6).

The program’s content and format reflected the needs and skills of adult learners. Classes were offered in the afternoons or evenings once a week for 15 weeks so that students could attend after work. In the summer, intensive three-week classes were scheduled to coincide with school vacation.

Students demonstrated their newly acquired knowledge by creating projects that were practical and individualized. The first course in the sequence, “Computer Literacy for Educators,” introduced students to innovative applications such as word processing,

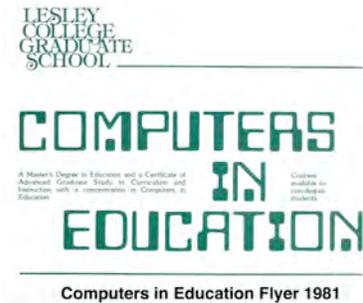
spreadsheets, databases and educational software. Students learned about system dynamics and computer modeling. They used a paper model to understand how a computer worked.

Ricky Carter developed the “Programming in Logo” class, where students entered commands to move a triangle “turtle” around the screen. Logo incorporated the philosophy of Seymour Papert’s (1993) book *Mindstorms* and the concept of teachers experimenting alongside their students, not always knowing what the outcome will be. Students programmed a robot “turtle” as well as a programmable toy called “Big Trac.”



Henry Olds, working on an Apple II

For the software evaluation course, local developers and innovative thinkers, including Tom Snyder, Henry Olds, Bob Tinker and Art Bardige were guest speakers. They later became entrepreneurs and owners of successful companies, but generously gave their time, shared their ideas and listened intently to feedback from Lesley students.



In the “Fundamentals of Computer Structures” course students took apart computers and reassembled them. They learned about operating systems and programmed in machine and assembly language with rudimentary commands and simple outcomes. Using wire and diodes, they built a “full adder,” modeling the base-two language underlying friendlier user interfaces.

Students learned to program in BASIC and Pascal, skills that were abandoned after a few years when software became more sophisticated and the average teacher no longer needed to write her own programs. Over the years new courses were developed, reflecting the trend to integrate computers into subject areas. Multimedia and digital video became more user friendly and prompted creative classroom applications. Technology expanded the possibilities for special needs students and for a variety of learning styles. New approaches that were proven to enhance teaching and learning were incorporated into Lesley courses, reflecting the needs of teachers and their students.



Nancy Roberts with students, 1982

Going National: An Era of Expansion

As mentioned earlier, in 1980 Lesley launched the Computers in Education off-campus outreach program. Dick Wylie, Dean of the Graduate School, had come to Lesley from the University of Colorado. His Colorado colleague, Frank Cordell, told him the University of Northern Colorado would not continue to support out of state programs so Dick suggested that Frank offer the programs through Lesley instead. The timing could not have been better. Frank and his wife Louise formed Professional Outreach Associates and, for 25 years, they ran the off-campus programs out of Greeley, Colorado. When P.O.A. began to market Lesley’s computer program in Colorado, the information meetings drew large numbers of potential students.



Washington State Outreach Class

Frank and Dick visited Apple Computer’s office in Cupertino, California and asked for a donation of computers for the Lesley labs. Three months later, a Coors truck delivered a load of beer to California and brought back a load of Apples to Colorado. Apple was committed to supporting teachers and donated several more labs for Lesley student use.

In Cambridge, the National Outreach Division under Dean Mary Huegel was created to adapt, coordinate and deliver the program. In many largely rural western states the distances to a college or university were too great for a night course so the program was developed into an intensive weekend format. The courses provided the conventional 45 “contact hours” typical of 3-credit graduate courses, but in a concentrated timeframe. Students met for two weekends, a month apart, with sessions on Friday night from 5 to 10 PM and Saturday and Sunday from 8 AM to 5 PM. Cohorts of students, meeting in local school computer labs, could study together

and complete the eleven-course sequence in 22 months. The intensive weekend format proved attractive to teachers who found weekday night courses difficult to attend.

Michael Goodman was hired as the off-campus National program's first Program Director for states west of the Mississippi. Maureen Yoder was the first Program Director of the off-campus Regional Outreach Program covering New England. Frank and Louise Cordell hired Tim Greenshields to recruit students. Tim, a graduate of one of the early Colorado cohorts, was an enthusiastic and energetic promoter of the program and helped increase its size in both rural and urban areas in the Western states.

