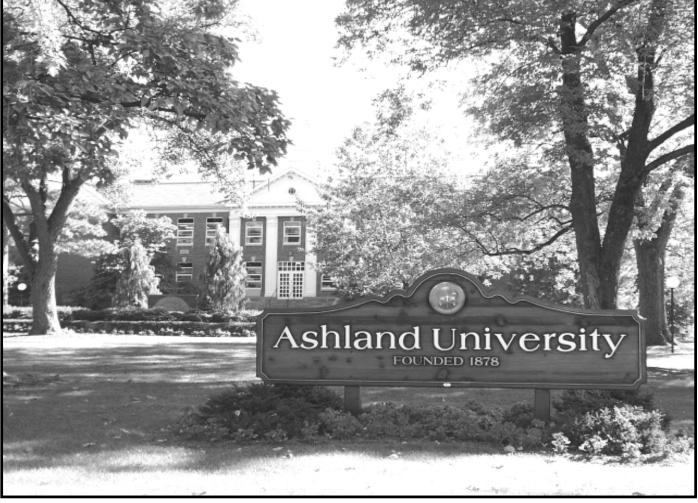# MID-WESTERN
EDUCATIONAL
RESEARCHER

• Official Publication of the Mid-Western Educational Research Association •

Ashland University

On the Cover

A private, comprehensive institution, Ashland University takes great pride in its philosophy of "Accent on the Individual" and offers a learning environment in which students can expect personal attention from professors and staff. Midway between Cleveland and Columbus, Ohio, Ashland is home to 2,000 full-time, undergraduate students. Total enrollment is 6,000 students, and includes graduate programs in business, education and theology and program centers throughout the state. Founded in 1878, Ashland University features a strong academic reputation, offering 70 majors including the traditional liberal arts majors as well as a wide range of majors in business and education. The education program, which offers pre-K through doctorate level courses, is one of the largest among independent and state institutions in Ohio.

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2001 Theme Issue on Bilingual Education

At the beginning of the 21st Century, bilingual education in the United States has received several severe political blows that may prove to be fatal. Bilingual education has become a symbol to rally pseudo-nativistic prejudices among extremists in this country. This contemporary "nativism" is as false as its antecedent movement in the 19th Century which was selectively "indigenous." This is, it failed to include the native, pre-European population of this continent, limiting itself to Europeans only.

The current wave of overarching prejudice against immigrants, third world populations, and bilingual education exists in the midst of a major economic and political contradiction. As multinational corporations push for globalization of access, markets, resources, and domination, the education profession is pressed to reject the inclusion, teaching, and learning of other languages, cultures, and heritages. As the world expands its educational programs to include other languages, cultures and diverse populations, the US education system is moving toward "English Only."

In the struggle for and against bilingual education, teacher education programs have developed self-defeating curricula in that teachers need not be proficient in the target languages. The compromise has been to develop and implement programs that do not maintain the languages, cultures, or heritages of their students. Transitional programs have been developed for K–3 populations that mainstream students by the third grade. This implies that heritage languages are not valued by the teaches, the communities who speak them, nor the institutions in which they exist. In the process, bilingual education has acquired political baggage and stereotypes, and has been cast a failure: persons associated with bilingual education programs, students and teachers alike, have been devalued.

This special edition of the Mid-Western Educational Researcher will present a variety of perspectives, experiences, and theoretical frameworks that reflect the diversity of multilingual education in the United States. The guest editors call for papers that address issues in bilingual education.

Manuscripts should be submitted by May 15, 2001. Four copies of the manuscript should be submitted, typed, double-spaced (including quotations and references) on 8 ½ x 11 paper. All materials should conform to the language, style, and format of the *Publication Manual of the American Psychological Association*, 4th ed., 1994. Manuscripts should be sent to:

2001 MWER Theme Issue

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Future Shock: Education in the Information Age

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A colleague asked me some time ago if I thought technology, specifically the Internet, would do away with higher education as we know it. Would this new technology—with its ability to organize and present information faster than we can even think of the questions, at distances sometimes not spanned reliably by telephone—create that fundamental change, that shift of paradigms referred to by Kuhn? He asked me this question because he was genuinely concerned on a number of levels. He also knew that I was into technology, having spent the last decade studying, thinking, and experimenting with new technologies in education and educational research.

On the most primary level he wondered if he could learn, change, and adapt to the new technologies, and so be able to remain a contributing member of the faculty. He didn't want to be a dinosaur, made extinct by the comet of micro-electronics. He was worried about whether he could still contribute, still make a difference, still even be able to interact with others in his field! Being tenured, he wasn't worried about losing his job, although he was worried about being marginalized by his younger and more technically literate peers. How could he be the "senior scholar," the "elder statesman," if what he knew no longer mattered (or, at least, was being used), and how he came to know it was now obsolete?

On another level he was concerned for his students, those who were preparing to come into the professorate. Would they be able to succeed in this new world? Was our institution providing them the kind of knowledge, the training and the skills, that the university of the next century (I should say that this conversation was conducted **last** century) would demand? What **would** the university of the 21st century look like, and how could we do a better job of preparing future faculty to work, and succeed, in that environment?

Before I could answer any of these questions, or give my own futurist vision of things to come, I though it best to look backwards for a moment and see how new technologies have impacted education over the years past. Perhaps this might lend some insight into how the institution, and society, would cope with our rapid technological advancements. And, if nothing else (as my doctoral advisor always told me), chanting the ancients is always a great way to start any speech.

Over 1,000 Years Ago

I begin, therefore, with a look back at a time before the modern, western university, over 1,000 years ago near the end of the first millennium. At this time education existed in primarily four arenas: at home, at church, at court, or with a master.

Home education, through the early years (about age seven for the gentry, and almost exclusively for the peasant) consisted of those things one needed to know to exist: daily living, hunting, growing grains and other foods, and interacting with one's peers. Reading was a limited skill, restricted only to a very small segment of society. Instead, the emphasis was on memory and knowledge of local conditions (travel being that which one could accomplish on foot in a single day).

Theology, carried to the masses by the priestly class, delivered rote instruction designed to ensure obedience to God and King. Monastic and cathedral schools focused on the preservation of knowledge and its fit with doctrine, its aim to produce a literate priestly class. The seven liberal arts, codified into the **trivium** (grammar, rhetoric, and dialectic (logic))—the "arts" part of the curriculum—and the **quadrivium** (arithmetic, geometry, astronomy, and music)—the "science" part of the curriculum—by Martianus Capella during the fifth century, served as the cornerstone for this religious education. Boys as young as ten could be accepted to such a school, where they might study to the age of 18 before being admitted as a member of that order.

The sons of the gentry and nobility would spend their first seven years or so at home, the next seven as a page, and the next seven as a squire. At home he would be educated in morals and religion; as a page in manners, reading, writing, and other social skills; as a squire to a master in the arts of hunting, fighting, and waiting on his master or lord. Upon reaching 21 years of age the son would undergo an elaborate religious ritual, receive a blessing on his sword and armor, and receive his knighthood.

The fourth arena was that of apprenticeship, reserved for those engaged in a trade or craft. Apprenticeships were a contract most often formalized between a male child (and his parent or guardian) and a master in that trade or craft. In exchange for certain number of years of, essentially, indentured servitude (oftentimes in addition to other items of value, similar to a dowry), the master would agree to teach the apprentice their skills. These tradesmen, in the later part of that first millennium, organized into gilds for the purposes of protecting their earnings through the domination of trade in certain finished goods by the restriction of those who could be taught, and practice in, that trade. These gilds were to

exert enormous influence over medieval Europe, and serve as the forerunners of both unions and universities. To illustrate, the following is a fictitious account of a commencement address that might have been given, circa 950 A.D. from a master to his graduating apprentice (it has been written in relatively modern English for your convenience):

> William, son of Frederick, the day has arrived when you must leave this shop and strike out on your own. You came to me as a mere boy of nine years when your father contracted your services to me apprentice. Side by side with my own sons over the last seven years you have learned the tradescraft of leather smithing, as taught to me by my own father and to him by his. As your master I have done my best to teach your these skills and learnings such that you might prosper. I know I have been, at times, a hard master, pushing you to work beyond the light of day. Throughout, despite all, you have not taken your leave of me nor complained to the gild. You have learned, and in doing so have developed a skill worthy the status of journeyman. Your master piece work, examined by the highest within the gild authority, demonstrates your quality and craftsmanship. Be mindful of the imitation, the cheap imposter who would weaken our gild strength with inferior product or underpriced goods. Likewise listen not to those who would replace the work of men with that of machines. Go forth, now, and find such work as you are able. Likewise too find a bride, have many sons, and teach them the skills I have so taught you. Be good and true to your trade, your gild and your God, and may you live beyond my own years of thirty and two.

By the 1200s the formalization of gilds was nearly complete. Gilds helped to insure uniformity of produced goods, provided protection against the abuse of apprentices, and normalized the route through which an apprentice might proceed—in education and experience—to become a master. These gild policies were later oftentimes codified into law, with by the 1600's much of trade law resting on the prior policies and practices of the various gilds.

It must be remembered, though, that the primary purpose of the gild was the protection of its members from deleterious influence. Such influences could come from inside its own ranks (such as the advancement of an apprentice inappropriately skilled), or from the outside (individuals or foreigners seeking to cut in on the tradesman's livelihood). New technologies, when they did appear, would pose a similar threat to the income of gild members and would be treated in the same way. Only when the members of the gild had time to adapt to the new technologies, either through retooling or re-education (or both), would the new technologies be accepted.

The Origins of the Modern University

Our modern institutions of higher education trace their roots back to events of the late 1000s and early 1100s. At this time the first university (or **studium**) was established around 1088 in Bologna, Italy. The University of Paris was founded just a few years later in 1119, the different colleges of Oxford University between 1167 and 1185, and Cambridge in 1209.

These early universities were not created by kings or popes, nor by the wealthy or landed. Instead, they were formed as common protection societies for students and teachers. Indeed, the very word university comes from the Latin word **universitas** meaning a "corporation" or "gild", a union of scholars. Unlike today, students were very much in charge of these early institutions; according to Gwynne-Thomas:

> The students specified the length and pace of the lectures (since note taking was imperative in the absence of readily-available texts), and could dispense with unpopular instructors who failed to attract more than five students to their classes.

In addition, students determined the times and places of lectures, set rules concerning the nature and conduct of faculty (including salaries), and would strike (or leave town entirely) if local conditions were not to their liking. Town merchants, profiting off of the collection of students and teachers in their towns, quickly learned to acquiesce to lower rents, food costs, and the university's control over students' public behavior lest the institution up and leave the town (taking all its revenue with it)!

Students organized themselves into **nations**—really dormitories for students coming from similar backgrounds and geographic regions—which in turn organized together to form the higher structure of the institution. Faculty, in turn, formed their own gilds, called **collegia** (colleges), to promote the faculty interests both with the students and in the town in general. Eventually these nations and colleges somewhat merged and came to dominate university life as we know them today. Universities other than Bologna followed somewhat different models, with the University of Paris initially organized around masters of the institution (the professors).

Students entering one of these early universities would normally do so at about the age of 14 to 16 years, enrolling for study under a particular master. Although not all from the upper classes, most students could read and write Latin, had studied from Capella's seven liberal arts, and were quite capable of living on their own. Depending on the field of study, the student would engage for between four and seven years, refining his skills at reading, writing and speaking. A **baccalaureate** (from the Latin **baccalaureus**, according to one source being roughly equivalent to the word "cowboy", or one who is just beginning his candidacy for a degree)

would recognize these abilities, and the student's intention for beginning serious study. Only later on did this designation become a degree in itself, intended for those who did not intend to pursue teaching as a career.

