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ABSTRACT

This document, a summary of reports presented at the 1998 annual symposium of the Forum for the Future of Higher Education, covers a wide range of issues that are likely to influence how colleges and universities deal with such questions as what business they are actually in, what are their institutional strengths, how will they compete in a transformed higher education market, and what are campus leaders' hopes for the future. Summaries of papers presented include: "Higher Education as an Associative Good" (Henry Hansmann); "Students Educating Students: The Role of Peer Effects in Higher Education" (George Goethals, Gordon Winston, and David Zimmerman); "When Industries Change: Scenarios for Higher Education" (David Collis); "Tenure Issues in Higher Education" (Michael McPherson and Morton Owen Shapiro); "Private College Pricing: Are Current Policies Sustainable?" (David Breneman, Lucie Lapovsky, and Daniel Meyers); "Intellectual Property Meets Information Technology" (Dennis Thompson); "Inside Internet2: Advanced Networking for Research and Education" (Mark Luker); and Asynchronous Learning Networks: Strategies for On and Off Campus Network-Enabled Learning" (John Bourne). (CH)

FORUM FUTURES

1999

EXPLORING THE FUTURE OF HIGHER EDUCATION

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About the Forum

The Forum for the Future of Higher Education is a community of academic leaders and scholars from across the country who convene annually to explore new thinking in higher education. The Forum facilitates shared inquiry and collaboration on issues likely to influence the future of higher education, primarily in finance and economics, structure and strategy, and technology and learning. The Forum sponsors research, presents findings at annual symposia, and disseminates information throughout the higher education community. The Forum was previously resident at Stanford University and known as the Stanford Forum for Higher Education Futures.

About NACUBO

For more than three decades, the National Association of Colleges and University Business Officers (NACUBO) has been and continues to be the preeminent association for those involved in the leadership, management, and administration of higher education.

NACUBO and its members, the chief administrative and financial officers at more than 2,100 colleges and universities, seeks in its mission to anticipate issues affecting higher education and to promote institutional effectiveness and exceptional business management practices.

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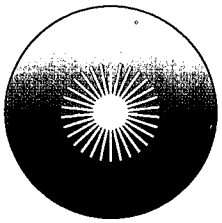

FORUM FUTURES WAS ORIGINALLY DEVELOPED THROUGH THE SUPPORT OF THE JAMES IRVINE FOUNDATION TO INFORM LEADERS OF INDEPENDENT CALIFORNIA COLLEGES AND UNIVERSITIES OF THE RESEARCH AND FINDINGS OF THE FORUM FOR THE FUTURE OF HIGHER EDUCATION.

Fast Foreword

...a fundamentally different landscape for higher education...

...widespread price competition...

...an advanced Internet that will "change everything"...

...academic tenure under attack...

...simultaneously increasing productivity and quality...

Introduction

Higher education is undergoing enormous change, wrought by converging forces largely beyond its control. One force is the surging global demand for higher and continuing education. Another is the tremendous growth of the Internet and related learning technologies. In the past, greater demand was met by expansion mostly within the same, traditional model employed in this country for centuries. The old model, however, may not prevail in the current wave of expansion. Instead, new modes of delivery made possible by technological advances are poised to reshape higher education.

To successfully meet the challenges and build on the opportunities presented by this new world of higher education, leaders of today's colleges and universities must grapple with fundamental questions such as:

- What business are colleges and universities actually in?
- What are their institutional strengths?
- How will colleges and universities compete in a transformed higher education market?
- What do campus leaders hope to see happen in the future?

The Forum for the Future of Higher Education convened its annual symposium in the fall of 1998 to share new ideas and research in an effort to shed light on these and related issues. Discussions centered on wide-ranging, stimulating visions of a very different future and routes toward it. This report, *Forum Futures*, summarizes the symposium's presentations and offers direction to campus leaders as they steer their institutions toward the 21st century.

"students educate students"

Scenarios for Change in Higher Education

Today's college and university leaders are witnessing the formation of a fundamentally different landscape for higher education. To help understand—and influence—this transformation, a clear picture of the higher education environment and the forces affecting it is crucial.

Higher Education as an Associative Good

A large part of what many leading institutions offer to their students today are their other students—past, present and future. Henry Hansmann, Harris Professor of Law at the Yale Law School, captures this notion in his description of higher education as an *associative good.* That is, students care very much about who their fellow students are, largely due to the strong influence of classmates on their educational and social experience.

The associative nature of higher education distinguishes it from most other goods and services. Colleges and universities care very much about who their customers, or students, are; they prefer higher quality students to make themselves more attractive to other students. The result is clustering, or stratification, of the best students at top tier institutions, the next best at the next tier, and so on until all students are sorted in a hierarchical fashion.

