Reengineering Higher Education: Reinventing Teaching and Learning

"TQM and its variants have brought to universities and colleges a new awareness of… overall accountability, although such metrics have been applied proportionately more often to administrative organization and processes than to academic affairs."

by Herbert F. W. Stahlke and James M. Nyce

Successful reengineering in higher education must begin with teaching and learning, rather than administrative processes. Addressing educational processes first will naturally force a reconsideration of such features as the student credit hour, faculty load, space utilization, the academic calendar, course scheduling, instructional resources like technology, and the design of student-faculty interaction. This article reviews selected literature in this area and develops a principled framework within which to think about reengineering teaching and learning in higher education.

Organizational reengineering owes much to the work of Walter Deming, who, at the invitation of General Douglas MacArthur, applied his management principles to rebuilding post-war Japan. Deming's principles, under the rubric of Total Quality Management (TQM), require a business or industry to evaluate processes, from supplier through customer, in order to achieve maximum efficiency and customer satisfaction. The effects of Deming's principles can be seen and measured in efficiency, productivity, customer satisfaction, and, ultimately, profitability. TQM and its variants have brought to universities and colleges a new awareness of these measures and of overall accountability, although such metrics have been applied proportionately more often to administrative organization and processes than to academic affairs. The reason for this skewing is that administrative processes in a higher education environment share many of the measurable properties of business processes: they can be evaluated according to many of the same parameters. Academic activities are notably more difficult to quantify and evaluate; even such fundamental business concepts as customer and supplier resist clear definition in academic terms.

A significant part of the difficulty of thinking about reengineering in higher education arises from the absence of clear analogs between industry and colleges and universities. As William

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Massy and his colleagues point out, many academics would contend that academic process is of a fundamentally different order from business process: it resists business models of productivity.[1] It also resists the sort of quantification commerce requires. Attempts to quantify, as in debates with state legislatures about productivity, lead to serious misunderstanding of what goes on at a higher education institution.

For this reason, James Porter argues that reengineering should be applied only to administrative processes, namely the support processes that are the business-like side of higher education.[2] Porter acknowledges that the core processes—teaching, learning, and research—remain resistant to standard business process reengineering. He ascribes this resistance in part to the fact that attempting to reengineer these core processes requires a degree of agreement among administrators, faculty, and trustees that is unlikely to be achieved. This confounds any attempt to build instruments to measure, quantify, and rationalize these core processes. However, Porter's division of institutional processes into support and core academic processes follows perhaps too closely a traditional distinction between academic and administrative spheres in a college or university. Core business processes in higher education can be viewed as including, as in commerce, links between suppliers and customers. While payroll and student records may not be core processes, a case can be made that recruitment and placement are. These are the processes in which academic personnel meet high school teachers, counselors, and employers, the groups most clearly identifiable as suppliers and customers.

Carol Twigg argues that higher education must reengineer in order to improve productivity and to serve new and broader constituencies.[3] However, she does not broach the issues of reengineering teaching and learning; rather, she argues that, just as IBM achieved savings and efficiencies using technology to reengineer training, higher education can use technology to make teaching and learning more effective and efficient. Twigg's argument makes the common mistake of assuming that corporate training is enough like college and university teaching and learning that what works in the corporation will work in higher education. However, the goals and motivations of faculty and students differ enough from those of supervisors and employees to make the comparison at least questionable. Reengineering efforts that rest on analogy and resemblance misread fundamental differences: the driving force for business is profit; the driving forces for higher education are quite different. They include increasing the body of knowledge and preparing young people for productive, satisfying membership in society. The word "profit" does not appear in many college or university mission statements.

Twigg's more recent work adopts an enhanced distance-learning model as a basis for rethinking the infrastructure of higher education.[4] She argues that campus-based, lecture-mediated higher education limits access in the very ways that have led to the increased use of distance education. The physical plant, in her model, will diminish in importance as a network-based national infrastructure becomes more available. Twigg foresees replacing the existing campus-based infrastructure with an infrastructure that is entirely electronic and that is, therefore, accessible to anyone with appropriate computer and Internet access. In this way, she suggests, teachers and learners will have greater control of learning situations and of the scale of application within them.

To further reengineering, Ellen Wagner proposes that universities first apply technology to improving the delivery of distance education courses and then transfer those methods to the campus-based course.[5] In 1992, the first author of this paper, collaborating with several colleagues, took a similar approach.[6] However, we examined the question of how technological tools can be scaled to the teaching-learning environment and argued that course planning must consider the question of scalability.