In 1985 George Blakeslee replaced Michael Goodman as the Program Director of National Outreach. George was instrumental in assembling an education software collection to support the off-campus courses. It was housed in his office closet until it became too large and was moved to the computer center in the library.

Under Lesley's newly appointed President, Margaret McKenna, the college engaged in the development of a vision and mission. These specifically cited a commitment to serve "the underserved" and attract students who worked in the "professions that put people first." Both goals directly aligned with the outreach effort and played an important role in the sustained college support that the Technology in Education program has received since that time.

The "Theory into Practice" pedagogical philosophy of the School of Education was equally well received. Students were pleased that they could learn something they could use with their classes "on Monday" as well as foundational knowledge to guide long-term use and adaptation of educational technology.

Teacher certification requirements and local salary schedules, both of which rewarded graduate study, were incentives to pursue further education. In addition, students found that the cohort model provided them with a community of learners and an ongoing environment of mutual support. Through its willingness to "bring higher education to the student," Lesley University's off-campus programs grew and prospered.

The off-campus format has expanded to include cohorts of students in 22 states. Core and adjunct faculty have taught in locations as close as Somerville, Massachusetts and as far away as remote islands in Washington State. Two hundred and twenty students (10 cohorts), were pursuing their masters degrees by 1985, 660 by 1990 (30 cohorts), 880 by 1995 (40 cohorts), peaking at 1400 in 2000 (65 cohorts) where it has remained relatively stable. In the 30 years the program has been offered, over 20,000 educators have earned a Technology in Education masters degree from Lesley. As the program grew, so did the faculty, now numbering 12 core members of the division, four national faculty and 180 adjunct faculty.

Dick Wylie's confidence in the program led to entrepreneurial efforts that included an accelerated approval process for new courses, residential conferences in Colorado, and even a one-week, three credit "Voyage of the Mimi" course offered on a 95-foot schooner organized by Angie Ferris. Dr. Wylie recalls his role at Lesley with memories of exciting new initiatives and a collaborative spirit. "Lesley gave me the opportunity to develop an environment where faculty were encouraged to be innovative and



Delivering Computers for Conference

creative. I saw my role as helping others achieve their dreams. The faculty showed that an entrepreneurial spirit and quality academics could survive and prosper together.”

In the late 1980s significant effort was placed on receiving formal recognition and accreditation for the intensive weekend graduate education model. This was accomplished in 1989, the same time the program was recognized as an exemplary model for in-service technology integration education by the United States Department of Education. The program subscribes to a “good practice based on good theory” and emphasizes the effective integration of technology into classroom practice to improve student achievement. Based in the pedagogy of adult learning, the Technology in Education program provides students with both skills and immediate benefit.

Adjunct Faculty: Essential Ingredients to Success

Concurrently with the creation, development and growth of the Computers in Education off-campus programs, the airline industry was being deregulated. This created the modern “hub and feeder” system that brought air travel to many regions of the country. It became progressively easier to fly faculty to and from cohort sites in the space of a weekend. Early morning “commuter flights” would bring faculty to airline hubs where they could readily make connections to even the most remote Lesley site. With the rise of the “commuter” airlines, almost every city in the United States soon had access to regularly scheduled flight service.

Faculty from Cambridge, and adjunct faculty from around the country, flew out to urban and rural off-campus sites. Dick Wylie, who became the President of Endicott College in 1987, reminisced, “While student interest and demand was high for the masters program an unexpected benefit came from the graduates who became our disciples. They became the catalyst for computers in education across the country and they became our teachers of teachers. They formed a powerful Lesley College network.”

To protect the integrity of the program, Lesley Technology in Education faculty trains its own adjunct faculty members. The faculty developed procedures that have since been adopted



Colorado Institute Instructors

by other Lesley programs. At the outset they recruited students who had completed the Lesley technology masters degree, since there were no similar degree programs at that time. Those who were interested in graduate teaching in the program chose a course, applied to be a Teaching Assistant (TA) and, if selected, went through the course again as a TA. If the TA experience was successful, the former student could then teach the course. In later years, with other technology in education graduate programs coming into existence, it became possible to recruit prospective

adjunct faculty more widely. Initially the program recruited at local, state and national educational technology conferences.

In 2000, with the advent of the National Programs office and the creation of additional off-campus degree programs, Ellen Jackson was hired to direct a central office for adjunct faculty recruitment and to conduct regular faculty training workshops. Over the years the program has held many adjunct faculty meetings to review and update courses. These meetings assure that every faculty member covers approximately the same material without overlapping

the content of other courses. Adjunct faculty, almost all classroom teachers, brought the real world of education to the program. Some even developed new courses for the program, such as the robotics and telecommunications classes.

