Business Designs for
The New University

Peter J. Denning
George Mason University
Fairfax, VA 22030
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Have you ever heard of a "business design"? I am thinking of the overall framework in which a business is formulated --- its style, approach, and basic assumptions. Most businesses have research, development and marketing (RD&M) processes by which they invent and market new products and services. These processes are part of the company's business design. What happens if the business design itself becomes obsolete? Would that render the RD&M processes incapable of keeping the firm competitive? Indeed, this happens frequently, sometimes spectacularly! The designs of IBM and Digital Equipment Corp. worked very well for many years until Microsoft introduced commodity software --- and now Microsoft is being challenged by the business designs of Netscape and Sun's Java. Maxwell House and Folgers coffees are now challenged by Starbucks. The Postal Service is challenged by FedEx and e-mail.

When a new company offers a better design, customers migrate to it from other companies. Because the old products and services are formulated within a context that the customers no longer find attractive, the older company cannot seem to find new products and services that will attract the customers back.

What happens if the institution with the obsolescent business design is a university? Private universities with obsolescent designs tend to respond

quickly to declining enrollments. State-controlled universities are generally much slower. Customers of state universities who wish to migrate have two options: choose private alternatives (at a considerably higher price) or complain to the political process. After enough complaining, the political process responds by passing new laws to regulate the ailing schools or by transferring budget monies to more popular programs.

I suggest that business design of the university is becoming obsolete and that public universities especially are slow to respond. Our customers (students, parents, employers) are looking for cheap private alternatives and are complaining loudly to the political process. The politicians in our state capitals have been reacting by cutting budgets, micromanaging our time (more hours in the classroom), and abolishing tenure (post-tenure review).

Here is a partial list of the growing number of important, new issues that our customers want us to take up, but which we find difficult to address because they don't seem to fit with the current way we operate:

1. A general education that affirms values central to our civilization, cultivates historical sensibility, and prepares young people for responsible and meaningful careers, families, and lives.
2. Rising level of industry requests for professional education after the bachelor's degree.
3. Rising competition from private companies offering courseware, seminars and other educational services.
4. Rise of education brokerages.
5. Certification of certain professionals, such as software engineers and network engineers.
6. Distance education and virtual universities.
7. Accreditation of virtual degree and certificate programs.
8. Restructuring curriculum for Internet delivery.
9. Industry requests for senior design projects.
10. Collaboration with industry on research leading to products.
11. Responding to hot interdisciplinary areas such as bioinformatics.
12. Student and employer demand for more practical competence.
13. Students who are not fully prepared for the curriculum.
14. Teaching teachers management of groups.
15. Teaching teachers to motivate, inspire, coach.
16. Moving to different measures from publication and grant counts when evaluating faculty.
17. Designing curricula attuned to the rising spirit of entrepreneurialism sweeping the world.
18. Teaching how to cope with the apparent rise of complexity in a world increasingly dominated by technology.

Make no mistake about it, the market and political forces are conspiring to generate a new design for universities. The only questions are who's in, who's out, and who new is going to show up and compete for our customers? We are facing enormous threats not only to our traditional ways of doing business but in some cases to our very existence. At the same time, we are presented with enormous opportunities for significantly improved education that once again attains its aims of preparing people for productive careers and meaningful lives.

Columbia University professor Eli Noam said in a recent issue of *Educom Review* that information technology is undermining the assumptions that constitute the foundation of a university. This is his way of saying that the business design of the university is becoming obsolete. He is not optimistic that most faculty will grasp what is happening until it is too late. I am.

The Call for Competence

The market themes I listed above demonstrate a recurring call for a greater orientation toward competence in the educational goals of the university. This is no surprise, given that so many people now view a college diploma as a ticket to a good job, and that so many employers recruit directly from universities. Many faculty hear this as a call for vocational "training" and argue strenuously that it is not the mission of a university to provide training. At the same time, many educators argue strenuously for more proficiency-based courses, which means that students don't pass until they can *demonstrate* that they know the material and can act effectively with it. The former group interprets competence in a narrow sense while the latter view it more broadly. We may not like the call for competence, but we need to face it and respond to it. We have a lot of work ahead of us to respond to this call.

What does competence mean? I intend it in a broad sense including competence at public speaking, rhetoric and debate, analyzing history, working on and managing teams, leading a group, operating a computer, or building a large software system. The common theme is that there are community standards for competent action and a requirement that the student demonstrate a capacity to meet or surpass those standards. The process of demonstration is often called certification. In some cases, such as engineering, education, accounting, law or medicine, certification can be quite specific and rigorous. Certificates are necessary or at least highly desirable for professional practice. Proficiency-based learning is a form of certification that can be used in many courses.