The student would then engage in specific study, again under the tutelage of a specific professor (or group professors), in a particular field. After additional years of study (three to four for a Master of Arts, perhaps as long as 16 years for a Doctorate, with considerable variability from field to field and university to university), the student would be required to engage in a dispute (a defense of his thesis, consisting of both a private and a public discourse). Like the apprentice craftsman, the apprentice professor would present his "master piece" to the authority of his gild (the "nation" of his "university"), seeking recognition and the awarding of the degree and, with it, the **licentia docendi** (a licence to teach anywhere). Such a license would actually be granted typically by the vice-chancellor, using language such as this from the University of Paris from the mid-1300s:

> I, by the authority invested in me by the apostles Peter and Paul, give you the license for lecturing, reading, disputing, and determining and for exercising other scholastic and magisterial acts both in the faculty of arts at Paris and elsewhere, in the name of the Father and of the Son and of the Holy Ghost, Amen.

If you think this is much different than what we do today, consider the rules related to the **inception** (the process for actually receiving the degree) from the University of Bologna in the mid-1200s:

> Wherefore, there is required a vigorous examination by some lecture or disputation in which he must answer arguments. And then he has to be approved or rejected by a ballot of the members of the college according as the majority vote. And by the chancellor or vice-chancellor of the university is given him license to receive the doctorate, either in theology or law or philosophy or medicine, and the power of occupying a chair, or lecturing in universities, disputing publicly, interpreting, glossing, and the like. Then the recipient of the degree, after making a brief speech in praise of the faculty, requests one of his promoters whom he names and who is present that the insignia of the doctorate may be given him. And that one rising, after commending the candidate's proficiency in the subject in which he is to receive the degree and commending the doctorate, gives him the insignia: namely, first a closed book that he may have that science close and familiar in mind and may keep it sealed from the unworthy and in such respects as it is not expedient to reveal. Second, he gives him an open book that he may teach others and make things plain. Third, him gives him a ring of espousal to that of

science. Fourth, a cap as a token or aureole or reward. Fifth, the kiss of peace.

At this time the terms Master, Doctor, and Professor were essentially synonymous, with only minor differences existing between fields of study and particular schools. The real prize of the whole effort was the combination of the license to teach and acceptance into the gild of the professors. Thus the early university and, indeed, its modern counterpart, are seen to differ little from the trades craft gild structures of the late first millennium—structures design primarily to restrict entry into a particular profession (and, by doing so, to protect the earnings power of those in the profession) and, secondarily and much later, to insure the quality of the craft so produced.

Thus, the structure of our modern university was essentially established and routinized by the late 1200s. It has remained in this form for, I believe, two main reasons. First, it seems to work, or at least serves a function adequate enough for society that, over time, there has been no major reason, no uprising, resulting in a change. Second, the university structure has not faced any real challenge—technological or otherwise—for which it could not adapt. That is, I think, up until just recently. To understand this second point better let us take a look at some of the technologies that have, over the years, had some impact on higher education.

Books: The First Technology

Clearly the first technology that had a major impact on the university was the printing press. To have realistic mass production of books one must combine four major technologies: paper, movable type, ink, and means for putting the first three together. The mass production of paper—originally from old clothing (boiled into a pulp, spread over a screen, then dried, hence the terms "linen" or "rag") originated in the first century A.D. with the Chinese. By the ninth century these Chinese printers had mastered techniques for setting characters into wooden blocks to mass produce books. The real breakthrough occurred, of course, in 1450 when Johannes Gutenberg was able to combine sturdy metal characters into a form with a relatively easy process for inking that was the forerunner of the modern printing press.

Gutenberg's steel punches consisting of 264 movable and reusable characters; his combination of heated oil, resin, and soap as an ink slurry; and his transformation of a wine press into a printing press was truly innovative. And while his Gutenberg Bible was the most publicized of his works, he actually made most of his money through the printing of indulgences—a kind of "do not stop on go, do not collect $200" pass out of purgatory for those wealthy enough to buy them from the Church. Like many small businessmen, though, Gutenberg's ideas were better than his execution, and while the notion of a printing press was first rate Gutenberg never profited all that much from his invention.

Despite the potential of the printing press, it was not until almost 300 years later, in the 1730s, that really cheap printing emerged. Later inventions of the steam engine, paper being fed into the press from large rolls, and the use of a cylindrical printing plate to speed production times transformed the process. By the early 1800s, books, magazines, and newspapers were now somewhat affordable. Prior to that, printed books remained relatively rare, expensive items for which few had access.

Its Impact on Education

The professors and students of the late middle ages and renaissance certainly used printed books, in addition to hand-copied texts, when available and affordable. Students would often band together to share in the purchase, or more commonly the rental, of texts too scarce and costly for any one individual to own (perhaps a precursor to our modern bookstore book buyback and used textbook trade). Early professors would be said to "read their lectures", quite literally reading the textbook, to their students. The professors' explanation of the text, more important the more complicated or vague the text was, would often be written in the sides or margins of the text next to the original narrative. This method of enhancing and expanding upon the meaning of the text, known as glossing (the glossing mentioned in the prior inception narrative) was often formalized in the recopying or reprinting of the text. With some particularly difficult subjects, especially law, a single gloss was often not enough, and it was not unusual to see texts with two or three levels of gloss! The term "glossing over" a text, then, carried a much different meaning years ago than it does today, although we still have the remnants of glossing in modern footnotes and endnotes.

The real impact of the book, though, was not so much the mass proliferation of knowledge as it was the standardization of knowledge. Initially one had to rely solely upon a single master, whose own skill and capabilities were all you had from which to learn your craft. Books allowed students to have multiple masters. The dialectic was not between people, as it had been in Aristotle's time, but rather among their writings. Professors became increasingly known for their ability to sort, organize, and recite from these writings—the "chanting of the ancients." Possessing a large library not only spoke to one's wealth, but also to ones dedication to learning, since presumably one had read (and could recite from) those printed bodies of knowledge.

Machines: The Second Technology

The second class of technology that seems to have had an impact on the university were mass produced machines, especially those designed to aid a single person in doing repetitive tasks. These machines generally fall into two categories: those designed for computation, and those designed for transcription.

Machines for Computation

The first of the computation machines is generally credited to Blaise Pascal, although there is some suggestion that both Leonardo da Vinci and Wilhelm Schickard had prior, perhaps successful, attempts at creating such devices. Pascal, in 1642 at the age of 18, created a calculating machine (called the Pascaline), capable of performing eight digit addition and subtraction. His mechanical device, only reproduced in small numbers, improved upon the earlier abacus by simplifying the operator skill required for its effective use.

Like the printed book, however, mass produced calculators would not enter the market until almost 200 years later, when Xavier Thomas de Colmar created the Arithmometer in 1820. So successful was this particular machine (it could add, subtract, multiply, and divide) that it was still manufactured over 100 years later, through the 1920s. A variety of mechanical devices followed, including the slide rule which was just an extension of John Napier's "numbering rods" (sometimes call "Napier's Bones" due to the resemblance to human bone, having been made out of ivory), invented in 1617 to simplify multiplication through the use of logarithms. Electronic calculators, at first motor assisted mechanical machines, then later devices based solely on circuitry, made their appearance in the 1950s and 60s.

Machines for Transcription

The Sholes and Glidden Type Writer, first produced in 1874 by the E. Remington and Sons company of Ilion, New York, represented the first mass produced machine for doing, on an individual level, what the printing press was doing on the large scale. Inspired by an idea in the journal Scientific American (which actually coined the term "typewriter"), this original machine more resembled a sewing machine—sitting on a platform connected to a foot treadle to operate the carriage return—than it did a modern day typewriter!

As with many of the early machines is was a clunky thing, typing only in capital letters and frequently jamming or breaking outright. Later machines improved on these features, including providing a way for the typist to actually see what he or she was typing while they were typing it (the early machines having the paper below the operators sight line). These early machines also experimented with a variety of keyboard layouts, eventually settling on QWERTY as the standard we use today.

As an aside, QWERTY was not chosen to slow down typists to prevent jams (as was explained by Stephen Jay Gould in the book "The Panda's Thumb"); rather, Sholes wanted to increase typing speed! Manufacturing capabilities at the time placed practical limits on what could be produced with sufficient precision. Early typewriter keyboards, arranged alphabetically, jammed too easily. By using a study of letter-pair frequencies prepared by educator Amos Densmore, Sholes was able to separate commonly paired

letters to opposite sides of the mechanism, reducing the likelihood of clashes and actually increasing the speed of early typists. In 1932 Professor August Dvorak of Washington State University, on a grant from the Carnegie Foundation, created a new keyboard layout that placed more of most commonly used keys on the home row. While the efficiency of such an arrangement is still under debate, the prominence of QWERTY makes mass change unlikely.

Putting the Two Together

Putting these two together—the calculating machine with the transcripting machine—and you have today's modern computer. Of course, the modern computer didn't actually start out that way. It, too, went through a series of developmental steps.

Perhaps the earliest concept model of what would become our modern-day computer was proposed, although never successfully created (due to the limitations of the manufacturing tolerances of the time) by Charles Babbage. In 1822 he proposed a device called the **Difference Engine** which would, he hoped, do away with the inefficiencies and inaccuracies of large scale calculations. After 10 years of work, Babbage revised his original design into a new **Analytical Engine**. This new machine, proposed by Babbage in concert with August Ada King, the Countess of Lovelace would have been, had it been successfully built during his time, easily recognized as the mechanical version of any modern computer. Its innovation, thanks to Lady Lovelace, would have been the ability to be programmed with an infinite varying set of instructions; to be able to carry out those instructions (including conditional, or "if ... then ...", series); and to report the results of such a programmed run. This earliest computer, when finally constructed in more modern times, was as big as a locomotive and powered by steam, yet possessed all of the constructs of a computer: an input device (punched cards, read in the same way as those used in Joseph-Marie Jacquard's looms); a "store", or memory, for holding up to 1,000 values of up to 50 digits each; a "mill", or central processor, that controlled the execution of the instructions on the punched cards; and output devices to print the results of a run!

Herman Hollerith, in 1889, borrowed this idea of using punched cards to improve the speed of the U.S. census tabulation from over 10 years to about 6 weeks! Although not a true computing machine, the idea of punched cards as a means of computer input remained through the 1980s. Later developments by John V. Atanasoff, a professor from Iowa State College (now Iowa State University, and his graduate student Clifford Berry, extended the work of George Boole and his clarified system of binary algebra to electronic circuits. In 1940 their work culminated in a prototype machine that, unfortunately, never went much beyond that stage.

World War II saw other developments in electronic calculation from both German and British scientists, although it was a Harvard engineer named Howard H. Aiken who, in 1944, finally created a working, large scale all-electronic calculator know as the Harvard-IBM Automatic Sequence Controlled Calculator, or just Mark I. Shortly after that the Electronic Numerical Integrator and Computer, or ENIAC, made its appearance courtesy of the University of Pennsylvania and inventors John Presper Eckert and John W. Mauchly. ENIAC, using electronic tubes rather than relays like the Mark I, was a true general purpose computer. Although much less powerful than the handheld calculators of today, ENIAC had the advantage of using of 18,000 vacuum tubes and consuming over 160 kilowatts of power when running!