Staying Ahead: Teaching on the Cutting Edge

Also contributing to the success of the outreach effort in the late 1980s and early 1990s were significant developments in technology, travel and socio-economics. The microcomputer, originally considered a hobbyist's toy, became a respected business tool with the advent of the IBM PC, Microsoft Corporation and VisiCalc's spreadsheet program. Apple Computer responded with the creation of the Macintosh computer and the graphical user interface. The open architecture of the PC sparked the development of "PC Clones" and Microsoft created the Windows operating system. This back and forth "platform war" has driven technology development ever since and has resulted in tremendous advances in desktop computing power and capability. The Technology in Education program has benefited from the growth of interest in technology, tapping into a strong cultural movement to improve teaching and learning with new tools and techniques.

In 1986 George Willett and Len Scrogan developed Lesley's first telecommunications class. When George, Len, and Maureen taught those first few years, they loaned 300-baud modems to students and used local bulletin board systems. When on the road, they became system operators of temporary bulletin boards, set up in student's homes. Classes were run with one phone line, often accessed by a 100 foot modular jack cable to a school nurse's office, or by an alligator clip device attached to the nearest pay phone, or by using an acoustic coupler. In spite of the rudimentary resources and without the power of the Internet, Lesley students still formed collaborations with teachers and their classes around the world, an empowering concept never before realized.

Sometimes the Technology in Education program cultivated a new technology that did not become widely accepted, but provided students with a creative challenge and experience. In 1987 Marie Gannon and Maureen Yoder taught two different weekend courses in videodisc production. Students designed, storyboarded and videotaped segments that were later sent away to be "pressed" onto a 12-inch videodisc and programmed, with BASIC, to be interactive. The fleeting popularity of videodiscs was a precursor to easily burned and interactive compact disks (CD-ROMs).

Through these forward thinking endeavors the program has continued to bring educationally sound courses that keep our students up-to-date on the latest technology tools and resources available, and to help teachers integrate them into their curricula in thoughtful effective ways.



Going Virtual: Expanding to Online

George Blakeslee developed the first Technology in Education online course during 1995. In 1996, with the support of a Sloan Foundation grant, George developed a second, more

technical online course. In the fall of 1997 the fully online version of the degree program was launched under the direction of Maureen Yoder. Both core and adjunct faculty began to transform their courses into fully online formats. Online support tools were in their infancy and faculty created their own class web sites with web page authoring tools, linking them to a free discussion tool called NetThread.

To launch the program Maureen passed out information at conferences and sent flyers to 300 international schools. The first 15 students began in September of 1997. They were a self-selected group of pioneers who chose the online program because of convenience and flexibility. The asynchronous nature of the assignments, and the ability for students to go through the program at their own pace, continue to be attractive advantages of taking classes online. All online students participate in a “virtual graduation.” They listen to “Pomp and Circumstance,” choose a virtual cap, gown, and hood, view video greetings from their online instructors, and watch the President grant them their diplomas. They post messages such as:

I really enjoyed the asynchronous format that allowed me the flexibility to complete the coursework on my time schedule. With teaching, coaching and starting my family, it was a big responsibility, but with self-discipline, hard work and understanding instructors, I was able to get through it.

Another noted, “The best part was that even though I was in an online program I never felt isolated from my classmates.” Hundreds of students from every state and 37 foreign countries have graduated from the fully online program. The online program continues to attract students who otherwise could not complete a masters degree because of distance, personal responsibilities or scheduling constraints.

More and more Lesley weekend courses and blended classes are incorporating substantial online elements as the technology improves and students appreciate the benefits of online learning. In addition to the Master’s program, newly updated off-campus Certificate of Advanced Study (CAGS) and Education Specialist (Ed.S.) programs started in the fall of 2004, with several online courses. In 2006, a blended program was introduced, consisting of shortened intensive weekend hours along with online course work.

Changing Lives; Improving Learning Reflections on the Impact of the Technology in Education Program

From the vantage point of the 21st Century, clearly the Technology in Education program has consistently fulfilled the mission of the university. Wherever it has been offered it has had a profoundly positive impact. This can most readily be seen in the reflections of those who have been effected.