How do general education and certificate education fit together? General education is the aim of the undergraduate degree programs, some elements of

which can be proficiency-based. But proficiency is not the whole story; socialization, involvement, participation in groups, communities, and histories are also important. The more focused forms of competence come at the higher (graduate) levels. The new university can accommodate the call for competence by making proficiency the basis for assessment in many courses and by establishing graduate programs that offer professional certificates.

The Old and The New

The design of the modern university features four-year programs, large classes organized on semester (or quarter) schedules, midterm and final examinations, a small menu of degrees awarded after a student completes a certain number of credit hours with certain grades, a research program that occupies a lot of faculty time and energy and is accessible mainly to graduate students, and occasionally a continuing education program adjunct to the main academic offerings. You and I did not create this overall design; it was already here when we entered the academy. New programs and services that do not fit within this framework are seldom implemented. For example, a graduate program leading to defined, certified competence doesn't fit because our conception of university doesn't accommodate courses of study in which students proceed at different rates toward a fixed outcome. It deals best with courses taking a fixed amount of time to produce variable outcomes.

I have listed a number of major forces that are undermining the assumptions on which this design is built. Eli Noam has pointed out forcefully that the Internet and digital library are making the university library and local community of scholars obsolete, while at the same time, e-mail, phones, fax machines, and jet airliners have made it easier for faculty to establish stronger loyalties to national professions than to local institutions.

In addition to Noam's observations, it's clear that a college education is now seen as an essential credential for a good job. Many people want to earn certificates of competence part-time while employed full-time, and many people want educational services that are customer-oriented and non-bureaucratic, and which offer good value for the money. And while all this is happening, the federal government plans to freeze or cut research dollars and student-aid grants. The successful educational organization of the 21st century is going to have to resonate with these changes in order to attract students and their employers as customers.

The principal aspects of the new design will surely include:

1. For general education, new course formats will keep groups of students together for several years in the same "learning communities," focus on

subjects deeply one at a time, work toward public exhibitions of knowledge as milestones, and feature more investigation by students. There will be a reaffirmation of the aims of general education, including wisdom in the ways of the world, historical sensibility, an understanding of social relations and power, a capacity to deal with international business and culture, and the skill of building a credible reputation.

2. For graduate education, new course formats will feature occasional workshops, active working groups of students communicating via the Internet, projects, and public exhibitions and defenses of results. The regular weekly scheduled class will become a little-used option. These formats will be consistent with the working schedules of employed people.

3. Educational organizations will offer programs for learning entrepreneurship, business practice, management, and leadership.

4. Everyone will make heavy use of information technologies for locating information and services, and for coordinating and communicating among course participants.

5. Educational organizations will establish programs for working professionals that promise, deliver and certify specified competencies. Professional people will prefer to market themselves with portfolios of certificates in addition to their formal degrees. There is a possibility that today's formal degrees will become obsolete.

6. Educational organizations will establish new programs for working professionals who seek higher levels of competence than anything now offered --- e.g., expert, virtuoso or master levels of performance.

7. Research programs will be integrated with curriculum, to teach students the investigative practices of research and the processes of innovation.

8. Education brokerages will custom-design courseware to meet stated needs of individuals and groups, selecting from the modular offerings of various providers.

9. Educational organizations will be highly responsive to their customers and will deliver value commensurate or exceeding the costs. This does not necessarily mean that costs will go down; it certainly means more value, more effort to deliver the educational promises to the student, less overhead, and less administration.

I use the term "educational organization" because there is no reason to suppose that all of today's universities will do these jobs. Some will

transform themselves and be successful. Others will not. Some will disappear. Private organizations will be increasingly successful, and will probably take the lead in the brokerage business.

The Role of Research

Wilhelm von Humboldt, founder of the University of Berlin in 1809, did the most to spread the notion that universities are places of research. Their sole job had been to give students a broad education and to prepare them for careers in church or government. Humboldt argued that professors should be scholars and researchers as well as teachers. Over the next hundred years, Humboldt's idea spread to universities everywhere. The world over, universities became centers of scientific advancement and intellectual ferment.