The invention of the transistor (in 1948), then of the integrated circuit (in 1958), then of Large Scale Integrated Circuits (or LSIs), Very Large Scale Integrated Circuits (VLSIs) and, by the early 1970s, Ultra Large Scale Integrated Circuits (ULSIs), dramatically reduced the size needed for computing hardware while simultaneously increasing its speed and power. The Intel 4004 chip, created in 1971, followed by the 8080 chip, spurred the development of early computers from Commodore, Radio Shack, and Apple. IBM introduced its first personal computer (or PC) in 1981, with the Apple Macintosh making its debut in 1984. Development has continued since then, with new generations of computers seeming to appear about every 18 months. New development is approaching a crossroads, however, as the ability to miniaturize components on an integrated circuit fast approaches theoretical maximums (where circuits are actually small enough that quantum electronic effects, seen in individual atoms and electrons, interfere with computing)!

Its Impact on Education

The impact of these, and similar, machines on the university was both interesting and unexpected, and has really been seen more in the last two decades than at any time before. Prior to their introduction students needed to be able to master the mechanical skills, the operational skills, related to writing and arithmetic. Sharpening a quill, performing arithmetic "long hand", penmanship—all were considered traits that a serious scholar needed. The increasing use of these machines radically changed, for the first time in over 800 years, the kinds of skills a student ought to have mastered. More importantly, these changed portended a more serious change yet to come; namely, the need for students to acquire significant skills and knowledge that their teachers, the masters, may not themselves have!

The real impact of computers on higher education, however, seems to be the mass storage, indexing, searching, and retrieval of information from stores previously unthought of. Whereas scholar of the prior century could, at best, hold the knowledge of a few hundred volumes in his or her head, the scholar of today has ready access to thousands—perhaps even millions—of works. High capacity disk drives, CDs and DVDs, and disk arrays compress not only the works themselves, but the indexed characteristics of the works. Our current desktop machines not only calculate faster, they also

search faster, introducing for the first time in history the notion of "data mining" as a real term. Memory, even the possession of books, is now less important than the ability to manipulate these machines to locate information applicable to a particular issue.

Communications: The Third Technology

Telegraphy

On the 24th of May, 1844, Samuel F. B. Morse received the first long distance transmission of a coded message over wire. Morse's assistant, Alfred Vail, located in Baltimore, Maryland sent the text "What hath God wrought?" to Morse, who was in the Supreme Court room in the Capitol. This message, recorded on paper tape (sounded telegraphy, with audible clicks and clacks, did not appear until 1849) really signaled the beginning of the communications age. Just a few years later, telegraph lines began spanning the country, and companies like Western Union arose as leaders in the new long-distance communications industry.

By 1888 the volume of information being sent by telegraph had increased to the point where telegraph operators were beginning to report a new malady known as "Telegrapher's Paralysis". Pain, numbness in the fingers, and a stiffness and difficulty moving the hand and wrist were common. Such symptoms are today known as "carpal tunnel syndrome". Changing from a vertical telegraph key to one mounted horizontally let telegraphers place their hands and wrists in a more natural position.

Telephony

When a permanent magnet is moved towards the pole of an electromagnet, a current of electricity appeared in the coil of the electromagnet; and that when the permanent magnet was moved from the electromagnet, a current of opposite kind was induced in the coils. I have no doubt, therefore, that a permanent magnet, like the reed of one of my receiving instruments, vibrating with the frequency of a musical sound in front of the pole of an electromagnet, should induce in the coils of the latter alternately positive and negative impulses corresponding in frequency to the vibration of the reed, and that these reversed impulses would come at equal distances apart.

These words, written by Alexander Graham Bell in 1874, describe his breakthrough idea that would combine the message carrying capability of the telegraph with his own developments in the electronic reproduction of sound. A serendipitous occurrence on June 2nd, 1875, provided the final insight. In this instance Bell, and his assistant Watson, had set up several telegraph stations using a tuned reed to produce a particular tone when the telegraph key was depressed. A corresponding tone on a tuned reed relay at the other end of the telegraph wire in another room was to reproduce the sound carried electronically over the wires. Wrote Watson of the experiment:

The undulatory had passed through the connecting wire to the distant receiver which, fortunately, was a mechanism that could transform the current back into an extremely faint echo of the sound of the vibrating spring that had generated it, but what was still more fortunate, the right man had that mechanism at his ear during that fleeting moment, and instantly recognized the transcendent importance of that faint sound thus electrically transmitted. The shout I heard and his excited rush into my room were the result of that recognition. The speaking telephone was born at that moment.

It took two more years of development and testing, which by January 20, 1876 culminated in a patent application of the first practical telephone. Continuing developments on this theme included: operated staffed switching centers; direct pulsed dialing; automated switching centers; dual-tone multiple frequency (DTMF) dialing; multiple-line business and residential service; overseas land-line and satellite calling; and wireless connections and cellular phones, all culminating in our ability to pay $1.10 to make a local call from our hotel rooms!

The Internet

Packet switched networks, enumerated by Paul Baran of the RAND Corporation in a 1962 report to the U.S. Air Force, detailed one way for the government to create a telephone network of computers that could survive a nuclear attack. Wrote Baran:

Packet switching is the breaking down of data into datagrams or packets that are labeled to indicate the origin and the destination of the information and the forwarding of these packets from one computer to another computer until the information arrives at its final destination computer. This was crucial to the realization of a computer network. If packets are lost at any given point, the message can be resent by the originator.

The Advanced Research Projects Agency (ARPA), later renamed the Defense Advanced Research Projects Agency (DARPA), took on the task to develop such a network. In 1968 ARPANET came on line connecting four host computers over 50 kbps lines (just slightly faster than the typical home telephone modem of today). The Transmission Control Protocol/Internet Protocol (TCP/IP) can into existence in 1973, with ARPANET having grown to over 23 interconnected machines. The next year Vint Cerf and Robert Kahn first used the word "Internet" on a paper about TCP/IP. USENET and BITNET were introduced in 1979, using a store-and-forward strategy to connect computers for e-mail and Listserv. By 1984 T1 lines, carrying data at 1.5 Mbps (25 times faster that the 56 kpbs original lines) began to appear as the National Science Foundation Network

(NSFNET) began to replace the civilian side of ARPANET. T3 lines, capable carrying data at 45 Mpbs, were conceived in 1988 and in wide use by 1992 as the primary backbone of the national network.

The notion of the World Wide Web was also conceived in 1992, although it was not until one year later that Marc Andreessen at the University of Illinois spearheaded the development of a graphical user interface for the web known as "Mosaic". By this time the number of hosts on the network had grown to over 2,000,000 computers. Asynchronous Transfer Mode (ATM) replaced T3 lines in 1994, increasing the speed of the network's backbone to 145 Mbps. By 1995 over six and one-half million hosts were on the Internet, and in 1996 network speed increased to over 622 Mpbs.

New technologies are pushing the speed limits over 2.5 Gpbs, with home users finally being able to benefit from these innovations as "broadband" technologies, with speeds of between 275 kbps to 10 Mpbs, connect home users to the backbone. The latest estimates for computers on the Internet is at well over 100 million machines with over 22 million web sites available for browsing. Popular among these web sites is one called "The Gutenberg Project" (http://www.gutenberg.net) which makes out-of-copyright texts available for download free of charge. Of course, numerous pay-for-product sites also exist providing text, search and index, audio, video, and very entertaining multimedia on demand.

Its Impact on Education

Computers and the Internet are placing enormous pressures on institutions of higher education in a number of different ways. The first of these is in distance education.

The beginnings of distance education in the United States is generally identified with correspondence courses in shorthand first advertised in the *Boston Globe* in 1728. Large scale distance education, however, had to wait until the creation of the Open University in the United Kingdom in the 1970s. Since then technology has increased the diversity in which distance education courses may be conceptualized, created, and delivered. Today students engage in asynchronous web-based tutorials, e-mail discussion lists and group forums, and live chat rooms (typewritten, audio, and video) from sites all over the world. Traditional geographic boundaries no longer apply, and many institutions are looking towards Internet-based computer-assisted distance education as the means to expand their student bodies (and, therefore, bottom lines).

Another pressure is related to traditional, campus based instruction. Students have become more technically savvy, more computer and network literate, than many of their instructors. Our fast paced, entertainment oriented culture colors how they see their world, including higher education. Today's students expect their classes to be as technically rich, as rapid and entertaining, as what they see on televi-

sion and experience through mass marketing. When it isn't, administrators begin to worry that they will use the power of the Internet to make other choices, physically or virtually attending other schools more to their liking.

Unfortunately, with just a few exceptions, many of these institutions of higher education have been glacially slow to adopt and acquire new technologies. Costs are huge, and more often than not institutions undertake these acquisitions at the expense of human capital and infrastructure maintenance. One also wonders whether the typical faculty member, even if they have the willingness to retool for the new technologies, has the time! This poses a serious problem, in which the Masters of the new information age seem to be the Students themselves!

Where Are We Going?

What does this all mean? Well, first let me summarize:

(1) Western institutions of higher education, first conceived of in the early part of the second millennium, have survived to today essentially unchanged in form.

(2) Recent technologies, however, are poised to change several key foundational aspects of these institutions. Specifically:

(a) For the first time Professors are increasingly **not** the Masters of the information technology of their trades craft;

(b) The sheer volume of information now readily available insures that hyper-specialization is a necessity, in addition to requiring increasing technological competencies just to access that information;

(c) The rate of technological change, once measured in centuries, is now measured in months, making the task of just keeping current in **only** the technology (let alone the content area) a near full-time proposition;

(d) Students (or apprentices) have increasingly easy and inexpensive access to means of education and certification that skirt, or entirely bypass, the traditional institutions, and are becoming more willing to exercise those alternatives with their buying dollar; and

(e) State support for higher education is not increasing at a pace that would support the current infrastructure as well as new technology.

New Technologies on the Near Horizon

There is one other concern not yet mentioned. The technologies that we all see in front of us today are **not** the technologies that we will be working with in the coming years. Unlike our predecessors for whom change came at a relatively modest pace, our information technology world thrives on change, on new ideas. We can, however, look down the

road to the very near future with some certainty. Changes we should expect to see within the next five year include:

(1) *High speed wireless local networks on campus, in the workplace, and in our homes*. Already on the market are wireless network cards, costly only slightly more than their wired counterparts, with speeds of up to 11 Mbps (traditional wired Ethernet is only a 10 Mbps connection). The mobility these devices allow, and the freedom from costly wiring, make them worth the additional costs.

(2) *Broadband connections into our homes*. If you live in most metropolitan areas you probably already have access to either high speed cable modems (over the same cable that bring TV to your house) or fast Asynchronous Digital Subscriber Line (ADSL) technologies (using your telephone wires). Rural areas are served by fast satellite download services over your satellite TV provider. Telephone and entertainment companies are now competing to establish the next standard in which telephone, television, and high speed network access are all brought into your home over a single connection.

(3) *New ways of interacting with your computer*. As any slow typist can tell you, using a computer can be a real pain. New technologies including improved voice recognition, handwriting recognition, and virtual keyboards (computers that detect your intent by the simple movements of your hands and fingers without contact with any real keyboard or mouse) are already in use. Computer displays are becoming lighter, thinner, and more flexible, with one prototype unfolded from your pocket when needed and another embedded as a part of your eye glasses.

(4) *Personal digital assistants (PDAs) that replace, in power and functionality, most desktop computer needs*. Current PDAs carry slimmed down versions of popular desktop applications, with some having memory capacities and processing speed equal to that of desktop computers from just a few years ago. Battery powered, with high resolution color displays, these devices will merge with your cell phone and pager to provide a single unit for all your portable information, communication, and web browsing needs.