To assess of the TIE program the authors interviewed many of the people involved in the early years. The remarks gathered fall into four categories: Impact on Teaching Philosophy; Collaboration, Research and Development; Impact on Education Policy; and Implementing the Vision.

Impact on Teaching Philosophy

June Fox, former School of Education Dean, reflects on the beginning of the Program.

In the days when Nancy Roberts was gathering support for the Computers in Education program, June Fox was the Dean of the Graduate School of Education. June recalls Nancy coming to her with the idea of offering a computer course:

I went to Dick Wylie, Dean of the Graduate School at the time. Dick went back and forth with me and finally said if it will not cost the school any money and if the course brings in 3 times Nancy's salary, she could do it. Dick found a closet off the Library's second floor to use as a classroom. The wiring was completed to connect the PDP 11, donated by DEC. Students loved the course.

We used our own graduates to grow the program, though some of our first graduates taught computers in education courses at surrounding colleges, becoming our competition. With the rapid growth of the Computers in Education program and the start of the off-campus programs in Colorado, however, Lesley became an institution with a national reputation.

Reflections from Early Graduates

The impact of the program on those who graduated in the 1980s was unmistakable. Many graduates organized technology initiatives in their districts, rising to newly created leadership positions or making innovative changes in their classrooms.

A poignant reflection about the impact on her career is from one of our first graduates, Jane Manzelli (CAGS).

As a grade 6 teacher in 1979, I realized computers offered new ways for children to learn. I remember programming a turtle on the screen, and a robot on the floor, and understood the potential to visualize math concepts for my students. Every Friday, I borrowed a computer from Henry Olds at EDC. I pulled into the school parking lot early and my entire class was waiting for me! My principal witnessed the learning going on and used PTO funds to buy an Apple II for the school, which cost \$2000! At faculty meetings, I would demonstrate Lemonade Stand, Oregon Trail, and Print Shop. We were the mavericks, the risk takers and the pioneers in our school systems.

The impact of having graduated with a CAGS in Computers in Education was enormous. In 1984 I became the Computer Education Coordinator for Brookline Public Schools. I've consulted with Brookline's sister school in Nagoya, Japan, been a board member of the Boston Computer Society, an Apple Distinguished Educator, and became a principal in the technology rich Morse Pond School in Falmouth.

Another early student, Phyllis Kalowski (CAGS, 1985), reports:

For me, professionally and personally, the courses at Lesley inspired me to stretch beyond the limitations of a classroom teacher. My world expanded. I designed and

published software for elementary students, contributed articles to computer magazines for teachers, and presented workshops to school systems and conferences.

Additionally, a student from our first class who stayed on for many years as a faculty member, Angie Ferris, (CAGS, 1984) explains:

Because I was both a student and faculty, I had both perspectives. The early days were very exciting times. I was involved in something that had never been done before. It was the first program in the country so it attracted students from all over, many of whom went back to their hometowns and led their schools in the computers and education initiative.

Finally, a Lesley graduate from the undergraduate college in the 1950s, Molly Watt, who also taught in the graduate programs, shares her memories of learning with Logo.

I believe Lesley College and I offered the first graduate course in Logo in the world, in the Hamilton Wenham School district. When Lesley began offering Logo courses on campus, Ricky Carter invited my husband, Dan Watt, or myself, to give guest lectures. We were part of a growing Logo teachers learning community, sharing insights and process freely.

By the eighties when I taught in Golden, Colorado in Lesley's Computers in Education program, I had devised procedure plays. Any Logo procedure could be considered a script. Painter hats for the procedure name, carpenter aprons with pockets for the input, and we were ready to understand recursion!

Collaboration, Research and Development

The impact that collaboration on grants had, both on Lesley and its early associates, comes from three people representing three of the organizations with which Lesley worked—BBN, TERC, and Enablearning, Inc.

First is Wallace Feurzeig, Principal Scientist at BBN Technologies:

A major thrust of the TIE program has been the development and use of advanced computer technology as an integral component of teacher preparation programs. Lesley realized early that instructional technology would have an increasingly important role in supporting inquiry and project-based learning in mathematics and science education. From the 1980s on, Lesley education faculty pioneered the classroom use of new instructional software. Some of that effort came through close collaboration with colleagues from the Cambridge research firm BBN. Key Lesley faculty, including Nancy Roberts, Richard Carter, William Barowy and Frank Davis, worked with Wallace Feurzeig, John Richards, Beverly Hunter and other BBN Education Department staff on several innovative research and instruction projects centered on educational computing.