Something has happened to tarnish this image. The kinder critics say that publicly-supported research should be limited to the professors who are genuinely good at it. The sharper critics say that research should be banished from universities. The problem is that much academic research is mediocre or of no consequence. About 2 million scholarly papers in science and engineering are published each year by 72,000 journals; the vast majority of these papers are read by a few hundred people at most; in many disciplines well over half the papers are never cited by another author. The associated "publish or perish" syndrome has devalued the original purpose of research in the university --- education itself --- and has even led the Federal government itself to question whether the massive spending on research produces the value claimed by the Humboldtian and Bushian supporters.

Even as a German-led university started the modern notion of research university, a German-led research institute may have discovered a formula to save research in the 21st century. The Chairman of GMD, Dennis Tsichritzis, has proposed that the value of research lies not in the discovery of ideas but in the innovations that eventually result. An innovation is a shift in the standard practices of a community that makes them more effective at what they do. A product is most likely to stimulate innovations when it is a tool by which the customer can make his own innovations. The modern research university is hampered by a belief that the discovery of new ideas is the main path to innovation. The process of idea-discovery is actually one of four different processes that produce innovations. The research associated with each process is based on values and emphases peculiar to the process. The four processes are:

1. **Generating new ideas.** Powerful new ideas shift the discourse, in turn shifting the actions of those practicing the discourse, producing an innovation. Research consists of formulating and validating the new

ideas. It places a great deal of emphasis on originality and novelty. The scientific publication process aims to certify originality and novelty through peer review.

2. **Generating new practices.** A teacher inculcates people into the practices of a new discourse. Research consists of selecting, clarifying and integrating the principles relevant to the practice. It places a great deal of emphasis on understanding that produces competence.

3. **Generating new products.** New tools enable the new practices, producing an innovation; the most successful are those that enable people to produce innovations in their own personal environments. Research consists of evaluating and testing alternative ways of building a tool or defining its function. It places a great deal of emphasis on economic advantage.

4. **Generating new business.** Successful firms continually improve their business designs. Research consists of testing markets, listening to customers, and developing new narratives about people's roles and identities in the world. It places a great deal of emphasis on market identity and position.

In the university, we place the highest value on the first kind of research and the lowest on the fourth. Most companies value these four in the opposite order. The third kind of research is common in industry R&D groups and is occasionally found in university-industry collaborations. Historically, most technology innovations have come directly from the third kind of research and only indirectly from the first.

Many faculty are highly competent practitioners of the second kind of research. They do this when, through their scholarly work, they investigate questions, compile results, integrate their findings, bring clarity to a subject, and offer the new narratives needed for others to understand the subject. Their results are popular articles, books, simulators, tools and software. Their research directly supports the mission of teaching students to be competent. By participating in the research process, writing scholarly papers, building software, and attending conferences, the faculty member stays sharp, teaches students competent investigative practices, and maintains credibility as a person knowledgeable about the leading edges of technology.

As the "business design" of the university shifts, the first kind of research will be performed only by the faculty with proven track records, working mostly in well-equipped labs. This will be the only way to adapt to shrinking federal funding for basic, "curiosity-driven" research. The second kind of research will rise in stature because it will be directly tied to the teaching of competence, which will be central to the new university. Universities will

participate more of the third kind of research because it will be important for graduates to understand this process --- many of them will participate in it when employed.

In short, the transition to a new business design for universities will carry a shift in the meaning and practice of research. While it may be easy for critics to say that discovering basic truths is something that can be left safely in the hands of a few specialists, it is much more difficult for them to deny that clarifying and integrating principles is important. If there is a problem today, it is that a large number of faculty are expertly practicing the second kind of research while under the illusion that they are engaging in the first.

Professional Education

Our curricula are organized for the undergraduate who comes to us straight from high school and earns a bachelor's degree in four years. The Master's Program covers two more years beyond that. We offer very few programs for the remaining 45 years of a person's professional life. Most continuing education programs are not part of the regular academic program and are not staffed by the regular faculty.

A growing number of working professionals want certification in selected subjects valuable to them (and their employers) in the workplace. They want educational programs that promise and deliver specific, well-defined competence and skills. They want a way to build on their general, undergraduate education with a collection of certified skills that grow and evolve over time. They want professional certificates to be part of their portfolios. The formal degree may become obsolete and be replaced with an equivalent set of certificates.