(5) *Books, and other audio and visual entertainment titles, that only exist in electronic form*. Napster showed the world just how easy it is to "rip" (translation: copy from an audio CD to a computer disk) songs and share them with others over the Internet. Stephen King's latest book has been distributed entirely online, by-passing the traditional paper format and big publishing house with King still raking in huge direct payments. Electronic books, thin and lightweight battery powered tablets capable of storing and displaying numerous titles complete with graphics, hypertext links, audio and video content, now exist from several manufacturers, and publishers are competing to determine which format will work best.

(6) *Internet search engines that learn from your choices and style, remembering, adapting to your preferences and foibles*. Such engines become tailored to you, the more you use them the better they become.

(7) *A continued reduction in the use of paper for everyday transactions*. On-line forms, e-submissions (college applications, tax filings, reports), and record retrieval (bank statements and bill paying) are just some of the current applications. Signed into law this year was new legislation permitting the use of e-signatures in certain commercial and legal transactions. More and more companies and universities are putting important references and documents on line, finding it cheaper and faster than printing them on paper.

(8) *New forms of computing that promise even faster speeds and smaller sizes*. While current computing technology is very near the limit of what can be performed without quantum mechanic interference, three new developments hold potential for the future. The first of these new methods involves the use of massively parallel machines, where hundreds or thousands of relatively low-cost processors are ganged together to work on a common problem. SETI, the Search for Extraterrestrial Intelligence, recently employed a distributed version of such a technique in enlisting hundreds of thousands of Internet users to donate their spare compute cycles (that time when the computer is on but you are not really doing anything) to analyze radio signals from deep space. The second of these methods is called quantum computing. Quantum computers would, according to the theories being tested, operate near instantly and with orders of magnitude of simultaneous processing power over traditional binary machines. These quantum machines would make solvable problems completely intractable by current standards, and would threaten even the most secret of encryption schemes. The third method is known as bio-electronic computing, the merging of biological and electronic systems for computational power. Bio-electronic computers give rise to visions of intelligent robots or humans with augmented brains—currently still in the realm of science fiction, but for how long?

These are just some of the technologies on the near horizon. What will come beyond these in ten, twenty, or fifty years? And how will our institutions of higher education adapt to, or even prepare for and anticipate, these changes?

Predictions for Education from 1985

Before I make any predictions I thought it best, just one more time, to look back a bit and see if there was some wisdom to be gained from those who had come before. In this

case, though, I chose a more recent source. In 1985 Martin Cetron published a text titled "Schools of the Future", a work developed in conjunction with the American Association of School Administrators, and designed to predict what public schooling might look like in the year 2000. I think, as it is the year 2000, it might be illustrative to look at these predictions for their future, our present. I offer several of their predictions from 15 years ago as is, without comment.

(1)   High tech will cause workers to re-train approximately every five years just to stay current in their jobs.

(2)   Public schools will do the bulk of this re-training, perhaps three to four times in a person's career.

(3)   The average work week will decline to approximately 32 hours in 1990, then to 20 to 25 hours in 2000.

(4)   More businesses will be involved in apprenticeship training.

(5)   Annual teachers' salaries will be raised to within ten percent of parity with other professionals requiring college degrees.

(6)   Performance-based merit pay will be in effect in most school districts.

(7)   Paid sabbaticals will be offered to professional educators in many school districts; often the districts themselves will pay for teacher re-training—this will probably occur three to four times during teachers' professional careers.

(8)   Teachers' unions may be less contentious in the nineties or in the 21st Century. As teaching and pay conditions improve, union membership may decline.

(9)   The school day will increase from an average of about six hours to between seven and eight hours, and the number of days in session each year will increase from about 180 to between 210 and 240.

(10)   All students will have IEPs.

(11)   Computers will replace textbooks.

(12)   Vocational education will expand, with schools and employers working more closely together.

(13)   One-tenth of primary school students and one-quarter of secondary students may use interactive television to study at home one or two days per week.

And in specific regard to technology . . .

(14)   By 2000, computers will be available to 25% of the poorest school districts on a ratio of 1 per 8 students. In contrast, 25% of the most affluent school districts will have a ratio of 1 computer to 4 students.

(15)   Many of the details that plague administrators in 1985 will be taken over by computers. These will include: 1) scheduling, 2) attendance records, 3) payroll, 4) personnel data (certification), 5) bus scheduling, 6) cafeteria management, 7) inventory management, 8) student records, 9) budgets, 10) repair and maintenance scheduling, and 11) scheduling of extracurricular activities. As a result, administrators will have more time to concentrate on instruction and academic achievement for all students.

My Crystal Ball

So what do I think will happen, where the world will go and how higher education will fare? Following are my predictions, perhaps no better (or worse) than those from Cetron in 1985.

(1)   Public K–12 education, will remain virtually unchanged for the foreseeable future. Increasing numbers of single-parent households, and dual-parent dual-career couples, need someplace safe, nurturing, and cheap to send their kids each day.

(2)   Technology will make increasing numbers of options available to K–12 teachers and students resulting, I believe, in a continued erosion in schools' ability to offer any but the most basic of subjects. Foreign languages, advanced math and science, music and art, and other so-called electives will be made more affordable over the Internet and on CD instead of live and in-person.

(3)   Teachers will increasingly be at a disadvantage when it comes to knowing about, operating, and using advanced technologies. Their role as content area expert is long gone, and the current role of facilitator will likewise vanish. I am not sure what their next role will be.

(4)   As was true in the 1200s, most parents want their children to ease their way into full adulthood . "Camp undergraduate" provides just that opportunity, although increasing numbers of undergraduates will be older, working adults returning to school for the first time in the evenings, on weekends, and from a distance.

(5)   More students will opt to enter the work world directly, and will be educated on the job by their employers.

(6)   Enrollment in graduate and professional programs will continue to increase. With that will come more demand for off-campus, flexible schedule, and on-line education. Higher education will respond by making more demands of faculty, changing traditional work roles and expectations in order to remain competitive.

(7)   Many companies (the most recent example being the United States military) will examine and adopt Just In Time (JIT) education philosophies. Training will occur when you need it, for what you need it. Education will be continuous and on-going, but highly job oriented.

(8)   Public university will be even more entrepreneurial, less publically supported, and more in competition with privates schools and corporations. The produc-

tion of knowledge for knowledge's sake will decrease, as our accountability oriented culture demands an immediate return for its investment.

In Conclusion

To finish this story, I go back to the original questions my colleague asked me. Could he still be an effective professor if he could not operate well the technologies of today? Are we doing a good enough job to enable our students to succeed in the world of tomorrow? Are we undergoing the shift of paradigms referred to by Kuhn?

Yes, I told him, but not in the way he thought. It is not the computers, or the Internet, or all these other technologies that is causing this paradigm shift, this radical change in terms of how we look at the world. Rather, it is what these new technologies enable us to do! Information, and the knowledge that comes from the study of, and reflection about, information, is becoming easily and relatively inexpensively available to everyone, at almost any time, in almost any place. The university of the next century will not need gild Masters to apprentice students already more skilled in the technologies than they are. The content area expert, the "sage on the stage", will be an anachronism. The universities will instead need instructional developers—people who can sift, sort, organize, and create presentations and interactions of information that others will use. The universities will need instructional troubleshooters—facilitators who can help direct lost and confused students to new sources of information, different styles of information presentation, and creative ways to resolve problems. The universities will need instructional humanists—people who interact with other people to continuously remind each of us why we ask the questions, to consider the ramifications of our actions before acting, and to work to improve our lot as well as that of everyone else.

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From the Archives

MWERA's First Conference

On May 12, 1978, MWERA conducted its first annual conference at the Indian Lakes Country Club in Bloomingdale, Illinois. The one-day conference was jointly sponsored with the Northern Illinois Association for Educational Research, Evaluation and Development (NIAERED). The conference which was titled "Symposium on Education" emphasized the interaction and exchange of experience between producers and consumers of educational research.

The conference attracted 185 attendees--many more than the 40 attendees initially anticipated by the Association Council members at the December 3, 1977 meeting in Oshkosh. In each of the conference's eight meeting rooms, on-going sessions in well-defined areas of interest were conducted throughout the day. These areas included: Predicting Academic Success/Non-Verbal Instructional Approaches, Affective Domain, Measurement, Reform in Higher Education, Program Evaluation, Counseling and Guidance/Outreach Groups, Statistics/Moral Aspects of Education, and Curriculum and Instruction. The presenters included future MWERA presidents Thomas Andre, Judson Harmon, Barbara Hutson, and Dennis Leitner, and MWERA Secretary Nona Tollefson.

The conference included both a day and an evening program. The registration fee was $20 for the day program and $8 for the evening program. The day program included conference sessions, breakfast, and luncheon. The evening program included MWERA's first annual business meeting and formal election, dinner, and an invited address. The election of association officers at the conference was the only election in which a full slate of officers appeared on the election ballot. All future annual elections were conducted by mail. Elected officers included: Edward Griffin, President; Samuel Mayo, Immediate Past President; Judson Harmon, Vice-President; Jean Pierce, Secretary; and Steven Colby, Treasurer. Also, MWERA's constitution was reviewed and approved.

An enthusiastic letter affirming the success of this first conference was sent to Co-Chairpersons Edward Griffin and Samuel Mayo on May 15, 1978 by an assistant professor at Indiana University Northwest, who stated:

> "The number of persons who have joined MWERA and the group attending the business meeting were certainly indicators that there is a felt need for such an organization. I want to thank you all for the effort you have expended in making MWERA a reality. I also want to congratulate you and your colleagues on an excellent conference. ... I went to the meeting hoping there would be an opportunity for interaction and conversation with colleagues who were interested in and/or working in areas such as I am investigating. That did indeed prove to be the case."

MWERA's Presidents

Year	Name	Affiliation	Location
1977-1978*	Samuel T. Mayo	Loyola University	Chicago, IL
1978-1979	Edward M. Griffin	Ferris State College	Big Rapids, MI
1979-1980	Randall M. Isaacson	Indiana University	South Bend, IN
1980-1981	Judson A. Harmon	Wisconsin Department of Public Instruction	Madison, WI
1981-1982	Barbara A. Hutson	Virginia Polytechnic Institute and State University	Blacksburg, VA
1982-1983	Frank Farley	University of Wisconsin	Madison, WI
1983-1984	Jean W. Pierce	Northern Illinois University	DeKalb, IL
1984-1985	John J. Kennedy	The Ohio State University	Columbus, OH
1985-1986	Ralph F. Darr, Jr	University of Akron	Akron, OH
1986-1987	Fredric M. Wolf	Univ. of Michigan Medical School	Ann Arbor, MI
1987-1988	Robert L. Brennan	American College Testing Program (ACT)	Iowa City, IA
1988-1989	Isadore Newman	University of Akron	Akron, OH
1989-1990	Dennis W. Leitner	Southern Illinois University	Carbondale, IL
1990-1991	Ayres G. D'Costa	The Ohio State University	Columbus, OH
1991-1992	Barbara S. Plake	University of Nebraska-Lincoln	Lincoln, NE
1992-1993	Kenneth A. Kiewra	University of Nebraska-Lincoln	Lincoln, NE
1993-1994	Richard C. Pugh	Indiana University	Bloomington, IN
1994-1995	Thomas Andre	Iowa State University	Ames, IA
1995-1996	Gregory J. Marchant	Ball State University	Muncie, IN
1996-1997	Sharon L. McNeely	Northeastern Illinois University	Chicago, IL
1997-1998	Kim K. Metcalf	Indiana University	Bloomington, IN
1998-1999	Thomas S. Parish	Kansas State University	Manhattan, KS
1999-2000	Jeffrey B. Hecht	Illinois State University	Bloomington, IL
2000-2001	E. Jane Williams	Ohio State University	Columbus, OH

* During 1977-78, Sam Mayo and Ed Griffin were Co-chairpersons of the newly formed association, and during 1978-79, Ed Griffin was elected as MWERA's first president and Sam Mayo was designated as MWERA's first past president.