One major NSF supported project, "Power Tools for Algebra Problem Solving", investigated the use of educational software for teaching algebraic concepts such as variables, equations and functions to sixth-grade students. Another NSF project, "Setting

a Research and Planning Agenda for Computer Modeling in the Precollege Curriculum," brought together educators and educational software developers from several universities and research institutions to address the issues involved in bringing computer modeling into precollege teaching.

This second grant produced the book, *Modeling and Simulation in Science and Mathematics Education*, edited by Wallace Feurzeig and Nancy Roberts.

The second reflection is from Robert Tinker, founder of Technical Education Research Centers (TERC):

At the time the Lesley Technology in Education program began, I was leading the struggling TERC organization, a nonprofit in Harvard Square that was committed to improving math and science education. We were interested in electronic instrumentation for science education in general, and in lab interfaces specifically. We realized that there was great potential to be gained by connecting electronic sensors to computers and using the computers for real-time data acquisition and display. Adeline Naiman shepherded these kits from dreams to products. Adeline later became a member of Lesley's Board of Trustees. TERC staff and Adeline often presented talks and workshops at Lesley College's annual technology conferences. I saw my first Macintosh in the 1984 meeting and was struck by the possibilities inherent in its graphical interface.

I knew of Jay Forrester's System Dynamics group at MIT's Sloan School and had read their literature that contained the intuitive drawings they made of systems of "stocks" and "flows." I realized that with the Macintosh, a student could design a system and then the software could crank out the solution using simple numeric methods. This could be revolutionary. Nancy Roberts had recently earned a doctorate for her work in applying system dynamics to Education. We recruited Jay Forrester and Mary Budd Rowe and submitted a proposal to the NSF to explore the educational potential of this idea. In 1985 NSF awarded us the grant for what became known as the "Modeling" project.

The basic ideas of probes and models that we developed at TERC and Lesley in the 1980s will turn out to be among the most important contributions of technology to science education.

The third reflection is from Art Bardige, President, Enablearning, Inc.:

One of Lesley University's great strengths is its outreach not just to schools but also to the educational business community. Just the opposite of the ivory tower institutions that too often talk only to each other, Lesley has made it a practice over my 30 years of experience in educational software to reach out to the developers and publishers of educational materials and software. It has offered us much needed guidance, support and community. We, in the business side of education, all too often are isolated from the academic and teaching side. Lesley has hosted events that bring us together and give us a chance to interact with faculty and students. We have presented our creations in classes and got them critiqued. We have been able to get help on research and on grants. And we

have been able to link our enterprises with interested faculty members who help us get them right.

This kind of cooperation and interaction has made a major difference in our ability to create great educational products. So on this Centennial Anniversary, I want to applaud Lesley University for its great contribution to education and to educational technology through collaboration with industry. I want to thank all of my friends at this farsighted institution of truly higher learning for their help and guidance. I feel very fortunate that my educational software companies have been housed in Cambridge and can work with Lesley.

Impact on Education Policy

The third category of reflections on the Technology in Education Program considers the impact on education that it has had. Beth Lowd eloquently speaks of this as she describes her association with Lesley.

My motivation for taking courses in the Technology in Education program was to learn how to use computers in the classroom. I was moving from teaching middle school English to being a "computer specialist" for the Lexington Public Schools and I needed to know much more than the little BASIC programming I had picked up on my own. Lesley helped me develop a philosophy and ways to help teachers learn. As computers and software changed and matured, Lesley's program helped us all make sense of the changes and see how they could impact learning.



Beth Lowd, computer education specialist for the Lexington schools, helps students discover the finer points of programming a battery-powered truck.

Beth Lowd, helping students program a Big Trac

I saw Lesley as a community of learners. The early conferences really helped those of us in the schools to connect with thinkers, academics, researchers and software developers. Lesley brought in the experts from so many other worlds to share what they knew. Much of what I learned at Lesley I was able to bring directly back to my teachers. I felt supported by the faculty and other students—we helped each other.

My particular niche was at BEST— Business and Education for Schools and Technology—the informal lobbying coalition that Bob Pearlman and I founded to educate the state legislature about the need to fund technology in the schools. The many relationships I developed at Lesley, Lexington, MassCUE (Massachusetts Computer Using educators) and MCET (Massachusetts Corporation for Educational Telecommunications) served me well. We all helped to pass the Education Technology Bond Bill that funded the original wiring of the Schools for Internet in 1996.