Warren Baker and Arthur Gloster also address campus-based academic reengineering.[7] They describe a massive effort to use technology to improve teaching and learning, one which requires the resources of a large research university and partnerships with major vendors and is therefore difficult to replicate in much of higher education. Such models do not implement well in smaller institutions.

William Massy and Robert Zemsky, in a lucid analysis of the economics of higher education, conclude that higher education cannot become more productive or hold costs down unless colleges and universities embrace technological tools for teaching and learning.[8] They argue that information technology offers mass customization and economies of scale that are not achievable through traditional models. By appealing to the ability of technology to ease limits of time and space, Massy and Zemsky, in effect, allude to the sort of asynchronous model we present below. William Plater makes a similar proposal, recognizing how intrinsically time-linked the various elements of teaching and learning are.[9] However, Massy and Zemsky, like

[1] William F. Massy, Andrea K. Wilger, and Carol Colbeck, "Overcoming 'Hallowed' Collegiality," *Change*, July-August 1994, 10-20.

[2] James H. Porter, "Business Reengineering in Higher Education," *CAUSE/EFFECT*, Winter 1993, 39-46.

[3] Carol A. Twigg, "Improving Productivity in Higher Education—The Need for a Paradigm Shift," *CAUSE/EFFECT*, Spring 1992, 39-45.

[4] Carol A. Twigg, "The Need for a National Learning Infrastructure." *Educom Review*, September-October 1994.

[5] Ellen D. Wagner, "The Technology Aside: Building a Strategic Plan to Strengthen Academic Programs," *CAUSE/EFFECT*, Spring 1994, 5-20.

[6] Herbert F. W. Stahlke, Kay E. Hodson, Tamara Estep, and Leigh Mainwaring, *Technology Access for Distance Learning: A White Paper* (Muncie, Ind.: Ball State University Computing Services, 1992).

[7] Warren J. Baker and Arthur S. Gloster II, "Moving Toward the Virtual University: A Vision of Technology in Higher Education." *CAUSE/EFFECT*, Summer 1994, 4-12.

[8] William F. Massy and Robert Zemsky, *Using IT to Enhance Academic Productivity* (Washington, D.C.: Educom, 1995).

[9] William M. Plater, "Future Work: Faculty Time in the 21st Century." *Change*, May-June 1995, 22-33.

Plater, appear to accept uncritically the proposition that information technology can, in fact, mediate productivity increases without concomitant losses in quality. Further, they provide for no mechanisms to ensure this result. Finally, the economies of scale that they propose are less likely to be achieved in areas like composition, literature, foreign languages, history, music, the arts, and some of the social sciences, where the medium of teaching, content, performance, and evaluation relies heavily on natural language.

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In 1995, Stahlke presented an alternative, arguing that reengineering must begin with teaching and learning and that administrative changes should be driven by the results of academic reengineering.[10] To reengineer, this work argued, one has to start with, and pay serious attention to, those categories and enterprises that define the college and university. For reengineering to so succeed, for innovation to occur, it must start from teaching and learning, and a second parameter — appropriateness — must be added to scalability. Together, scale and appropriateness provide a principled matrix for designing teaching-learning tasks and matching them with appropriate tools. Finally, this work argued that reengineering is not primarily a question of using technological tools but rather that the process requires that faculty members regard traditional methods and technological tools as a set of resources to be interrogated, not taken for granted. Each tool or method has appropriate uses and scalable implementations which are not fixed.

It is within these parameters that we will discuss reengineering. In this article we will develop a principled framework within which to think about reengineering teaching and learning in higher education.

Extending reengineering to higher education

As Twigg has shown in her National Learning Infrastructure Initiative papers, teaching and learning in higher education have changed only very slowly since the first American universities were founded in the 17th century. Curricula have been modernized periodically, and new technologies, including low-cost publication, electronic media, and the computer, have had significant impact on the means and accessibility of higher education. However, little has changed in the basic assumptions as to how higher education is to be carried on: the lecture hall, the library, the tutorial, and the laboratory remain the structural constants of college and university education. These constants assume that higher education is best carried on by bringing the learner to the repositories and masters of learning and by organizing teaching and learning according to certain economies of scale.