Conference Highlights

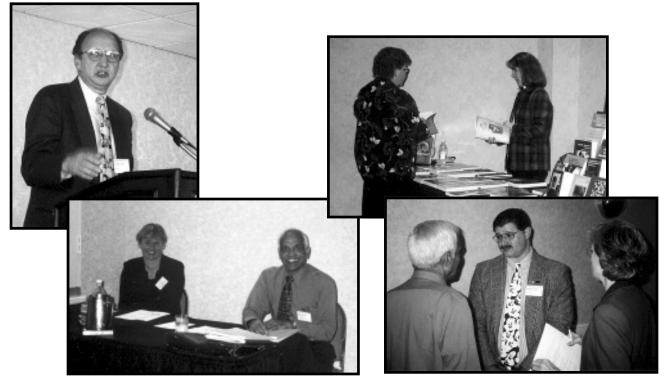## The 2000 Annual Meeting of the Mid-Western Educational Research Association

Carmen R. Giebelhaus, Program Chair
University of Dayton

The 2000 Annual Meeting of Mid-Western Educational Research Association is over and what a time we had! The 2000 annual meeting of Mid-Western Educational Research Association (MWERA) met once again at the Holiday Inn Mart Plaza in Chicago, IL from October 25th through the 28th. I am pleased to report that the conference was a success! This year there were 338 registered participants of which 135 reported themselves as new members! In addition, there were 70 "student" participants. It has always been a calling for MWERA to bring into the professional organization new members and graduate students; it appears that we were, once again, successful in this. Thank you!

There was an exciting program of invited speakers, focused workshops, and paper presentations intended to generate discussion concerning education and educational research as we begin making a difference in the 21st century. The conference featured 10 workshops and 17 symposia interspersed within a diverse and interesting program of paper presentation sessions, invited speakers, roundtables, panel discussions, and division and association meetings. Featured Speakers included Dr. Mary Diez, Dean of Graduate Studies at Alverno College in Milwaukee and Dr. Thomas Lasley, Dean of the School of Education at the University of Dayton.

The program began with a very well received workshop conducted by Bob Barcikowski and his graduate students on Wednesday afternoon. At the conference kick-off and social—the "Fireside Chat"—Wednesday evening the membership snacked on hor'derves while becoming involved in a thought-provoking informal discussion with Dr. Mary Diez on the role of standards (K–16) and assessment. This conversation, sponsored by Riverside Publishing, was preliminary to the Keynote Address on Thursday, where Dr. Diez challenged the MWERA membership to consider whether reform—based on standards and assessment—will make a difference in student learning in the 21st Century. After outlining the elements of reform based upon standards and assessment, Dr. Diez's Thursday address focused the membership on critical principles necessary for making a difference in learner outcomes. She pointed out several serious misconceptions that have damaged the reform's potential both in K–12 schools and in teacher preparation. Listeners left considering the implications of standards-based assessment and what impact this has on student learning not just in K–12 schools, but in higher education as well.

The traditional New Member Welcome, organized by Francine Michel, was again well attended. In addition to the introductions and breakfast pastries, new members participated in roundtable discussions with officers.

Workshops were held throughout the conference covering such topics as *Hierarchical Linear Models, Publishing, Developing Professional Districts*, and four teaching strategies sessions planned primarily for pre-service and in-service teachers. All sessions were well attended and feedback was very positive.

A busy schedule of paper sessions and workshops on Thursday gave way to the Cracker Barrel Social in the Brio Room overlooking the beautifully lit Chicago skyline. We relaxed and chatted among friends and colleagues to discussions about. . . well, a variety of scintillating topics!

After a morning of interesting and well-attended paper sessions, workshops and the business meeting, it was time for the Friday Luncheon Address. Dr. Thomas Lasley, Dean of the School of Education at the University of Dayton kept the audience intrigued with his paper *Why Teacher Education Fails: How It Can Succeed.* Dr. Lasley's provocative address challenged the membership to take a hard look at the institutional program. He spoke of the need for colleges and schools of education to take risks, explore new paradigms for teacher education, and document what is occurring in teacher education so that the results can inform future practice. Attendees left with much to think about.

The very important Division Meetings were conducted throughout the two days. Again, attendance at these meetings was not as strong as we would have hoped; however, there were some intriguing new twists to the meetings. In addition to the general purpose of these meetings to discuss issues of the division and to select a "slate of candidates" for Division Chair(s), Division D and Division G both had invited speakers during this focused set-aside time. This seemed to be a very successful means of getting the attenti Dr. Jeff Hecht gave the Presidential Address "*Future Shock: Education in the Information Age* using props to show the technological advancements of our generation alone. The

provocative address examined technologies that have impacted education in our society and guessed at those to come.

A sincere and special thanks to Sharon McNeeley for coordinating the displays again this year and for working the registration desk with Jean Pierce, MWERA Executive Officer, and the several graduate students that answered questions, took registration fees and essentially kept the conference running smoothly. Without their assistance every year, the conference would not be what it is. Thank you.

Once again, Jeff Hecht, MWERA 2000 President and WEB manager should be commended for the long hours and diligent attention he gives to members, their questions, and the development and maintenance of the MWERA Website. It is a model for other professional organizations.

I would be negligent if I didn't publicly thank the Division Chairs and Co-chairs for their help and cooperation in putting the 2000 conference together and its ultimate success. These are responsibilities that are often not explained

fully nor recognized for the importance to the organization. Chairs and co-chairs can make or break a professional conference. Thank you so much for making this one!

Also, I would like to than Jane Williams, MWERA President 2001, for her help and advice throughout the last year. Insight into the problems and calm discussion assisted me over several hurdles! Thank you. And to Bob Barcikowski, a big thank you for picking up the pieces that needed attention. I appreciate your assistance in those final program manipulations as well. I am sure that everyone will pitch in to help you during the coming year as you move the organization forward to the MWERA 2001 conference.

Finally, the biggest thanks goes to the membership. Without you, the papers you submitted and encourage others to submit, and your attendance we would not have a conference. As I have for the past 12 years, I look forward to each October and the MWERA conference . . . seeing old friends, discussing issues and relaxing in the warm collegiality that is MWERA.

Will Reform Based on Standards and Assessment Make a Difference in the 21ˢᵗ Century?

Mary E. Diez
Alverno College

You may remember the movie *Norma Rae*, about a woman in a blue-collar job who becomes a union activist. When her husband complains that she's not keeping up with her housekeeping duties, she responds, in my favorite part of the movie, by throwing clothes into the washing machine and food into pots and pans. "You want washing? I'll give you washing! You want cooking? I'll give you cooking" Never mind that neither action was the careful process he had in mind.

I keep being reminded about Norma Rae as I hear teachers talking about the pressure that "standards"—especially in the form of standardized test scores—are putting on them. The latest was in a K-12 performance assessment workshop, where a teacher asked "Well, if all they're going to hold us accountable for are the test scores, why should we look at these other kinds of performances?" It's parallel to what I've heard teacher educators say in response to a brief introduction to the INTASC portfolio: "Well, if that's what they'll have to show in the second year of teaching, then that's all we need to do in our programs." These kinds of reductionism, while probably predictable, do not reflect the careful process of matching standards to learning experiences and assessments that the proponents of standards-based reform had in mind.

What did they/do they have in mind? While Thompson (1999) cautions that the movement is not monolithic, he and others (c.f., Darling-Hammond, 1993; Diez, 1998; Reeves, 1998) describe the fundamental intent of standards-based reform as democratic and egalitarian. This intent is, specifically,

> transformation of public education from factory-model schooling into communities of learners where all students experience a rich and challenging curriculum that holds the possibility of preparing them for the demands and opportunities of life and work in the 21ˢᵗ century. The intent is not only to hold all students to high standards of performance, but to provide teachers. . . with the tools, processes, opportunities, and supports that will enable them to help students across the socioeconomic spectrum reach for and achieve high levels of performance according to their "multiple intelligences" (Thompson, 1999, p. 46).

In this paper, I'll first lay out the signs of trouble I see in both K-12 and teacher education around the notion of standards-based reform. Then I will argue for a return to a set of principles underlying standards-based reform, along with attending to essential elements for its successful implementation. Finally, I will highlight implications for researchers looking at standards-based reform.

Signs of trouble

While there are criticisms of the various meanings of standards-based reform (sometimes as defined by proponents and sometimes as interpreted by critics), and criticisms of how specific reforms have been implemented, I will focus on four concerns that seem to me to be most apparent: reductionism, superficiality, inequity, and pseudo-change. For a discussion of a wider range of problems, see Ohanian (1999, 2000), Carpenter (2000), and McColskey and McMunn (2000).

Reductionism

The problem of reductionism begins with its opposite—the magnitude of the expectations for student learning in the subject areas. Once a group sits down to identify what learners need to know and be able to do in a subject the outcome is predictable: Across all of the subjects, the system will account for 300 percent of the elementary school child's time! As I'll argue later, that is one reason to see standards as a beginning point for a conversation among teachers, rather than a non-negotiable set of demands imposed on teachers. Given the magnitude of the standards, it's understandable that folks look for ways to make the standards manageable. One way to do that might be employ an analytic process, finding the large frameworks and processes that mark a discipline and that can be taught using concrete examples that the discipline offers. This is what Coalition of Essential Schools means when they talk about "less is more" (Cushman, 1994). But policy makers and teachers alike have instead looked to the accountability measures, often developed outside of the classroom, to substitute for the larger meaning of a set of standards. In the current policy climate the test stands for success in meeting the standards and so it becomes the *de facto* standard. In this compromise, less is much less indeed than the vision of what we want for our children and our teachers.

Superficiality

Another criticism of the implementation of standards-based reform is the "Norma Ray" response—giving those asking for reform the *words* without the meaning to back

them up. Like Norma Ray's response in the film, the intent is to "get you off my back."

Superficiality is evident in the adoption of "portfolios" when nothing about the assignments changes except to collect them in a folder. Witness the high school mathematics class where the old practice of doing the odd problems at the end of the section remains unchanged, but the copies of student answers are collected in a "portfolio." Or visit a teacher education program undergoing state review or accreditation visits and see the "portfolio" that is operationally defined as a 700 page scrapbook, with little evidence of conceptual understanding or growth through self-examination. You want a portfolio? I'll give you a portfolio.

Inequity

Asa Hilliard (1998) is an outspoken critic of those who would hold all learners to a set of standards while providing adequate resources to only a few. He would agree that three kinds of standards are equally vital: Content standards, performance standards and opportunity to learn standards. But he excoriates state policy makers who raise the expectations for performance and institute high stakes tests to count as meeting standards, while they also put in place restrictions on school spending and allow less-than-qualified teachers to work in classrooms of the least advantaged students.