Adeline Naiman also comments on the impact of the TIE program on education policy:

In 1968, the American Association for the Advancement of Science (AAAS) had its annual meeting in Boston, and I took my 10-year-old along one day. I was then editor of the Elementary Science Study at the Education Development Center (EDC). Seymour Papert and Marvin Minsky, with whom I had done some work at MIT, brought four terminals connected to the MIT PDP-8 mainframe and invited visitors to try them.

My son had a ball, and I had a kind of revelation of the empowerment computers could now bring to everyone. In 1975, I joined the corporation and later the board of Lesley College, and took part in its computer conferences that began in 1978. I became friends with Sue Friel, Nancy Roberts, and Beth Loud, who shared my vision. In 1979 I became managing director of TERC, where Bob Tinker was pioneering the use of early personal computers in science education. I influenced his bringing his science probes to younger students, and when Apple, Texas Instruments (TI) and IBM brought out the first commercial individual computers, the world exploded.

When TERC moved to Massachusetts Avenue in the early eighties, the interchange between TERC and Lesley became more frequent. Tinker worked on his probeware, and I joined HRM Software to direct publication of this and other curriculum tools for classroom computer use. Lesley became a center for teachers to learn to use computers in the classroom and took on distance learning, establishing branches around the country.

And Dan Watt's memories of Lesley, TIE and Logo:

For me, the beginnings of Lesley's Computers in Education program coincided with my own professional beginnings as an advocate for appropriate uses of computers in schools. My connection to Lesley College began in the late 1970s when Nancy Roberts and Sue Friel called a series of meetings for people interested in educational computing, to advise the college on how to make use of a PDP-11 mini-computer donated by the Digital Equipment Corporation. It quickly became clear that the folks who came to those meetings—representing Lesley, MIT, BBN, TERC and several public school system—felt a strong need to continue meeting as an interest group.



We started having monthly meetings on Saturdays, breaking up into interest groups. I was in the “computers and human values” group with Andee Rubin, Tim Barclay, Lynn Nadeau and others. We focused on two main issues: equal access to technology and making sure that students and teachers kept control of the computers, rather than being controlled by them.

We decided to hold a conference at Lesley about educational uses of computers—the first ever in the Boston area. Then there was the annual Lesley educational computer conference, which was another marvelous opportunity to share projects in progress and talk with other developers, teachers, administrators, and Lesley faculty and students. It was an event to which I always looked forward with pleasure.

John Richards, one of the very first supporters of the Lesley Graduate Program for Computers in Education, also has strong memories of the early days:

In the late 70s and early 80s, the Apple II, the TRS-80 and the Atari dominated the personal computer market. Macs and PCs weren't invented yet, and society was unaware of the changes that were about to happen. Schools were told that technology was the answer, but we didn't even know the question, and teachers had no place to turn for answers. At that moment in time Nancy Roberts created the Lesley Graduate Program in Computers in Education to provoke questions, and to provide answers. The program led to a research and teaching community that persists to this day. More importantly, it provided a critical mass of people working to understand the practical impact of computers in teaching and learning that complemented the more esoteric research being conducted at some of its better-known neighbors.

My own contribution was to create and co-teach a couple of courses that would become staples of the program. Lesley was a true collaborative environment. When you created a new course, the rest of the faculty sat around the room taking notes, preparing to improve it and then teach it themselves.

National recognition of the program was established when, in 1989, Nancy Roberts and Susan Friel co-chaired the National Education Computer Conference (NECC) in Boston. Lesley sponsored it and I served as Program Chair. The conference was the largest NECC ever held, and was a testament to the closeness of the community.

Len Scrogan, a long time adjunct faculty teaching in our off-campus programs, reflects on the impact of the program on the country as well as himself.

The Lesley Technology in Education program has reached thousands of educators across the country, clearly contributing to the technology revolution in schools more than any other single institution. Due to my longevity, I have seen dozens of Lesley graduates reach leadership pinnacles in their respective careers: I have seen the transformation of many hundreds of teachers into district and state coordinators, principals, assistant superintendents for technology, and leading edge consultants. It's astonishing. In the early years, the graduate students were clearly proudest of the national recognition afforded to Lesley University's outreach program by the US Office of Technology Assessment. Lesley was recognized as the leading outreach program in technology in the country. I saw so many students swell in pride as they considered their own part and parcel of this historical effort.