The basis of our argument is that if teaching and learning in higher education are to be reengineered, then a different set of assumptions must be embraced and implemented. A strong program of reengineering must proceed from the following assumptions:

- the fundamental teaching-learning unit is the teaching-learning task;
- the relationship of teacher, learner, and content varies from one teaching-learning task to another;
- traditional methods and modern technological tools together form a unified set of tools and methods, each of which is appropriate to some teaching-learning tasks and not to others; and
- methods and tools must be scaled to fit the learning environment.

We argue that these assumptions will require a rethinking of teaching and learning that can profoundly affect the roles and responsibilities of the student and the instructor, administrative support processes and calendars, and, in short, the entire structure and delivery of higher education. The resulting reengineering promises to increase the effectiveness of the teaching-learning process, to lead to more efficient use of resources, and ultimately to increase both the effectiveness of and accessibility to higher education.

An asynchronous model of teaching and learning

Teaching and learning require relationships among teachers, learners, and content, where content is understood as including learning materials. These relationships may combine any two or, on occasion, all three components. Since all three are not necessarily or, perhaps, even frequently involved at the same time, the overall relationship among them is largely asynchronous. (We are using the term "asynchronous" to refer to activities and relationships that do not require complete simultaneous involvement of all participants and elements; rather participants and elements are present as needed for appropriate, scalable design of teaching and learning.) In the typical lecture hall, for example, teacher and learner are together, but the role of learning materials depends on lecture methods. In a laboratory, learner and learning materials are present, but the teacher plays a more limited role. By providing parameters for the design of teaching-learning tasks, an asynchronous model lends itself to considering questions as to what is taught, what is learned, who is involved, and

[10] Herbert F. W. Stahlke, "Reengineering Teaching and Learning: An Asynchronous Model," in Michael Jeffries, ed., *Faculty Handbook* (Indianapolis: Indiana Partnership for Statewide Education, 1995).

what relationships hold among these elements.

Technology has a potentially rich, but largely unrealized, role in teaching and learning. This role is defined variously by what the teacher has available, has had time to learn, or can find an appropriate use for, and by what students have access to, are familiar with, and are willing to use. In all of these ways, technology usually plays an adjunct role to other, more traditional modalities for teaching and learning, including lecture, laboratory, library, textbook, tutorial, and practicum.

Successful reengineering of teaching and learning requires the realization that the putative distinction between technological tools and traditional methods must be rejected. Reengineering will require the use of both traditional and technological tools and modes, building on and extending traditional social forms of teaching and learning. Using appropriate tools and modes requires assessing carefully the teaching-learning task and the suitability of method to task. What we are proposing here is a research agenda in which we would apply the critical skills we associate with discipline-based research to the work we do as faculty members. This agenda promises pragmatic yield. Reform efforts in higher education would have, for once, an empirical base. Another result would be that efforts like these would no longer be driven predominantly by policy and administrative interests. A research agenda of this sort could also have significant intellectual yield, for it would throw light on categories and resources that inform much of the work we do.

Rather than assume, as most high school and post-secondary teaching models do, that the default mode is the lecture hall, one must question what lecture is appropriate for. Surely certain thought processes and types of teaching can be encouraged better by lecture than by most other means. Dialectic rhetoric, for example, incorporates an element of drama and of suspense that lends itself particularly well to a presentation whose intent is to give students the experience of seeing knowledge unfold and grow through the use of the scientific method. And few methods can match the effectiveness of lecture in presenting a new synthesis or a new discovery that has not yet appeared in print. However, most expository modes can be as well managed in print, since the typical student needs opportunity to review details of exposition while learning new material. Computer simulation is appropriate especially for teaching-learning tasks requiring large numbers of variables that interact in complex ways and that can be mastered only by experiential methods. A self-directed hypertext model may work well for exploratory learning but is less than adequate for content requiring precision, attention to detail, and broad command of factual knowledge. Just as no single traditional method is appropriate to all teaching-learning tasks, no technological tool is either, as Gail Bader and James M. Nyce argue with respect to hypermedia.[11]

A similar argument can be made about the more recently popular World Wide Web pages that are beginning to be used widely for teaching and learning. Web pages bring together a variety of technologies, but an examination of existing Web-based courses suggests that more thought has gone into what one can make available through the Web than what one should use it for. The Internet abounds with text-based course material that is, arguably, not an appropriate way to use the Web. Printed text is cheaper, more easily accessible, and in many ways easier to use. Few online, Web-based courses have taken full advantage of the hypertext potential of HTML. Further, Web-based courses sometimes depend on the availability of materials on foreign servers, where the institution hosting the course has no influence over the maintenance and accessibility of those materials.