Lack of equity in opportunity-to-learn is a serious threat to the efficacy of a standards-based reform effort. Put another way by Anne C. Lewis (2000) in a recent *Washington Commentary* in the *Kappan*:

> One who believes, as I do, that the standards-based movement is essential to closing the gap [between the achievement of white and Asian students and that of black, Hispanic, and other minority students], must conclude that not enough schools are using standards-based reform to give low-performing students, especially minorities, access to the same curriculum as everyone else (p. 103).

Pseudo-change

I define "pseudo-change" as the attempt to hang on to old approaches while mimicking new expectations. In both K-12 and teacher education, it's not hard to find teachers who want to keep the lesson plans they've used for years, force-fitting any new requirements to the current structure and form. In NCATE accreditation visits, it's become commonplace to see goals that come from statements in the program's conceptual framework at the front of every syllabus. But go to the middle of the syllabus and you'll find "topics" of discussion that may or may not lead to the goals identified. And go to the end of the syllabus and check if the "points" for certain projects and behavior relate to those goals. My critical question is always this: Could a student earn enough "points" to pass the course and yet not have demonstrated the goals at the front of the syllabus. The answer is usually yes.

When Blackwell and Diez (1999) studied programs that purported to "align" with National Board for Professional Teaching Standards processes and standards, not all of the interviewees described a rethinking of their programs. And some used words like "stuffed in" or "plugged in" to describe how they were integrating board standards and processes. Carpenter (2000) argues that "good ideas" like those embedded in a standards-based approach have produced very limited gains. I'd argue that they've not really been implemented at all—pseudo-change is hardly a fair test.

Overarching factors

Perhaps a factor in all four areas of concern is the perception of standards as non-negotiables. Rather than serving as a starting point for thoughtful discussion and examination, many perceive standards to be the last word. And such a perception is fostered when states require, as some do, that teacher educators use the exact words of the standards in syllabi. Such a practice invites compliance rather than thinking. Teacher educators, for their part, have too easily accepted the conditioning of a top-down approach to earlier requirements and have transferred it to the standards. When teacher educators appear unable to say, in their own words, what the standards mean, they're not accepting the responsibility to think. And when K-12 teachers and teacher educators alike seem reluctant to change the plans from which they teach—choosing instead to force-fit the new standards to the old plans, they have made any meaningful application of standards impossible.

Some would argue that U.S. educators approach most innovations in this way—embracing the words without the careful engagement and rethinking that might lead to real change (Carpenter, 2000). But it's particularly clear that it's going on with standards-based reform. Look, for example, at testing and assessment. Folks have adopted the word "assessment," but use it for everything we used to call "testing" as well as the newer modes that were meant to be distinguished with the new term. As I will note below, assessment in a standards-based context (Diez, 1998; Reeves, 1998) is intended to provide a sense of where the learner's performance is, with an eye to improvement of both ongoing learning and teaching in support of learning. The U.S. practice with testing has been to spread folks out across a bell curve, to rank them according to performance as a goal in itself.

More often than not, our approach to testing has made the bits of information the unit of analysis, rather than the learner. And so, tests often ask students to give back the same words or processes they've been taught, rather than to critique or express deep understanding. In contrast, assessments, and especially performance assessments, ask learners to do something with what they know, in a context that resembles the kinds of activities that call for this knowledge and skill in real life. Its focus is on the development of the learner's abilities, described in the standards, e.g., effective communication, critical thinking, problem solving, etc.

The Principles Behind Standards-based Reform

While again recognizing that the standards-based reform movement is not a monolith, there are some threads that can be pulled through the discourse about standards and assessment that would be useful in clarifying the issues. Darling-Hammond (1993), for example, lays out a contrast between competing models of policy making, articulating what the movement intended to break with and where it intended to take education practice. She describes the status quo model as "grounded in the view of schools as bureaucracies run by carefully specified procedures that yield standard products (students)." She notes that this approach to "*designing controls*" is rationalistic, depending upon "a belief in the power of rules to direct human action" (p. 754, italics in original). She characterizes this model as fitting "with a behavioristic view of learning as the management of stimulus and response, easily controlled from outside the classroom by identifying exacting what is to be learned and breaking it up into small, sequential bits" (p. 754).

Reeves 1998), as well, critiques "business as usual" approaches to education in U.S., challenging the appropriateness of credit being equivalent to "seat time" spent and the acceptability of "D" as a passing grade. Thompson (1999) notes that the factory model results in a set of equal periods divided by bells, while students are "labeled and sorted into different levels with different expectations" (p.46). Wiggins (1991) challenges the standardization of the curriculum that has led to "token efforts judged by variable criteria" (p. 18).

In contrast with the standardization and controls of the factory-model status quo, the new model described by Darling-Hammond (1993) is focused on "*developing the capacity* of schools and teachers to be responsible for student learning and responsive to student and community needs, interests, and concerns" (p. 754, italics in original).

Across proponents of standards-based reform (Diez, 1998; Reeves, 1998; Thompson, 1999; Wiggins, 1991), the focus of standards-based reform is on engaging teachers in thinking—about meaningful, quality work for learners, about the design of curriculum and instruction to meet learners' needs, and about transforming schools to promote powerful learning.

The greatest promise of standards-based reform is that teachers at whatever level can have conversations and come to some consensus around goals for education. Putting standards into words is just the beginning of an ongoing conversation, a conversation that should pull us more deeply into the examination of student learning and teaching practice. To the degree that standards capture what we believe is worth knowing and doing, they can serve as a guide to our practice. To the degree that they don't match what we believe would describe good practice in our setting, they provide us with a "foil" against which to clarify our understanding and our position.

The NCTM standards are a model of how that process needs to work. Over 40,000 persons—mathematics professors and math educators, along with teachers at every level of K-12 schooling—were involved in the initial drafting and review process for the 1989 standards. Moreover, these and many more stayed with the conversation, trying out what the standards called for in their work with K-12 students and with pre-service teachers. The standards did not become engraved in stone; rather, the ongoing process has led to major revisions—with updated standards just promulgated in April 2000. As Goldsmith and Mark (1999) note, the revised document. . . "makes more explicit the basic underlying assumptions of the original Standards documents" (p. 40).

Standards offer a promise to individual learners as well. They can make learning more available by making clear the "object of the game." Being clear about what we are shooting for (e.g., the big picture of problem solving or critical thinking in mathematics and science) as well as what counts as a good performance (e.g., the criteria for a specific project in problem-based learning) allows learners to target where they need to put their efforts to meet expectations. It guides teachers in making decisions about the kinds of presentations, practices, and problems to develop to engage their learners.

Standards make it possible for the teacher, whether K–12 or higher education, to embrace the responsibility for developing learners. Standards-based classrooms make clear both big picture and specific performance expectations in their assessment practice. In a standards-based classroom, the teacher creates opportunities for students to practice what the standards mean. He or she gives feedback on work, using criteria that are themselves descriptions of the kind of performance that meets the standard. And he or she guides students to internalize the standards as goals, involving them in looking critically at their own work over time, identifying strengths and weaknesses in relationship to the big meaning of a standard like "uses the scientific method effectively to raise questions and solve problems."

The principles behind standards-based reform challenge the assumptions of the "status quo" in U.S. education. Key is the belief that the object of the enterprise is *learning*—as contrasted to seat time (Reeves, 1998). In a standards-based classroom (whether in K–12 or higher education), proficiency calls for demonstrating what students can do with what they know is the goal—not just "covering the material." And an important assumption is that, indeed, all students can learn.

There are "existence proofs" available for the skeptics, who hold that standards-based reform can only lead to more of the top-down, bureaucratic approach we've been conditioned to expect. Darling-Hammond (1997) and Thompson (1999) give examples of schools and districts solidly underway in the process of implementing standards-based reform; Mentkowski and Associates (2000) provide the example of Alverno College, outlining both the practice and the research

on results for 25 years of "ability-based" education in the college's work with undergraduate college students.

Elements Required for Successful Implementation

Rethinking how we do things is never easy. I remember a Peanuts cartoon that decried how difficult it is to do new math with an "old math mind." If educators bring all of the old assumptions and practices to the implementation of standards-based reform, then indeed they can undo the promise of standards and assessment.

As noted in a recent evaluation of the New American Schools reform project by the Rand Corporation, it's not that interventions do not have the desired effects, but that they are not implemented in a way that will achieve the desired effects (Bodilly, 2000). What does it take for standards-based reform to have the effect of improving teaching and learning?

I would argue that the following are critical elements for successful implementation of a standards-based reform:

1. *Commitment* to building the capacity to ensure that all students learn, that all teacher education candidates develop the requisite knowledge, skills, and dispositions needed to work effectively with diverse learners. Note that such a commitment requires not only the efforts of leaders, but also the full participation of teachers, parents, and other stakeholders.

2. Ongoing *conversations* among teachers that lead to deep understanding of the meaning of the standards and the adaptation of standards to their own local environment. There is little chance of going beyond a "Norma Rae" response to reform unless teachers have the time to make meaning of the standards and develop meaningful adaptations to curriculum to meet the needs of their students.

3. Ongoing *examination of samples of student work* by teachers in groups and individually. Teachers need to use the experience of examining student work together to a) refine their understanding of the standards as applied to specific problems or tasks, b) develop a sense of the kinds of performances students at different developmental levels produce, and c) to plan for appropriate next steps in working with students.

4. *Development of teaching and learning strategies* focused on the standards. The sense of the "big goals" for student learning need to be clear as teachers develop the daily experiences that students engage in.

5. *Development of assessment as a support to student learning*. Assessment practice can reinforce these big goals by providing students with a sense of "how far" they have progressed along a developmental rubric or "how many" of the strategies they have mastered. A recognition that the standards are larger than any one performance and particularly larger than the limited

evidence provided in a standardized test can help overcome the seductive lure of reductionism.

6. *Support* the larger system for classroom change—from principals, superintendents, and the state. States, especially, need to make clear that the standards are more than the test. In a powerful statement issued in fall, 2000, the Connecticut Board of Education cautioned its districts not to focus only on the single test.

> Because success is multifaceted, it must be assessed using multiple measures: academic achievement over an extended period of time; student achievements that are other than academic; unique local indicators that represent community values; and the extent to which the performance gaps between various groups of students (by gender, race, economic status, etc.) are being reduced (p.1).

Connecticut's call for reporting how gaps are reduced provides incentive and support for the state's districts to think about opportunity to learn and suggests an underlying commitment to equity.

7. Support from the *community*. While politicians can talk glibly about their education programs, real support requires a willingness for taxpayers across stakeholder groups to take responsibility for underwriting the costs of quality education.

What's a Researcher to Do?

The bottom line question regarding any reform is this: Did it work? The Rand study (Bodilly, 1998) cited above would argue that a prior question needs to be asked: Was the reform implemented appropriately? If not, then what's the "it" that worked or didn't. If the reform was implemented appropriately, then a researcher can move on to looking for measures that are appropriate for judging the efficacy of the reform.