Another factor contributing to stratification is highly visible rankings of institutions, such as that of *U.S. News and World Report.* These rankings become self-fulfilling when top students choose their college based on its ranking rather than on other possible factors such as location or strength in one's field of interest.

Stratification reduces competition among institutions because very few of the more than 3,000 colleges and universities in the United States are considered to be any one institution's direct competitors. With less competition to drive them, managers can lose their creative and efficient edge and be unprepared for changes in the higher education environment.

Hansmann's paper raises issues the Forum has sought to engage for many years—mainly, what are the costs, institutionally and societally, of concentrating the best students and faculty in fewer and fewer institutions?

Students Educating Students: The Role of Peer Effects in Higher Education

Implicit in the stratification phenomenon is the assumption that students learn better in the company of stronger students than with weaker ones. That is, students educate students. George Goethals, Gordon Winston, and David Zimmerman of the Williams College Project on the Economics of Higher Education are investigating these so called peer effects on learning to determine whether they actually exist, and if so, whether they justify competition for top students. Otherwise, today's intense competition for student quality may be seen as a less noble—perhaps wasteful—hierarchical struggle among institutions.

The implications of peer effects are central to a number of institutional issues, including selective admissions—turning away less qualified students and the potential revenue they represent, distance learning—whether peer effects can be replicated electronically, and affirmative action—whether a diverse student body raises the level of education for all.

Peer effects may be most significant for elite institutions as they consider their comparative advantages and how they might use them to compete in a transformed higher education market. The appeal of the residential, liberal arts environment is dependent in many ways on the strength of peer effects.

Along these lines, a metaphor regarding the cruise ship industry may be appropriate. Early in this century cruise ships were a means of transportation, the only way to cross the ocean. Today, people still use cruise ships, but more as a means of entertainment—to enjoy the time spent on the ship as much as to get somewhere. If the strategy of elite institutions is to emphasize their personal, highly interactive environment, are they focusing as they should on the business they are in? Campus leaders can consider this troubling analogy in the context of their own institutions.

When Industries Change: Scenarios for Higher Education

To help campus leaders anticipate how today's higher education system may evolve, David Collis, visiting professor of management at the Yale School of Management, applies analytical techniques developed within the field of business to the higher education arena. Collis uses Harvard Professor Michael Porter's *Five Forces* approach (recently amended to include a sixth force, complements) to review the drivers of change in higher education. Together, these six forces determine the profitability of any industry, and shape the conduct of competition within that industry. They include entry barriers, substitutes, complements (the mirror of substitutes), supplier power, buyer power, and rivalry.

Colleges and universities can assess their positions using this framework, and devise strategies for moving forward. Collis describes two very different possibilities: institutions can choose to focus only on markets where their strengths offer a competitive advantage, or they can embrace new technologies and customer needs, and enter new markets generated by the changing environment.

Collis notes that the most common transformation that industries facing extensive change undergo is to become more specialized and less vertically integrated. That is, firms tend to pull back, spinning off many of their functions and focusing on their strengths. This raises a critical issue the Forum has considered for years: Is "retreating to the core," the strategy adopted explicitly or implicitly by many leading institutions, likely to be successful in the future?

Competition in Higher Education

Growing demand, new technologies, new entrants...all are increasing competition in the higher education marketplace and affecting traditional methods of institutional operation—perhaps most notably in the areas of faculty employment and student recruitment.

Tenure Issues in Higher Education

Michael McPherson, president of Macalester College, and Morton Owen Schapiro, dean of the College of Letters, Arts and Sciences at the University of Southern California, note that widespread concern over the steadily increasing cost of higher education has helped intensify the long-standing tenure controversy. In their discussion of tenure, they point out that change is occurring in higher education whether traditional providers are prepared or not: while debate rages on at the institutional and state levels, a move toward part-time faculty—not subject to the tenure system—has long been underway.

McPherson and Schapiro review recent tenure controversies and clarify the issue by showing that it centers largely on questions of authority in the management of campuses. Their discussion moves the level of discourse toward a more nuanced understanding of what tenure is, and under what circumstances it may be most appropriate. They advocate moving beyond thinking of tenure as an all-or-nothing proposition that is either valuable for all types of institutions or is simply wasteful. Further, they raise the important question whether tenure actually is wasteful or more expensive than other possible arrangements,

particularly given that tenure—a voluntary system—still dominates in an environment of great competition among universities.

Private College Pricing: Are Current Policies Sustainable?

David Breneman, dean of the Curry School of Education at the University of Virginia, and Lucie Lapovsky, vice president for finance at Goucher College, describe another effect of competition in the higher education market: the transformation of student financial aid from what had been largely need-based awards to formulas that include merit aid and other criteria. Today, financial aid is commonly referred to as tuition discounting, and price competition is widespread even among elite institutions.