Professional education programs for these people will be part of the business design of the successful university of the 21st century. Some universities now have certificate programs, which normally award the certificate to a student who has completed a specified set of courses with A or B grades. These are not the kinds of certificate programs in demand in professional education. Professional certificate programs will promise specific competence and skills, include rigorous project work and testing, and will take as long as needed to deliver a given level of competence. Developing these programs and making them a regular part of the university's offerings will be a major challenge because they are based on a variable length of time to attain a given grade (the certificate) rather than a fixed length of time leading to a variable grade.

With a focus on competence and a clientele of working professionals, it becomes possible to consider educational programs at higher levels of

competence than we are able to offer now. These would include the expert, virtuoso and master levels, which we normally associate with later stages of a person's career. This will be fertile, virgin territory for universities.

The Need to Transform Teaching

Our practices of teaching will change to fit the new university. Two forces are driving this. One is the demand of students for a more customer-oriented relationship with the university. Faculty are going to master new skills in listening, trustworthiness, compassion, service, valuing diversity, communication, and historical sensibility --- not only to interact effectively with their future students, but to teach these things to them.

The other driving force is digital media and networking. We have been trained in an environment where teaching is mostly presentation and testing; testing probes to see whether the information presented has survived transmission intact. We can judge each other's teaching by watching our performances in front of the classroom, i.e., by peer review of teaching. But, as machines take over much of the presentations --- often doing it much better than we can --- and as the machines take over testing and record-keeping, what will be left for the teacher to do? There is much. It is a complex of practices and skills that have to do with inspiring, motivating, managing and coaching students. Few of us have learned these skills because we never had to and in any case there was no one to teach us. We will need an extensive program of faculty and teacher development to assist them in learning how to be highly effective teachers. The topics that will be important in such a program include:

  Educational goals
  Automated learning
  The human "map"
  Professional education
  Reading
  Communication
  Listening
  Seduction
  Trust
  Compassion
  Fear and self-esteem
  Service
  Assessment
  Diversity
  Seriousness and humor
  Invention and innovation
  Historical sensibility

  Games and simulations
  New course management practices
  Coaching

Unfortunately a good training workshop in the above topics is not enough. Teaching practices are strongly connected with the curriculum. There is little room for some of these practices in today's curricula. Engineering curricula, for example, are structured as an intense presentation of topics in a well defined order; the use of games and simulations or creation of milestones that can be passed only by proficiency demonstrations would not fit easily into this structure.

The two driving forces of customer-orientation and machine-aided presentation are pushing us toward restructuring our curricula and teaching practices. The only question is the timing.

The prospect of this change is undoubtedly unsettling to many faculty. Many will be offended by a move to treat students as customers who expect them to fulfill educational promises rigorously. Moreover, the end of presentation-oriented teaching will bring new methods of assessing teaching effectiveness. The situation will be a lot like that faced by the manager of a business project or the manager of a ball team. The manager's performance will be based on the performance of the team. Teachers will be assessed by how well their students perform. Nothing else will matter.

The New University

Although information technology, networking, and digital media may be undermining the basic assumptions behind our universities, we must look to the movements of the marketplace and political processes for guidance on how to respond to the changes. I have sought here to reveal these forces and suggest how we might respond. Those who do respond will be rewarded with enriched educational programs, more competent graduates, satisfied employers, an enlarged repertoire of ways to engage in research, programs in professional education, and new teaching practices.

These are the new realities that we must face. It is fruitless to deny them and pointless to despair over them. The opportunities for us are unprecedented. We can participate in changes that can produce enormous satisfactions and benefits. There couldn't be a better time to be an educator.

FURTHER READING

In *Value Migration* (Harvard Business School Press 1995) Adrian Slywotzky discusses at great length the concept of business design and gives many examples of customers migrating to new business designs that offer them greater value.

In *School's Out* (Avon Books 1992), Lewis Perelman discusses in great detail his vision of the future of education, a paradigm he calls hyperlearning. Definitely read this. You are likely to find this book deeply disturbing. You can find out more about Perelman's thinking from his interview with the *Journal of Bionomics* (September 1996 at http://www.bionomics.org) and from his own web site (http://www.cris.com/~Kanbrain).

In *Post Capitalist Society* (Harper Business 1993), Peter Drucker lays out a vision of what teaching and learning for the knowledge worker will entail. This expands on an earlier version of his vision in *The New Realities* (Harper & Row 1989).

Beginning with Charles Sykes's *ProfScam* (St Martin's Press 1988), various authors have written best-selling, iconoclastic books about disease and corruption in the academy. Even if you don't accept the premises of these books, they were best sellers and hundreds of thousands of people paid $24.95 to own one or more of them. If nothing else, they give good insight into what ails the current business design of universities.