Arguments for measures need to be examined carefully and probed for their underlying philosophical positions. In working with a local school district that appears to be moving away from efforts to undertake the kind of standards-based reform described by Darling-Hammond, Reeves, and Thompson, I listen very carefully to the arguments for embracing more standardized testing. At a recent school board meeting, district personnel presented a proposal to increase the standardized tests and to reduce the district's teacher-designed and scored performance assessments. A spokesperson for the research and assessment office pointed out that among the benefits of the standardized tests is that they will help us to ascertain what variables in student learning are *beyond the control of the district*, for example socio-economic status. Those attending the hearing questioned whether that meant that the tests will provide the district with excuses for failing with students in poverty, who make up a large percentage of this urban district's population. The

teachers and community groups were gathered there to argue for restoration of support for performance assessments, which not only gave students a chance to show what they can do with what they know, but also provide teachers with the opportunity to look together at student work and diagnose next steps to continue developing student knowledge and skills. Members of the school board argued that the "hard data" of the tests was more reliable and, therefore, more valuable. Not stated, but present in the room, was the issue of cost; the standardized tests are much cheaper than the assessments, which involve teacher time outside of the classroom. Here were two competing sets of values—efficiency, reliability, and possible rationalization of failure vs. opportunity to learn, teacher conversation, and attention to meeting of student needs.

As a teacher educator, researcher, and reviewer of research articles for refereed journals, I also observe some troubling patterns in the discourse around standards-based reform. At times, folks believe so in their ideological position that it affects their ability to deal critically with the results of a study. Is standards-based reform—or a specific set of standards—responsible for a superficial approach to portfolio assessment? Before concluding that the standards themselves or the standards movement is at fault, alternative hypotheses need to be probed. The National Board standards and the assessment process was designed in a highly rigorous process, drawing upon researchers with impressive credentials. That someone takes the portfolio exercises (which are public documents) and "stuffs" them into a master's program with no adjustment of the program itself is not an indictment of the National Board standards and assessment processes. Yet I've seen researchers who make claims like that one.

So, a number of cautions are in order for researchers who are looking at standards based reform issues.

1. *Raise questions that get at the central issues.* Researchers run the risk of their own kind of superficiality if they do not carefully examine the larger issues that provide context for a specific approach to reform. See Barton (2000) for a thoughtful assessment of the role of content standards and curriculum support in setting the stage for effective standards-based reform.

2. *Consider both quantitative and qualitative approaches.* Education reform is complex. While it may be appealing to have "the numbers," and many argue only with numbers, it is critical to get underneath what the numbers mean. Doing so often requires careful examination of the experiences of the persons involved in a reform effort. A school board member I know likes to dismiss everything not statistical as "mere anecdotal evidence," but the careful, critical application of varied evidence gathering techniques is likely to shed more light on what's happening in a reform process than "mere numbers" can.

3. *Don't assume that the independent variable (implementation of a reform method) is the same in place X and place Y.* The word is not the thing, as the general semantics folks like to remind us. Rather than assuming that the meaning of a term is clear, I'd recommend identifying the key elements very clearly to spell out what kind of standards-based reform was implemented in a given case. In that way, the researchers can develop methods to ascertain the degree to which the implementation is faithful to those key elements.

4. *Be careful to assure that the dependent variable is appropriate to the intention of the reform's implementation.* Not all tests are equally good measures of the impact of an educational reform. To the degree that a test rewards memorization of narrow factoids, it will not be a good measure of a reform that intends to strengthen student development of critical thinking, problem solving and communication.

5. *Don't be seduced by easy routes to reliability.* That standardized tests are very reliable does not change their appropriateness/inappropriateness to measure the goals of a program. In many cases, validity needs to be a prior consideration—does reliability matter is the measure is not testing what we want or mean to test?

Conclusion

To conclude, I turn to the question that serves as the title of this paper. Will reform based on standards and assessment make a difference in the 21st century? The answer, as with most questions of this type, must be "it all depends." It depends, returning to Thompson (1999), on whether the movement will successful in transforming public education so that all students experience a rich and challenging curriculum. It depends on whether, as a result of the movement, state and local policies not only hold students to high standards of performance but also provide teachers with the tools, processes and supports needed to close the gaps in opportunity to learn. These are powerful contingencies and the possible difference for learners hangs in the balance.

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Why Johnny Can't Teach
What Johnny's Professors Should Do

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The debate about teaching and the efficacy of teacher education is not new. Over the past century a number of reports have emerged calling for changes in how teachers are prepared and how universities endeavor to ensure teacher quality. Examples include the Commonwealth Teacher Training Study, 1929; the Commission on Teacher Education created by the American Council on Education in 1938; the New Horizons for the Teaching Profession, 1961; Educating a Profession, 1976; B.O. Smith's Design for a School of Pedagogy, 1980; and A Nation Prepared for the 21st Century, 1986 (see Edelfelt and Raths, 2000). These reports collectively describe the journey of teacher educators and of those outside education in their attempts to create better teacher preparation practices. Unfortunately, those attempts, individually and collectively, have failed to achieve their lofty goals; they have failed despite the reasonable validity of two assumptions: (1) teachers do make a difference in what and how much students learn and (2) teacher education can make a difference in preparing teachers for classroom practice.

The first of these two assumptions is questioned by few people. Thanks in part to the recent work of William Sanders, those both inside and outside the profession quickly concede that the quality of a teacher influences the level of student achievement (Archer, 1999). Sanders, however, is still largely silent on the characteristics of that "effective teacher." He confirms that such teachers exist and he plans to disaggregate achievement data to see what operational evidence of effectiveness can be discerned from the quantitative data he has collected, but specific characteristics have not yet been identified or defined (Sanders, 2000). Quite likely those characteristics will not be forthcoming from Sanders or other Sanders-like researchers because quantitative measures are unlikely to reveal the qualitative characteristics manifest in the behaviors of effective teachers. Teacher effectiveness will also, quite likely, not be readily identified or engendered by those who subscribe to programmed approaches (such as Direct Instruction) that offer "teacher-proof" excellence. In Starnes' (2000) words: "If we have one article of faith, this is it: Effectiveness cannot be found in the mediocre sameness that grows out of programs that require lessons, teaching strategies, and materials to be precisely executed in order to maintain integrity. If only it [effectiveness] were that easy!" (p. 114).

The second assumption regarding the effectiveness of teacher education is more contentious. True, many who have devoted their lives to preparing teachers would declare the assumption valid; they might even cite reasonable support for reaching such a conclusion (see Berliner, 2000; Darling-Hammond, 2000). Equally true, many outside the academy (and even some within its walls) would suggest that smart people with a few pedagogical "tools" can accomplish as much if not more than any fully certificated teacher, which is why some urban districts are initiating their own alternative programs. Indeed, Berliner (2000) describes the likely rationale for alternative approaches as grounded on one of his 12 teacher education slurs: "All you need is subject matter knowledge; the rest is a waste of time" (p. 358).

Any validity associated with the claims of critics, and some clearly exists, is in large measure due to three conditions of current professional preparation practices. These conditions not only mitigate the potential effectiveness of what teacher educators do individually, but they significantly "cloud" what is accomplished collectively.

Condition 1: Teacher education as it exists in most teacher preparation institutions lacks structural coherence. Over a decade ago Barnes (1987) published a paper on thematic programming in teacher preparation in which she argued for using themes as conceptual threads to hold preparation programs together. The theme woven throughout a program provided conceptual and practical coherence. Barnes wrote:

> The idea that the purpose of initial teacher education programs is to foster the development of grounded schema for teaching requires rethinking both the content and the processes used in teacher education. Clearly programs designed to achieve would not offer an array of unarticulated courses and field experiences. Rather, they would provide a set of coherent coursework experiences and utilize management practices carefully to monitor the cumulative impact of the program on learning to teach (p.14).

Since Barnes wrote those words over a decade ago, the National Council for Accreditation of Teacher Education (NCATE) adopted the notion of program themes. Many institutions went through the "adoption" motions and some, no doubt, with considerable seriousness of purpose, actually changed their approaches to teacher education. Unfortunately, what often emerged from "reforms" were pedagogical sound bites that faculty could use to describe

their programs, with results such as teacher-as-decision-maker or teacher-as-reflective-practitioner or teacher-as-critic-of-society. In fact, many institutions created themes without really changing programs. Their intentions were not dishonest, just disingenuous. The result was the same: programs continued to exist that lacked conceptual coherence throughout the range of field work and classroom-based experiences provided to and for prospective teachers.

Condition 2: Teacher education practices often result in training regimens or decoupled practices but not professional education experiences. This condition is particularly problematic because it reflects the schism that exists between the world of schools and the world of academe. Some higher education institutions are in tune with what is happening in K–12 schools, perhaps too much so. For example, when K–12 schools expressed an interest in Canter, some higher education institutions incorporated assertive discipline in their preparation experiences. Examples of this uneasy alliance abound: Whether education schools want reading materials or character education, a cottage industry of providers all too often emerges (it is, after all, the American way) and many teacher educators "buy" the programmed approaches to teaching for everything from phonics to values.

Some teacher educators too fully embrace the world of praxis and when this occurs, the result is teacher training, not teacher education. (An aside: From my perspective, teacher training focuses on the skills of teaching without reflection on contextual questions; teacher education fosters critical reflection on how and when to use a variety of skills in particularized classroom contexts.) Other educators, paradoxically, are almost totally out of touch with what schools look, feel and sound like. They read about schools, study the literature on schools, but they reject the notion of getting "down and dirty" in schools. They emphasize critical reflection without sufficient attention to praxis.

Aristotle's "the mean" may have as much relevance for teacher preparation as it does for teaching a virtue such as "self-discipline." Institutions that become pawns for what schools want and offer teacher training programs are just as problematic as those who adhere to a "hands off" view vis-a-vis what schools need in terms of practical assistance. What must occur and has not, at least to a sufficient degree, is *critically embracing* current educational practice. Let me provide an example.

The use of systemic reform models to effect change in schools is now common throughout the United States. At least 24 distinct reform models have been developed and are being disseminated to more than 8,000 schools (Traub, 1999). Those models focus on either those of teaching specific teacher skills (e.g., Direct Instruction) or on the transformation of a school's culture to foster a more dynamic learning environment (e.g., Accelerated Schools). Unfortunately, schools are adopting Direct Instruction, Success For All, Core Knowledge and a wide variety of other systemic reform options with little or no input from those within higher education in general and teacher education in particular. Many of these systemic models have their own training regimens (e.g., Edison Project and Core Knowledge)—the "training" descriptor is used intentionally because teachers are taught to use a narrow range of skills and to embrace them somewhat uncritically. The marginalization of traditional teacher education occurs because preservice teachers have little or no exposure to any of the models, except perhaps, to have them held in disdain by those within the higher education community.

Those who believe in the systemic reform models want smart people they can train; they imply that this can best be done by decoupling the certification process from colleges and universities (Kanstoroom and Finn, 1999). The training model is anathema to most teacher educators and it should be because of the absence of critical engagement with specific pedagogical skills so that preservice teachers know how and when to use specific teaching approaches or strategies. Training without critical engagement results in semi-professionals who lack an objectivity about and thoughtful understanding of professional practices. The disdain of many traditional teacher educators toward popular reform "packages" results in the functional decoupling of teacher education programs from K–12 schools, so much so that preservice teachers have neither the exposure to nor the critical disposition for thoughtfully examining popularized systemic reform practices.

Relationships with the field of practice are necessarily tenuous. Too close and training emerges; too distant and decoupling is engendered. At present, teacher education institutions vacillate between the two and because of an inability to find "the mean" and create educated teachers, those in K–12 schools and those interested in the politics of education are unable to see the value added of what preparation programs do to instill professional dispositions in prospective teachers. Understand that if we do our job of teacher education correctly, the critics will still not be assuaged, but at least our graduates will be more professionally equipped to use and defend what they have learned in preparation programs.