Managing this change has proven difficult. Today, for many institutions, published tuition is a price without meaning, confusing students, outside observers, and often institutions themselves. The interaction of tuition, financial aid, and enrollment levels can be unpredictable and complex—enormous swings in these crucial variables are not uncommon, producing financial problems at all but the top few most well-endowed institutions. A clear indication of how difficult it can be to use merit aid effectively are the examples cited of institutions where tuition and enrollment rose, yet net tuition taken in declined. The authors question whether in the long run tuition discounting is in the best interests of students and higher education, and whether economically viable alternatives may be possible.

Technology and Learning

Technological advances are changing the nature of higher education, allowing teaching and research to take on new forms, and forcing colleges and universities to reconsider the shape of their industry as they strategize for the future.

Intellectual Property Meets Information Technology

Dennis Thompson, Alfred North Whitehead Professor of Political Philosophy and associate provost at Harvard University, addresses contentious intellectual property issues that institutions will have to face as their faculty begin to create courseware and other information technology products. As chair of Harvard's Committee on Information Technology, Thompson led the university's effort to adopt a policy to speak to the intellectual property issue. He notes that traditional practices and established procedures no longer suffice to address new modes of teaching and learning made possible by technology.

The committee determined that in regard to ownership, the key question is whether the university contributed substantially to the making of the product. That contribution can be assessed on three possible levels of support: financial, intellectual and reputational. To fully address the issue, however, it is important to move beyond these ownership questions to more general institutional policies concerning conflict of interest and conflict of commitment. These questions arise when, for example, significant faculty time is devoted to the creation of courseware, or if an institution's name is associated with the product.

To protect key reputational interests, Thompson encourages institutions to provide support to faculty in producing and distributing courseware. Finally, he emphasizes the importance of fully addressing information technology issues by going beyond matters solely related to intellectual property.

Information technology issues will only become more pressing as technology improves. Mark Luker, a primary architect of Internet2 for the National Science Foundation prior to joining EDUCAUSE as vice president, describes an advanced Internet that will revolutionize its networking possibilities.

choose not to — meet the
be higher education's casualties"

Two academic applications commonly discussed are collaborative research and distance learning. While these activities are possible on today's Internet, key improvements would greatly advance current efforts. Enhancement of the Internet's capacity to allow ultra-high performance networking, for example, would enable complex communication and information tools for research, as well as anytime-anywhere distance learning. A more problematic improvement would enable networked access to the contents of libraries, not just their catalogues, as is the case today.

Inside Internet2: Advanced Networking for Research and Education

An advanced network promises to transform not only scholarship and learning, but also commerce, design, entertainment, and many other activities. At this point, the focus is on technology, economics and politics—issues such as how and for whom the advanced network should be designed and the government's role in stimulating progress are subjects of great debate. When all is settled, though, and an advanced network is established, the real challenge for higher education will be to rethink and transform its services in light of the incredible new possibilities at hand.

Finally, John Bourne, professor of electrical and computer engineering at Vanderbilt University, focuses on the transformation of learning through the use of Asynchronous Learning Networks, or ALNs. ALN courses typically are about evenly split between interaction among people—most of which is asynchronous—and self-directed learning activities. ALN courses free faculty from spending considerable time lecturing, and instead allow them to focus on mentoring by working individually with students.

Asynchronous Learning Networks: Strategies for Network-Enabled Learning

Bourne's analysis, based on extensive experience with ALN courses at Vanderbilt, shows that after an initial investment to build the necessary ALN courseware, productivity gains over traditional courses begin to accrue after roughly the third offering of a course. His revenue analysis shows that off-campus students can be added to ALN on-campus courses and generate revenue that significantly exceeds the costs of networking in the new students.

Bourne predicts that in the future, ALN will become an integral part of higher education. He suggests strategies to foster the use of ALN by faculty, and warns that in the end, institutions that produce the best courses will be the winners and those who cannot—or choose not to—meet the changing market's needs will be higher education's casualties.

Conclusion

To successfully move forward, campus leaders must focus on fundamental questions concerning the future role of today's colleges and universities in higher education. Thoughtful and thorough institutional critiques are essential, as is the ability to mobilize resources and adapt to a new environment. It is clear that higher education may not be afforded the opportunity to undergo organic change, stemming from within and at its own pace, but rather will likely be subject to external forces and threats that compel swift and systemic change in the nation's traditional colleges and universities.

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editor's note:

This foreword reflects observations made by Fred Rogers, senior vice president at Cornell University, in a summary presentation at the Forum's symposium. The remainder of this report contains summaries that elaborate on these brief descriptions of the papers presented at the 1998 Symposium of the Forum for the Future of Higher Education. Readers interested in more details are encouraged to consult the authors and the full text of the Forum papers, published annually in book form.