There are several reasons why the Web has been used as it has for teaching and learning. First, there has been a tendency to let technological possibilities drive Web instructional design and use. Second, the theoretical rationales that have been invoked to justify commitment to Web efforts have tended to be weak: *ad hoc* and *post hoc* appeals to post-modernism.[12] However, perhaps more than anything else, these efforts build on and reflect a kind of naive optimism about technology, particularly new technologies, and the role they should have in higher education. Characteristic of such optimism is the statement that the World Wide Web "may have 1000 times more 'pedagogical power' than two-way TV."[13] Crucially missing from almost all these Web efforts is any discussion of what is a suitable or appropriate use for the technologies. Rather the tendency has been to assume appropriateness. Further, there has been little in the way of attempts to establish research agendas that address the issue of appropriateness. However, as American colleges and universities begin to assert property rights to the virtual university, there will be both a real need and an opportunity for such research.

Some examples of tools or modes and their appropriate uses are laid out in Table 1. Table 1 combines technological and traditional tools and modes because they are alike in one way: each has appropriate uses and must be examined

"Just as no single traditional method is appropriate to all teaching-learning tasks, no technological tool is either …"

[11] Gail Bader and James M. Nyce, "Seduced by Common Sense: Why Hypermedia Works," in *Deciding our Future: Technological Imperatives for Education, The Eleventh International Conference on Technology and Education, Institute of Education, University of London, London, England, March 1994, Volume 1* (Austin: The University of Texas, 1994), 358-360.

[12] Lewis J. Perelman, *School's Out: Hyperlearning, the New Technology and the End of Education* (New York: William Morrow, 1992).

[13] Glenn Ralston (gralston @in.net), "Educational Standards," In AI-in-Indiana (ai-in-indiana@lotus.doe.state.in.us), September 30, 1996.

Table 1: Tools, modes, and appropriate uses

Tool or Mode	Appropriate Uses
Textbook	Economical compilation of established knowledge Some learning aids
Lecture	Economical presentation of new knowledge and new syntheses Limited interaction
Library	Convenient, economical mass storage, access to hard copy, collaborative learning environment, requires learner to acquire search and retrieval skills and to exercise critical selectivity
Classroom	Real-time, physically proximal exploration of discussion topics
Electronic Mail	Confidential communication One-to-one or one-to-several information distribution One-on-one dialog, not time-sensitive
Usenet News Groups	Access to many and diverse topical discussions Open discussion groups, not exclusive membership Tracking multi-threaded discussions Posting to multiple groups
Closed BBSs	Restricted discussion groups, not publicly accessible Tracking multi-threaded discussions
Internet Relay Chat	Online, real-time exploration of topics
Gopher	Hierarchical menu access to the Internet Easy search and downloading
World Wide Web	Hypertext and multimedia accessible through Internet browsing software, e.g., Netscape
One-Way Video	Limited simulation of lecture environment
Two-Way Audio	Limited real-time interaction
Two-Way Video	More complete simulation of lecture/discussion environment

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carefully for its proper application. The focus of reengineering must be on the relationship among teacher, learner, and materials if the appropriate tool or mode is to be chosen.

Scaling tools to context

Scalability is rarely considered a parameter in itself in the design of teaching and learning. However, choices like whether or not to use a microphone and whether to conduct a particular class in a lecture hall or a seminar room are examples of scalability, scaling room size to the size of the class and scaling audio amplification to room size. When taken up at all, scale has generally been addressed as an economic parameter. It is more economical to present a lecture to a section of 300 students than to one of thirty. As an economic parameter, scale has been outside the control of teachers and learners, manipulable only by administrators, not by faculty. We argue that design of educationally and economically effective teaching-learning objects requires that faculty members be able to make judgments of scale as well, whether in response to real conditions in which teaching and learning occur or with the intention of selecting a method and a learning group appropriately. Table 2 illustrates how a variety of tools can be scaled to the context.