EdnaMay Duffy, a professor in the program, reports on the impact of the course she teaches, ECOMP 6101 Technology: Impact on Society and Schools:

When I joined the graduate School of Education I discovered that teachers, armed with technology skills, could be investigators using their classroom as a laboratory. ECOMP 6101, the capstone course, focuses on change through research, and includes grant writing as one of its assignments, an assignment that integrates research with the knowledge and skills acquired throughout the entire program. Over the years, Lesley ECOMP 6101 students have been awarded monies for technologies and change-making curricula. This funding represents the impact that one course has made on schools all over the U.S. If multiplied by the number of these courses taught over the years, a real sense of the significant impact the Technology in Education program has made can be realized.

Implementing the Vision

The fourth category of reflections focuses on implementing the newly emerging educational technology vision. Two of the early program graduates who went on to work at Lesley, Ron Koehler as an adjunct faculty and Jeff Pankin as Director of the Computer Laboratory, contribute to this section. Tom Plati speaks for our western Massachusetts collaborators, and faculty member Bill Barowy recounts the ability of the program to inspire and guide district level system impact.

Ron Koehler remembers beginning his Lesley experience in the second class of students entering the Computers in Education Program.

“Computer literacy” seems a quaint concept in today's world of connected students, but curriculum integration is another matter. At Lesley, curriculum integration was always about using technology tools to promote the skills that matter: using information, problem solving, collaborating, and creating—the skills that have become increasingly important and are today listed among what is called “21st Century Skills.”

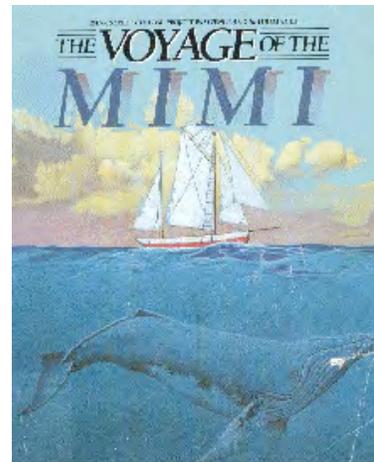
When I began teaching in the TIE program in 1984, the only online piece of the curriculum was an email demonstration we did in a course called Computers in the Schools. Today, second graders in my school district work on cooperative learning projects with 7-year olds in the UK and India. School technology was not ready for the future in those days, but Lesley was. By emphasizing technology's role in promoting the skills that matter, the TIE program was shaping educators who could prepare students for the Global Society long before anyone used that term.

Tom Plati, now Director of Curriculum, Assessment, & Technology for the Lexington, Massachusetts Public Schools, remembers:

The Lesley University environment in the 1980s, propelled by its visionary educators, was the single largest force in helping us first understand the power of technology in education in our region. As Math/Science Director in Shrewsbury, MA in the early 1980s, I was fascinated by the introduction of the new microcomputers and searched for different strategies for utilizing this new technology, learning them by taking courses at Lesley. Ricky Carter taught Logo I, Logo II, and the Software Evaluation class and became an important mentor and coach to me and to others. To inspire us Ricky brought in the who's who of technology at the time: Tom Snyder, Art Bardige and Seymour Papert. New instructors provided excitement in other areas: Maureen Brown Yoder in multimedia and Angie Ferris and Karen Gartland in technology curriculum development through the Voyage of the Mimi. Wow! And, how could any of us early adopters ever forget the "must" technology conference we just had to attend each year. It wasn't the MassCue Conference or even NECC. It was the Lesley Computer Conference, held on a warm spring May day that always provided us with rich sustenance in so many educational areas.

Jeff Pankin, an early graduate of the program and now a Senior IT Consultant at MIT, was the first director of the computer lab and reports on what it was like at the beginning of the Computers in Education program in the early 1980s.

My vision of the future is one in which schools become more humane places to learn and work. I came out of the Open School movement and then latched onto technology. To me technology held the promise of freeing teachers from mounds of paperwork and students from boring, tedious lessons. Technology also meant teachers would be better equipped to serve each child, with technology tracking progress and supporting teacher's pedagogic decisions. Schools would become more fun and turn out more sophisticated thinkers. I think we all shared some vision of schools being better.