—MD

Higher Education as an Associative Good

Henry Hansmann

Students care about their potential fellow students—their intellectual aptitude, previous accomplishments, sociability, athletic skills, wealth, and so on—as much as, if not more than, they care about a prospective college's faculty, curriculum and facilities. Henry Hansmann, Harris Professor of Law at the Yale Law School, explains how this key characteristic of higher education distinguishes it from most other goods and services: higher education is an *associative good*. That is, due to the strong influence of classmates on a student's educational and social experience, students are very much concerned with who the institution's other students, or customers, are. In short, a large part of what a college or university is selling to its students is its other students—past, present and future.

"a large part of what a college or university is selling to its students is its other students"

Stratification

Markets for associative goods do not function like markets for other goods and services, particularly in the nonprofit realm. Given that its tuition, or price, is the same for any student, a college or university will prefer the student of higher quality to make itself more attractive to its other customers. The result is clustering and stratification: everyone wants to patronize the institution with the highest quality students, but only the highest quality students are accepted as patrons. Once the top students form a cluster, the highest quality students of those who remain will cluster at the next tier, and so on until all the students are sorted in hierarchical fashion. This sort of stratification is very pronounced in higher education.

Competition

Stratification dampens considerably the degree of competition among institutions. Of the more than 3,000 colleges and universities in this country, very few are considered to be any one institution's competitors. The hierarchical structure of higher education in the United States is firmly entrenched—no other industry exhibits this kind of stability. A critical factor in preventing competition is the difficulty of quickly changing the character of a college's student body. Generally, it is possible to change the quality of at most one-fourth of the student body in any one year, as each new first-year class is admitted. Moreover, a college can do virtually nothing to change the qualities of its former students, who contribute strongly to its reputation. Thus there is a high degree of inertia in the relative attractiveness of colleges to prospective students, both undergraduates and graduates. The same is true for faculty, particularly given that tenure makes it difficult to quickly change faculty quality.

The nonprofit form also diminishes competition and accentuates stratification, as institutions often are inhibited from using price and the ability to pay as a basis for admissions decisions. For example, a low quality student generally is unable to gain admission to a high quality college even if he or she is willing to pay more than another prospective student. Further, since the 1950s, various groups of colleges that compete with each other for students—including the Ivy League schools—have entered formal agreements to not offer merit scholarships, but instead to offer aid based only on students' ability to pay. Thus, a student accepted at several schools may well be looking at the same cost to attend any one of them. In this situation, the quality of the institution and its students becomes a primary consideration.

Homogeneity of Preferences

If all students placed the same weight on the various characteristics of their fellow students, then stratification of students across institutions would be extremely pronounced. As it is, though, some students care most about academic aptitude, while others are more concerned with mathematics or music; still others may focus on sociability or athletic skills. These varying preferences help mitigate stratification. However, recent years seem to have brought increasing convergence of preferences, and hence stratification. Our increasingly meritocratic society has focused on a very limited, quantitative set of measures of intellectual aptitude—namely SAT scores and high school grades—exacerbating the ranking of students and the colleges and universities they attend. Prominent rankings of institutions, such as those published by *U.S. News and World Report*, further boost this process. Many students, lacking better information, have been led to apply to the highest ranked institution they believe will accept them, and then to attend the highest ranked institution to which they are admitted. The result is increased stratification; the rankings become a self-fulfilling prophecy and the hierarchy is further solidified.

Is Stratification a Good Thing?

Clearly, the associative character of higher education has a strong tendency to drive the industry toward hierarchical stratification. The question is whether this is a desirable situation, and thus whether public policy and institutions should act to assist or resist it.

There is no clear evidence whether the stratification of students by their academic strength maximizes the aggregate

"higher education is increasingly becoming a commodity"

effectiveness of education. If students are mixed by academic quality, the degree of advantage most likely is greater for weaker students than for strong students. But we simply do not know the optimal degree of mixing, and thus whether there is too much hierarchical stratification in higher education. Even if a high degree of stratification does maximize the average efficiency of higher education, it may lead to excessively unidimensional institutions, and strongly reinforce social inequality as an elite cadre further separates itself.

Another potential disadvantage of a hierarchy is, as noted, that it reduces competition among institutions, which in turn provides room for a good deal of slack in the management of those institutions. An elite college or university can survive many years of mediocre management without losing its reputation. This may be one reason why the professionalization of the administration of higher education has come relatively slowly compared to large corporations in the United States.