Achieving appropriate matching of tools and tasks in instructional design

The design of teaching and learning as it is carried on in most of American higher education presupposes a small number of default methods. Most of undergraduate education is centered on the lecture-discussion mode, with textbook and, perhaps, library-centered storage of and access

Table 2: Scaling tools to context

Tool	Context	Scale
Electronic Mail	Mainframe-based	Text-only, no attachments, limited help
	LAN-based	Full multi-media capability, attachments, full-screen display, online help
Fax	Telephone-based	Copy of original, subject to telephone service conditions
	Computer-based	Can be networked, clean copy, can be converted to word processor or spreadsheet file
Textbook	Public university	Current information, well illustrated
	Third-world school	Cost-driven, paperback, frequently dated material
World Wide Web	VT100 emulation	Text-based only
	28,800bps modem	Text, graphics, limited by file size
	56kb dedicated line	Text, graphics, some video and sound, some networking
	T1 (1.54mb) line	Full multimedia and networking

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to information. Certain disciplines make use of additional modes: the sciences use laboratories, teacher education uses supervised practicums and internships, business uses case studies, and architecture and music emphasize studio work. In any discipline, video technologies and, sometimes, computer technologies augment the dominant modes of teaching and learning but remain largely ancillary to the modes favored by disciplinary traditions. The classroom lecture remains the basic unit of instructional and fiscal planning.[14]

In order to begin reengineering teaching and learning, educators must first challenge the notion "default mode." Instead of designing for economical scheduling and movement of people, academics must attend to the teaching-learning task and its properties. With the teaching-learning task as the unit of organization for course content, we can borrow the concept of "object" from contemporary software technology, where an object is a self-contained block of information with certain intrinsic relationships to other objects. These objects can be designed in such a way that the necessary combinations of learner, content, tool or method, and teacher are most effectively associated. The nature and design of these objects will have to emerge from experiments, innovation, and reflection: if reengineering is to succeed, the artifacts of a new model cannot simply be built out of traditional elements of higher education. Teacher-learner communication can be mediated electronically by means of fax, electronic mail, electronic bulletin boards, or online conferencing systems as appropriate. Learner and materials can be associated by appropriate library or text assignments, laboratory experiences, database searches, or small group efforts. Evaluation can be carried on individually, peer-to-peer, in groups, or by various electronic means.

Such an approach to reengineering offers opportunities to test and extend notions of learning and teaching in higher education by appropriate matching of tool/mode, learning task, and participants, and by scaling the design of the object to the environment of the task. Among the consequences are more precise definitions of teacher and learner responsibilities. For example, instructor responsibilities include selecting and sequencing learning materials and activities, monitoring and evaluating student progress and performance, tutorial interaction with the top 15 percent and bottom 15 percent of students, lecture/discussion as needed and appropriate, and online discussion as needed. Student responsibilities include performance of teaching-learning tasks as prescribed or recommended, completion of evaluation exercises, and interaction, live or electronic, with the instructor or other students.

Some benefits of an asynchronous model

Reengineering teaching and learning along lines required by an asynchronous model will stimulate the evaluation and reevaluation of the

[14] Twigg, 1994, 9.

role of teaching and learning in higher education. The parameters of appropriateness and scalability will allow us to ask questions about matters that even reform efforts in higher education have frequently taken for granted: the basic objects and structures of the college or university. It is these objects and structures that a successful program of reengineering must both work through and challenge.

For students, an asynchronous model will provide greater responsibility for learning, control over pacing of learning activities, and multiple modes of interaction with instructors and peers. For instructors, the model presents research opportunities in teaching and learning and in higher education itself. It allows greater control over interaction with students, greater ability to direct attention to individual needs, and the ability to adapt modes/media appropriately to tasks. For the organization of learning, the model extends widely accepted practices in teaching and learning. Because students control the pace of their learning, learning is no longer restricted to traditional calendar terms. Because the instructor selects media/modes, traditional definitions of course, student credit hour, faculty course load, and all they entail could change radically and become dependent on teaching-learning tasks and the pace at which students can complete them.

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Potential areas of application for the asynchronous model

The most natural arena in which to apply an asynchronous model is distance education, where the asynchronous relationship among teacher, learning, and content is unavoidable. However, much of the design of distance education courses has attempted to replicate the on-campus lecture hall and discussion format. The use of one- or two-way television and two-way audio is clearly a compensatory measure that has led to significant investment in infrastructure and facilities simply to preserve a default mode of teaching and learning. Instead, the fact that teacher and learner cannot be in the same place at the same time should form the basis for redesigning distance education courses around modular learning objects that use appropriate and properly scaled tools and methods.