Eli Noam was interviewed in *Educom Review*, May/June 1996. He spoke specifically about the way information technology is undermining the traditional assumptions of the university.

Eliott Soloway has written repeatedly about the need for effective teaching and teacher development, most recently in "Teachers are the key" in *Communications* of ACM, June 1996.

Andy Whinston and two colleagues have written about educational brokerages in "Electronic markets for learning: education brokerages and the Internet", *Communications* of ACM, June 1996.

Dennis Tsichritzis, Chairman of GMD in Bonn, Germany, has adopted a new strategy for research. His article, "The dynamics of innovation," will appear in the book, *Beyond Calculation: The Next 50 Years of Computing*, by Copernicus Press, March 1997.

The Economist (24th August 1996, page 14) ran an editorial entitled "Teaching Spires", questioning whether the publish-or-perish syndrome is actually serving the original purposes of Humboldt's research university.

Last (and least) I have written several articles containing some of these themes. You can find them in the *Communications* of ACM, December 1992, July 1993, and May 1996.

SIDEBAR
Prototypes of Hyperlearning Environments

The Center for the New Engineer (CNE) at George Mason University (http://www.cne.gmu.edu) has been investigating effective teaching and learning of engineering for the 21st century. We are learning how to serve self-paced, proficiency-based, hands-on learning at the student's desktop without loss of quality. The supporting technologies fit hyperlearning, a non-linear model of learning, that will dominate the "virtual university" and commercial educational services. Our first generation of hyperlearning environments are embodied in a library of eleven CNE modules. The most difficult technical problem is assessment of student learning.

The Traditional Model. A traditional course is a sequence of topics covered in a series of lectures, held in classrooms at weekly intervals, with homework practice in between. This is a linear model of learning. Everyone proceeds at the same pace regardless of their interests, prior experience, talents or other demands on their time. At the end, grades indicate the level of achievement a student was able to make in the fixed time period allocated for the course.

The Hyperlearning Model. Imagine a new model. Instead of a classroom, see in your mind a large "learning room" with an entrance, an exit, and a number of learning stations (booths). You meet the teacher on entry. The exit is guarded by a certifier, whose job is to assess your competence against well-defined standards. You visit the stations to learn particular topics or practices. Colored lines on the floor suggest paths among the stations. You can visit as many stations as you need, and in any order consistent with your current knowledge, to prepare yourself for final certification. You can take trial certifications and then backtrack to the stations needed. You can take self-assessment tests at any time you like. You call on the teacher for help at any moment you are stuck. The teacher will offer guidance if you are heading in a wrong direction. In contrast to the linear model, everyone who exits gets the same "grade" (a certificate of competence); the variables are the length of time and the path followed. We call this the hyperlearning model. The prefix "hyper" means non-linear, the ability to jump to other dimensions, as in a mathematician's hyperspace or an author's hypertext.

CNE Modules. The hyperlearning model is easily implemented in the World Wide Web: a learning module contains information objects representing the stations, self-assessment tests, texts, pictures, demos, workbenches, links, and certifiers. For navigation, we use a subway map whose colored lines connect the stations and lead to the certifier. At our web site we have constructed a library of 11 hyperlearning modules: eight in computer science subjects, one on the general engineering subject of senior design, a refresher on high-school mathematics, and a refresher on introductory college statistics. The computer science modules are used in classes, where they allow instructors to shorten the classroom time on those topics and the students to do more sophisticated projects. The math and stat refreshers are being used by the Defense Acquisition University. A Module Authoring System permits teachers to construct their own learning modules. The CNE modules site receives 4,000 to 10,000 "hits" per week and has been awarded a three-star Magellan rating.

Certifiers. Certifiers confirm that a student has met the learning objectives of a course and issue an authoritative declaration of the student's competence. The first generation of certifiers deal with problems whose answers are algorithmically computable, such as occur in math, science, and engineering courses. The technical challenges include: designing test generators that accurately assess students according to given criteria, validating the tests, providing a data system giving instructors feedback about student performances on self-assessment tests, scrambling questions and multiple-choice answers to prevent fraud and allow students to meaningfully retake tests. The certifier generator should generate tests that completely cover the target domain, and it should provide feedback to the students about correcting their weaknesses. A Certifier Authoring System allows instructors to create certifier templates containing text, formulas, graphs, images, video clips, applets and sound.