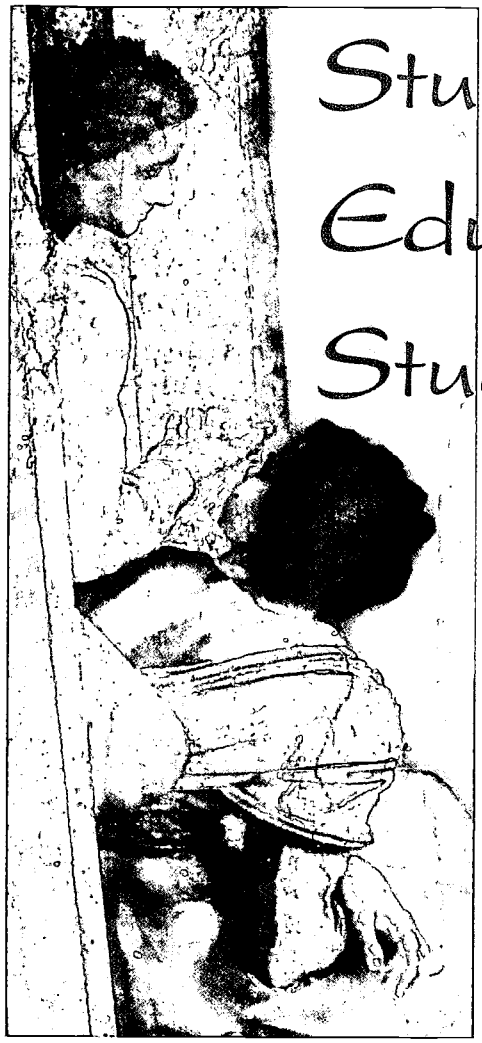
Public Versus Private Education

Public universities today account for nearly 80 percent of students in American higher education, and thus have served as a check on the overall amount of stratification in the industry. Generally, state colleges and universities are much larger and less stratified than their private counterparts. However, increased privatization of public higher education, accompanied by higher fees and greater autonomy, will strengthen the tendency toward stratification. In the future, we can expect a debate about the desirability of tying public subsidies to a willingness on the part of private institutions to accept a more diverse student body. Diversity in this sense will go beyond the issues of gender, race and class to include varying levels of intellectual aptitude and accomplishment.

Conclusion

It is possible for private institutions to employ various competitive strategies to bootstrap themselves up the educational hierarchy. Successful examples at the top reaches are rare, however, owing to the associative character of the experience the institutions offer. Among non-elite colleges and universities, in contrast, higher education is increasingly becoming a commodity, with the individual course rather than the four-year degree as the common unit of consumption. At that level, large numbers of institutions—public, nonprofit and for-profit—are competing with growing intensity for students with respect to price, curriculum, facilities and faculty. The result is a dual system of higher education, with ever more competition at the lower levels of the industry, and ever more hierarchical stratification at the top.

Henry Hansmann is Harris Professor of Law at the Yale Law School and also a member of the faculty at the Yale School of Management. His widely cited 1980 article, "The Role of the Nonprofit Enterprise," describes the structure of nonprofit organizations and the role they play in the economy. Hansmann's most recent book, *The Ownership of Enterprise*, was published in 1996 by the Belknap Press of Harvard University Press.



Students Educating Students: The Role of Peer Effects in Higher Education

George Goethals, Gordon Winston, and David Zimmerman

Why is student quality such serious business to colleges and universities, and why do prospective students care so much about the quality of an institution's students? Why does selectivity loom so large in quality rankings like that of *U.S. News and World Report*? The answer is straightforward, and based on the implicit assumption that students learn better in the company of better students than with weaker ones. The proposition seems reasonable and persuasive, yet despite their potential importance, very little is known about peer effects in higher education. George Goethals, Gordon Winston, and David Zimmerman have begun a methodological investigation of the role of peer effects among college and university students.

Why Do Peer Effects Matter?

Peer effects appear to be central to the way educational services are produced and, through that, to the structure of colleges and universities. Higher education is characterized by a unique customer input technology—that is, students themselves are the only suppliers of an important input to educational production, which varies markedly across individuals. Schools, therefore, care very much about who their customers are; they sacrifice significant revenues by not accepting huge numbers of potential customers in an effort to maintain student quality. Public universities, which cannot legally turn away students, create enclave honors colleges, or campuses differentiated by quality where they can. Among the most selective private colleges and universities, competition for student quality has become fierce.

The threat of high technology (and often for-profit) competition to conventional higher education should be assessed in light of peer effects. If such effects are important and difficult to generate via electronic media, there will be severe limits on the type and quality of education that new information technologies can replace. The distinction between education and training may become increasingly important.

Peer effects also may be relevant to the affirmative action debate. It's not a big step from the destructive stereotype anxiety identified by Stanford psychologist Claude Steele as reducing the confidence and competence of African-American students to the role of peer expectations and values in triggering or suppressing that anxiety. Further, should the argument prevail that it is unacceptable to allow minority representation in our best colleges and universities to fall significantly, then, in the absence of a proxy for race in admissions decisions, it may be necessary to lower standards for all to achieve acceptable levels of minority enrollment. Author Jeffrey Rosen has argued in *The New Yorker* that if peer effects are important, that situation would undermine the quality of public education in a way that affirmative action never did.