The asynchronous model can also extend other modes. The classic notion of tutorial can be mediated by an electronic bulletin board for asynchronous discussion, real-time conferencing systems can support synchronous meetings, and electronic mail and file transfer can support the submission of assignments. A wide variety of graduate courses emphasizing research can be redesigned to emulate the use of the Internet for collaborative research among scientists, reserving face-to-face lecture and discussion only for those modules requiring that sort of synchrony. Much supervision of thesis and dissertation work is already carried on over a distance. While face-to-face conferences are often of great value for debating research issues, much comment and criticism requires thoughtful contemplation and writing, tasks that do not require synchrony. Conceivably, even on-campus, large-section general studies courses can be offered in an asynchronous mode. In fact, the necessity for self-direction on the part of the student may well render asynchrony a significant advantage in the overall design of the first-year experience by inculcating positive learning habits and attitudes early in the academic program.

A subtle and indirect result of the asynchronous model is the blurring of the distinction between on-campus and distance learning. Distance education is widely viewed as a poor substitute for the on-campus experience, and design criteria for distance education seek to compensate for its perceived disadvantages to the learning experience. By designing around asynchronous assumptions, distance learning can become a rich, varied, and highly effective modality, so much so, in fact, that the college or university may well see a need to design the on-campus educational experience modularly and asynchronously so that on-campus students can enjoy as rich an experience as the off-campus student.

Implementing an asynchronous model

Implementing an asynchronous model of teaching and learning in higher education requires recognizing broad principles of reengineering that have been applied effectively in business and industry. However, the model also requires addressing the fact that colleges and universities differ from businesses in some fundamental ways, differences that, if not recognized early, will cause any reengineering effort to founder. Finally, the range of types of institutions of higher learning, as defined, for example, by the Carnegie Foundation, is varied enough to require radically different approaches to reengineering.

Identifying educational analogs to the primes of business process reengineering forces us to examine the role of the institution in the society it serves. The state university, for instance, receives tax money to prepare young people for successful, productive lives, preferably in the state providing the funding. Teaching and learning are overwhelmingly the primary sets of processes supporting this goal. However, the university must also recruit and must place these students with employers four or five years later if it is to fulfill its mission. It follows that recruitment of students and placement of graduates are also core processes in higher education.

We propose that the recruitment process be viewed as closely related to the design of curriculum and of teaching and learning. Those responsible for teaching and learning can contribute to the preparation of students for admission to their academic programs only if faculty work with the secondary school teachers who are preparing students for college. Building the preparation of applicants into the reengineering of higher education opens up new questions of how the secondary and post-secondary arenas can interact to the benefit of both.

Further, recruitment and placement can be linked through the curriculum so that relationships are established early between potential employers and potential college or university students. In order to serve as the connection between these groups, the institution will have to ask new questions about the nature of preparation for college, about the conduct of higher education, and about the relationship of the academy to the society it serves.

Back to principles

Reengineering concepts arise from the experience of business and industry in implementing Deming's principles. Applying reengineering concepts to higher education teaching and learning requires that these concepts be rethought. For example, some of the basic terms in reengineering, terms like "internal and external customers," are poorly defined in higher education. Further, administrative processes, as similar as they may seem to primary business processes, are not the primary processes of higher education. Here, they are support processes.

Any approach to reengineering higher education that begins from such processes will distort the mission of the institution: the goals and evaluation measures will address administrative rather than academic values, and attention will be paid to management of resources, faculty, and students rather than to teaching, learning, and research. For reengineering to be effective in higher education, the process must be driven by academic goals; issues such as appropriateness and effectiveness in teaching, learning, and research must count for more than administrative measures like efficiency and profit.

Because the research university, the liberal arts college, the comprehensive university, and the community college represent such varied manifestations of higher education, no single approach to reengineering is likely to work for all.[15] However, for reengineering to succeed, it has to put academic priorities first. What the parameters and principles described here offer is the possibility of tying teaching, learning, research—traditional academic priorities—to recruitment and placement. In short, what reengineering offers is an opportunity to ask fundamental questions about higher education structures, processes, and the relationships they have to each other. This reengineering proposal offers a set of parameters and principles with which to rethink higher education while preserving the value and values American higher education has represented for over a century. Our proposal can lead to a reinvention of higher education that would serve us well—students, faculty, administrators alike—as we go into the next century.

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[15] Robert C. Heterick (ed), *Reengineering Teaching and Learning in Higher Education: Sheltered Groves, Camelot, Windmills, and Malls,* CAUSE Professional Paper Series, #10 (Boulder, Colo.: CAUSE,1993). This paper is available online through http://www.cause.org/information-resources/ir-library/abstracts/pub3010.html