Voyage of the Mimi

Bill Barowy, faculty member and academic advisor to the Raymond, WA cohort illustrates the system impact that the Technology in Education program has had on one rural Washington State community:

Our 1998-2000 Technology in Education cohort from Raymond and South Bend Washington knows whole-heartedly what it means to belong to a community. In 1998 I became the cohort's advisor and later traveled to Raymond to teach a class. I observed the social conditions that follow when a 19th century boomtown depletes its natural resources of shellfish and trees and the economy goes bust. The teachers felt challenged, but much needed. The students were consistently performing one year behind grade level. When the local hotel burned, many migrant families were displaced, and the high school gymnasium housed them for many weeks. Teachers gathered clothes from the community, and the school fed its new inhabitants.

Cindy Jouper, who was a Lesley student, Lesley's lab coordinator, and a teacher turned teacher-trainer, assembled the computer lab every Lesley weekend and put the computers back in the classrooms during the intervening time to maximize their effectiveness with the children. The community obtained this equipment and a modicum of training by winning a Technology Literacy Challenge Fund (TLCF) grant for \$400,000. Linda Brummell recalled how the whole community pulled together to complete the proposal swiftly. Sandy Weller, another Lesley student, oversaw the completion of all the tasks. Cindy conducted the training for the yearlong Grant, leaving the school without its resident expert in technology. The staff searched for Master's programs that would further their abilities, and discovered Lesley. Linda became the site coordinator.

Linda, Vivian, and other Lesley students, wrote additional proposals and won subsequent Gates grants, which brought more resources and training. The TIE cohort model had significant effects on the educational practices of the entire school—a “critical mass” for change.

Conclusion: An Essential Thread

Throughout the history of the program both faculty and students have developed valuable connections and collaborations. Faculty have published many books and articles on a variety of topics, and presented papers nationally and internationally. It was the faculty's practice to work together on these publications. In different combinations, Bill Barowy, George Blakeslee, Ricky Carter, Angie Ferris, Margery Miller, Nancy Roberts and Maureen Yoder have written several books collaboratively.

For the educators in our classes, many assignments have empowered them to document their newly acquired knowledge, to raise funding for important initiatives, and to create materials to enhance their teaching and benefit their students and colleagues.

George Blakeslee, EdnaMay Duffy, and others teaching the “Technology: Impact on Society and the Schools” course require students to write a grant. Many of these have been funded, resulting in hundreds of thousands of dollars worth of equipment, professional development, and innovative ideas implemented in classrooms. Stephan Cohen, Bill Arrigoni, and other faculty who teach the “Web Site Design and HTML: Web Publishing for Educators” class have motivated students to create Web pages for their districts, their schools, and themselves. Jo-Anne Hart, in her class, “Technology and Social Studies” involved students in a “Growing Voters” project, promoting a national effort to register voters for the 2004 and 2008 presidential elections.

Students have also published articles with the support and encouragement of faculty members. Since 1999 Joan Thormann, in her class, “21st Century Teaching: Supporting All Learners on Ability Spectrum,” requires students to write an article for publication that focuses on some aspect of technology use in special education. To date ten articles have been published in a variety of journals. Mary Seegers, one of the published students, wrote, “I am now in awe at the thought of how our efforts have combined to potentially result in someone somewhere—someone whom we will never know or see—receiving some type of assistive technology software or hardware device that will significantly change their life.”

Judi Mathis-Johnson, another core faculty member, summarized the impact the program has on students:

Our philosophy has been to provide real applications in the current classroom and we continue to do that today. We change teachers, classrooms, schools, and curricula from the moment students take that first weekend class. We don't wait until students emerge with a degree to take leadership roles, we set them up with the philosophy and tools to begin that role immediately, so they can take on an even greater role later on.

Over the years, the masters program has been continually updated as hardware and software capabilities have changed and innovative new approaches to using technology in classrooms have emerged. Internet-based resources, advanced communications capabilities and virtual worlds offer exciting new possibilities in the years to come, along with technologies and applications about which we can only dream.

A spirit of educational entrepreneurship has characterized the Lesley Technology in Education program from the very beginning. As Sue Friel said, "Everything we did was lots of fun, was very creative, and everyone at Lesley supported us." That spirit has spread outward from Cambridge and now exerts positive educational change in communities in 22 states and in graduates' classrooms around the world. The Technology in Education program clearly illustrates the huge benefits accruing from faculty and community collaboration with administration that allows and supports entrepreneurship. As one of our recent graduates said, "The Lesley Program was life changing. It made me a better teacher and I can't wait to use what I've learned."

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