Do Peer Effects Really Exist?

Are there actually peer effects on learning? Is there an underlying educational rationale for all the attention paid to student quality, or is the competition for students driven by a less noble, hierarchical struggle among institutions? It seems important to know whether the magnitude of any educational benefits associated with peer effects warrant the resources expended to achieve them.

The most influential piece of research in this regard is the well-known study, Equality of Educational Opportunity, completed over 30 years ago by University of Chicago sociologist James Coleman et al. A key finding of the study, which included over a half million K-12 students, was that "...a pupil's achievement is strongly related to the educational backgrounds and aspirations of the other students in the school."

A more recent K-12 study by Roberston and Simons of the London School of Economics used British data that follows the entire cohort of children born in a particular week in Britain in 1958. They found clear evidence that peer effects were positive and nonlinear—that weak students were helped more than strong students were hurt. Students were best off if they were in the top group of a school sorted by ability and worst off in the bottom group of such a school.

Further, author Judith Harris argues in her widely publicized book, *The Nurture Assumption*, that peers are much more important than parents in human development. Meanwhile, educational researchers have considered the benefits of peer assisted learning. These studies show the benefits of group versus solitary learning; inasmuch as researchers are interested in designing optimal learning environments, the effects of peers are important to their analyses.

A Methodological Approach

Determining whether peer effects exist is of primary importance. A key methodological issue that must be addressed is that people often select those with whom they associate. Thus, what may appear to be a peer effect may actually be a case of "birds of a feather flocking together." Controlling for potentially confounding variables—particularly self-selection issues—is the central empirical challenge.

"are peer effects dependent upon physical proximity?"

"the notion that students educate students is central to a diverse set of issues"

Other issues of interest include:

- Are peer effects nonlinear? That is, do the benefits of improving the peer environment diminish at some point?
- Are peers individuals, or groups, or is a broader institutional ethos more influential? How much can the college intentionally shape or change that ethos?
- Do peer effects work with equal force for better (good behavior and academic performance) or for worse (binge drinking, drugs)?
- Are peer effects dependent upon physical proximity or can they function just as effectively through cyberspace?

Two broad approaches are being undertaken, including experiments in the psychology laboratory and observation and econometric analysis of behavior.

Experiments in the Psychology Laboratory

This approach entails the study of live groups interacting in the laboratory to observe the impact of two peers on one fellow student. All three students read and discuss articles from the *New York Times* "News of the Week in Review." The first study will look at the impact of two high ability peers vs. two modest ability peers on a modest ability student subject. It is expected that even in a situation with limited interaction, students learn more from high ability peers, and more enjoy doing so. The hypothesis is that face-to-face interaction with able, live peers will produce measurable increases in learning and motivation for learning.

Observation and Econometric Analysis of Behavior

Moving from a laboratory experiment to a natural setting where behavior can be observed is desirable; however, researchers must carefully avoid confounding results due to self-selection, as discussed above. One natural setting is in freshmen student housing where students' rooms are assigned, not chosen.

The Andrew W. Mellon Foundation's College and Beyond database provides an extraordinarily rich data set for the study of peer effects. It contains detailed information on the college experiences of approximately 90,000 undergraduates from 34 selective colleges and universities in cohorts entering in 1951, 1976 and 1989. One could, for example, check whether students tend to over or under perform conditional upon the SAT scores of their roommates. One could also check whether the over or under performance depends on either the student's own SAT score or on the gap in scores between roommates. The presence or absence of peer environment effects could be measured at the roommate, entry and house level of proximity. The College and Beyond database also contains data regarding students' pre-collegiate aspirations, presenting more interesting research possibilities.

Conclusion

The notion that students educate students is central to a diverse set of issues including selective admissions, affirmative action, and distance learning, among others. Beyond that, a clearer understanding of peer effects will help guide institutions as they face the formation of various student groups—formalized or not—that can have an enormous impact on students, campus atmosphere and, ultimately, the educational mission of the institution.