Condition 3: Disruptive technologies are emerging that threaten the educational status quo of teacher education because programs refuse to change. I began this paper by outlining the myriad historical efforts to reform teacher education–lots of reports, lots of recommendations and limited change. Social and political conditions are now different. Hill (2000) citing Christensen's work describes how descriptive technologies emerge to "offer simpler, cheaper and more user-friendly ways of accomplishing some goal" (p. 52). For years teacher education constituted a monopoly. Many complained, some threatened, but few had the political clout to force changes that offered to engender a real difference in program practices. In large part, the lack of change occurred because viable options for critics to explore simply did not exist. That circumstance is no longer

true. The market force approach is about to influence teacher education just as it has K–12 practices.

Some systemic reform model architects are developing their own teacher training programs and many larger urban districts are creating credentialing programs of their own. *The Chronicle of Higher Education* (June 16, 2000) described the intention of the Edison Project to open a teacher training unit to ensure an ample supply of qualified teachers for Edison Schools. Other for-profit entities (University of Phoenix and Sylvan Learning Systems) are also emerging and attempting to enter the "teacher training" market. Quite candidly, teacher preparation is business, big business, and as entrepreneurs discover the market possibilities for teacher training (which can be done relatively cheaply) the impact on those of us who are teacher educators and who have grown accustomed to threats but felt certain that strong words would not create concomitant action may find the new millennium "interesting."

Those in urban leadership positions are especially concerned with the capacity of traditional teacher education to deliver thoughtful, effective classroom professionals. Part of the highly publicized Houston Public Schools' success is because of alternative certification programs. Some who have studied the efficacy of alternative certification (AC) suggest that AC teachers actually perform better than those from traditional programs. Kwiatkowski (1999) citing Stoddart writes:

> The alternative route candidates are also more likely to hold high expectations for low-income and minority students than the teacher education graduates and to take more responsibility for students' academic success or failure.
>
> The university-certified novice teachers found it difficult to relate to students who were different from themselves. They emphasized the difference between themselves and the low-income and minority students they were teaching. Most held a "cultural deficit" perspective on student achievement and believed that their poor and minority students' lack of enriching life experiences made it difficult for them to function as autonomous learners or understand higher-order concepts (p. 226).

Hill (2000) asserts that disruptive technologies are a threat "because established providers cannot incorporate them" (p. 52) and, I would suggest, fail to fully understand what their success connotes about weaknesses in extant teacher education practices. Those weaknesses, whether the putative "low quality" of teacher education students or the apparent "mickey mouse" nature of some courses within education units (which is another of Berliner's "slurs") are also program opportunities. As any strategic planner readily shares, successful future programming is highly dependent on accurately assessing extant threats and weaknesses. Let me indicate where two opportunities rest. Those opportunities are significant because they can reinforce the process

and complexity of teacher education and potentially offer the value-added dimension that so many seek to establish.

Opportunities for Value-Added Change

Part of the historical weakness of teacher education can be attributed to the splintered nature of professional efforts. In a sense, entrepreneurialism has compromised the creation of truly professional education. In *Educating a Profession*, Howsam, Corrigan, Denemark, and Nash (1976) articulated salient differences between professions and semi-professions (see Figure 1), and the many attempts by those in teaching to more clearly move from the latter to the former, a circumstance incidently, that is of concern to teacher education critics because of the potential that professionalism holds for enhanced regulatory behavior. Some 25 years after the Howsam, et al., report was written, limited progress toward professionalism has been made but a host of political and social realities now further threaten movement toward ensuring that teachers who walk into classrooms possess the requisite professional credentials and dispositions to ensure that students can learn and that they can critically examine personal and professional decisions when their students do not achieve. Taking some necessary next steps will require further reforms in how we think about and structure teacher

Characteristics of a Profession

1. The profession collectively, and the professional individually, possesses a body of knowledge and a repertoire of behaviors and skills (professional culture) needed in the practice of the profession; such knowledge, behavior, and skills normally are not possessed by the nonprofessional.

2. The members of the profession are involved in decision making in the service of the client, the decisions being made in accordance with the most valid knowledge available, against a background of principles and theories, and within the context of possible impact on other related conditions or decisions.

3. The profession is based on one or more undergirding disciplines from which it draws basic insights and upon which it builds its own applied knowledge and skills.

4. The profession has agreed upon performance standards for admission to the profession and for continuance within it.

5. Preparation for and induction to the profession is provided through a protracted preparation program, usually in a professional school on a college or university campus.

Characteristics of Semiprofessions

1. Shorter training periods.

2. A less specialized and less highly developed body of knowledge and skills.

3. Markedly less emphasis on theoretical and conceptual bases for practice.

4. More subject to administrative and supervisory surveillance and control.

5. Less autonomy in professional decision making with accountability to superiors rather than to the profession.

6. A preponderance of women.

Source: Howsam, R. B., Corrigan, D. C., Denemark, G. W., and Nash, R. J. (1976). *Educating a profession.* Washington, DC: American Association of Colleges for Teacher Education.

Figure 1.

education within higher education. I suggest but two reforms that necessarily should result in value-added outcomes.

Reform 1: Create specialized or "tracked" programs that force institutions to move beyond generic programming. I refer to specialization beyond traditional licensure and certification tracks. Institutions should begin to think about special student populations and particular classroom contexts (urban students, Catholic schools) and orient their programs to educate prospective teachers for those particularized settings. If this occurs, teachers could be prepared in specialized ways (with pedagogical skills and critical perspectives) and employers could more nearly meet the specific educational needs of students who are part of their programs.

An example illustrates this approach. For some time Notre Dame has been offering a program called the Alliance for Catholic Education (ACE). Until recently, Notre Dame was "beyond" teacher education, but when it became reinvolved it did so by "tracking" students for Catholic schools. We spun the ACE concept off at the University of Dayton and conceptually expanded it. The program (Lalanne) offers some special seminars and mentoring support for students seeking an appointment after graduation as a Catholic-school teacher.

Now imagine Lalanne or ACE-like programs for urban or rural schools. Programs could develop one of more context foci and employers would know more clearly what they are "buying" when they employ graduates. More importantly, program graduates would have the more specialized professional skills that employers require for value-added classroom practice and they could learn those skills in ways that suggested their strengths and limitations with particular student groups. Employers might still do some *training* for reform models such as Success for All, but they would have an educated teacher who knew how such a model "fit" for urban students and would appreciate its appropriateness and limitations for urban students because he or she would more fully understand the urban context.

This approach would partially solve another problem that Cochran-Smith (2000) notes:

> Demonstrating that teacher education is "effective" and "value-added" assumes some kind of answer to the question of what it is teachers need to know and some kind of answer to the question of what teachers' learning does or should look like....there is not agreement in the community of educational researchers and teacher educators about how to pose these prior questions, let alone about what their answers should be (p. 18).

The lack of agreement is, in part, because teacher education tries to be all things to all people. Teacher educators now prepare students for "everywhere." Specialization won't solve the problem, but it should make the problem more manageable. In turn, specialization makes it much more likely that teacher educators could assess whether graduates are succeeding (by more focused assessment) and can, in fact, enhance student learning when they begin professional practice with urban or rural or Catholic students. This practice is not unlike what occurs in other professions. Lawyers go through law school but seek specialization for corporate or real estate law. Teachers would not only seek licensure specialization but would also have focused preparation for particular contexts.

Reform 2: Develop programs that are more coherent internally and externally and that result in teachers who are leaders of learning. Accomplishing this will not be easy. It necessarily demands some compromise of the academic freedom that faculty so value as members of the academy. I would argue, though, that quality professional preparation programming compromises, to a degree, a measure of a teacher educators' right to academic self-direction. Institutions have a responsibility to offer programs, not courses. Those in the arts and sciences can offer the latter; those in teacher education must proffer the former. Further, professional programs must transcend personal interests and accommodate program specializations. Of necessity, what we do in higher education needs to be relevant to what is expected in K–12. Professional teacher education fosters preservice teacher acquisition of a "body of behaviors and knowledge and a repertoire of skills needed in practice of the profession" (see Figure 1). That can only occur if a K–12 and higher education nexus is maintained.

The misalignment of the K–16 curriculum is not new and efforts by the National Council for Accreditation of Teacher Education (NCATE) and Interstate New Teacher Assessment and Support Consortium (INTASC) suggest that many within teacher education recognize the need for enhanced alignment. I am arguing, though, for an alignment that really changes the way we teach teachers. Such alignment would place incredible demands on all of us who prepare teachers to ensure that what we do conceptually fits and is more than personal convictions about what prospective teachers need. Clearly, the two are not mutually exclusive. Equally true, all too often faculty members act as independent vendors who dispense "ideas" without understanding the interaction effects those ideas may have on prospective teachers' pedagogical dispositions. Just as a pharmacist knows the interaction effects of drugs, those of us in teacher education must know how what we do contributes to the professional health of our students in ways that makes them more effective teachers. If we create truly aligned programs, I'm convinced that some courses will go; others will be added, and most will be modified. Students who go through such programs, though, will feel the value added even if they cannot prove it empirically. At the present time, most of our graduates can neither feel it nor prove it; they neither feel nor can they prove it because alignment is absent. In essence, there are two forms of alignment that need to occur. One is a form of K–16 alignment that NCATE and INTASC emphasize as they work with learned societies. Another type is alignment within our programs so that faculty speak a similar professional language.

At the University of Dayton we are attempting to foster alignment by structuring our teacher education curriculum around PRAXIS. That does not mean that all faculty mindlessly buy into the PRAXIS model; rather, PRAXIS is used as the foundation to anchor the program language and critiques of practice. I'm convinced that the model a program uses to foster alignment is less important than using some model that all faculty embrace—the model represents the conceptual and practical equivalent to Barnes' (1987) theme concept.

If external (K–16) and internal (teacher education program) alignment occurs, prospective teachers can then enter the classroom ready to serve as leaders—leaders of learning, their own and the students—because they will more clearly see the integrated and interrelated nature of professional knowledge. Part of the reason alignment has not been viewed as problematic previously may be because many who argued for professionalization viewed teaching as a clinical profession that delivered services to those who could not provide such services for themselves. Schlechty (1997) argues that such an orientation resulted in a wrong-headed mindset about what type of profession teaching should be (i.e., a clinical, service-based profession similar to medicine). Unfortunately, the focus on "service delivery" focused on preservice teachers' learning sets of skills (e.g., using different teaching strategies) rather than an understanding how "they must assess their own success through [the achievement of] others" (p. 185). For that outcome to occur, prospective teachers need a wholistic and more critical sense about what the curriculum is and what learning looks like. Teaching is not keeping students busy or on-task. It is, instead, leading students to learn and good teacher education, not teacher training, programs are capable of fostering such professional ability.

Conclusion

These two reforms are not pie-in-the-sky hopes; they are real possibilities. To occur, though, will likely mean that some institutions should be closed and all the rest of us focused on knowing more clearly what makes each distinctive: programs that are specialized in nature and that result in educating teachers who can lead student learning. It likely will also mean that teacher education will become more expensive. Good professional development costs money. Good teacher education does, as well. Indeed, I am convinced that we will not have to force some institutions to close (though we may need to encourage them!). Good professional education programming will cause many to suggest that the cost of high quality is not worth the effort to achieve it.

If we institute the right reforms, we will solve several (not all) of the problems now outlined in the reform litera-ture. That literature calls for better recruitment (now we will know why we are recruiting) and enhanced alignment (now we will know that the "language" of our particular program is spoken by all throughout the professional education experience). The right reforms will not ensure that Johnny Can Teach, but they should put teacher educators a step closer to preparing professional classroom educators who enter the field with value-added skills.

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