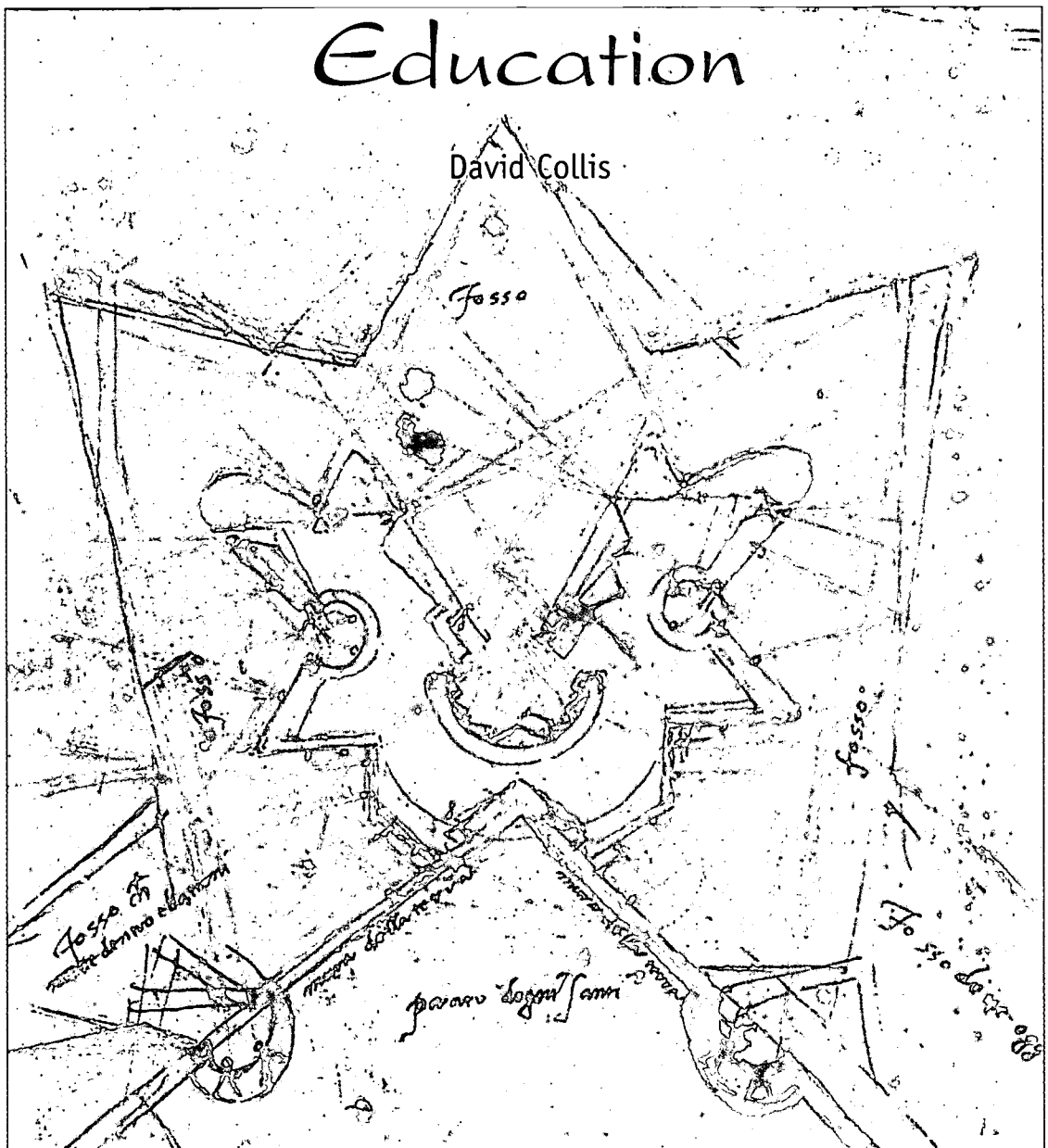
George Goethals is the Webster Atwell Class of 1921 Professor of Psychology at Williams College. He has written many publications, including the forthcoming textbooks, *Understanding Social Psychology* (with S. Worchel, J. Cooper, and J. Olson), and *Adjustment: Pathways to Personal Growth* (with S. Worchel and I. Heatherington).

Gordon Winston is the Orrin Sage Professor of Political Economy and Professor of Economics at Williams College, where he is also director of the Williams Project on the Economics of Higher Education. He is a frequent contributor to the Forum's symposiums. He is currently writing a book on the economics of higher education.

David Zimmerman is associate professor of economics at Williams College. Prior to joining Williams in 1991, he was a research associate at the World Bank. David has published numerous articles on a diverse set of topics including welfare reform, abortion legislation, economic returns of education, and social mobility.

When Industries Change: Scenarios for Higher Education

David Collis



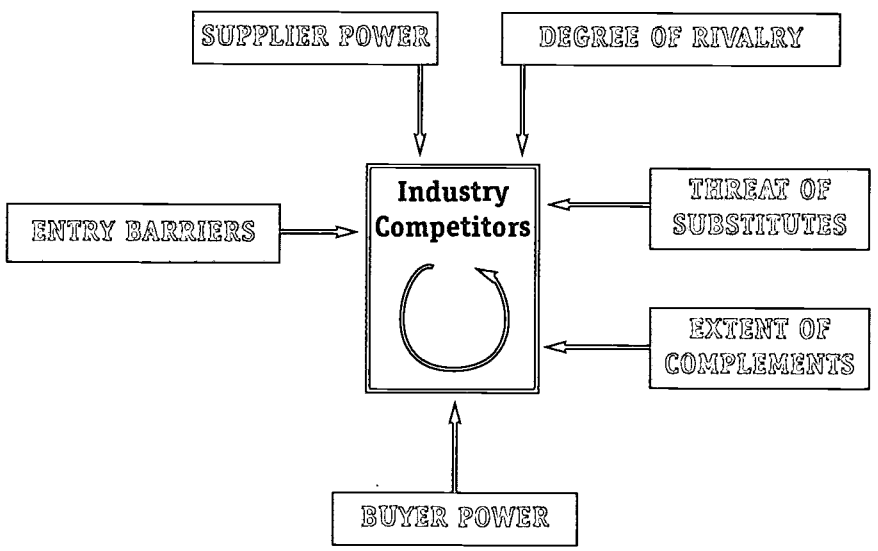
Higher education will be fundamentally different in the next millenium. Current pressures—new technology, shifting demographics, rising costs, and changing workforce needs among them—will drive change, although just which direction the industry will go is unclear. To help shed light on how the higher education system may evolve, David Collis, visiting professor of management at the Yale School of Management, applies techniques developed within the field of business strategy to the higher education arena.

Industry Analysis

To move beyond the typical, somewhat ad hoc review of the various drivers of change in any industry, Harvard Business School professor Michael Porter popularized the systematic *Five Forces* approach (recently amended to include a sixth force, complements), as illustrated in Figure 1 below:

Together these six forces determine the profitability and shape the conduct of competition within any industry, including higher education.

Figure 1: Elements of Industry Structure



Industry analysis begins with the premise that all industries create value. The key questions are what caps the amount of value the industry can create (the size of the pie), and who captures that value (the division of the pie)? Three forces affect the size of the pie—threat of entry, threat of substitutes, and presence of complements. Three forces determine the division of the pie—power of buyers, power of suppliers, and extent of rivalry.

Entry Barriers

In the past, barriers to entry in higher education were high, primarily because of the cost of building a campus and the long time needed to build a reputation to attract students and faculty.

Technology, however, promises to be a vehicle for easier entry into the higher education arena, because much of the educational experience can be replicated by technology at very low marginal costs.

"education is an intangible product"

Substitutes

The availability of and the demand for substitutes for higher education is increasing. Perhaps most significant is that many employers no longer regard the one-time provision of an undergraduate (or graduate) degree as sufficient for the lifetime learning needs of their workforce. Increasingly, they are meeting these ongoing training needs in-house or with third party suppliers. There is also a proliferation of new courses and initiatives available to students of all ages beyond the traditional extension schools or adult education programs associated with universities.

Complements

Less change is occurring among complements for higher education, although the importance of the higher education industry to many of its complements—for example, personal computers and local industry—is declining.

Supplier Power

The power of faculty as a supplier for higher education is in a state of flux. On one hand, the faculty superstar phenomenon has increased competitive bidding among universities for talent, and ratcheted salaries upward. On the other hand, the use of part-time faculty as a less expensive (and more flexible) source of labor has been rising steadily.

Buyer Power

The more options the buyer has to choose from, the more power the buyer has. New substitutes and new entrants erode the monopoly that traditional colleges and universities have enjoyed. Buyer power is also increased to the extent that firms themselves become suppliers of higher education, as they introduce lifelong learning programs for employees, reducing the ability of the universities to capture value.

Rivalry

Rivalry will increase in the future due to entry of new low cost providers into the industry. It is also likely that current institutions will become more competitive. Distance learning removes the capacity constraints that universities have traditionally operated under, so physical facilities no longer need limit the size of the student body. This will lead to increased competitive overlap between institutions, particularly as geography becomes less of a constraint.

Strategic Implications

Industry analysis, as summarized above, suggests strategic moves that current institutions can take to improve performance. The primary observation is that colleges and universities must recognize and accept that it will be more difficult to compete in the higher education business in the future. While acceptance will not by itself solve any problems, plans that realistically reflect the future have a better chance of succeeding than those that merely project the past. Further, it would be valuable for universities to develop strategies that address the threat of entry, substitutes, rivalry, and buyer

power—the four main drivers of deteriorating industry structure.

Three constraints on entrants and substitutes for higher education can be utilized to mitigate their negative effects. The first constraint is that the higher education experience involves more than just its classroom or paper writing components. To the extent that the formal educational experience involves group activity, mentoring, and other activities that are difficult to standardize or replicate, the threat of new technologies is reduced. The second and related constraint is the socialization process that characterizes the undergraduate experience. Again, the more universities can do to reinforce the traditional liberal arts notion of educating the whole person, the lower will be the threat of entry and substitutes.

The third constraint on the success of new entrants and substitutes is the credibility of their certification process. Because education is an intangible product, there must be some external legitimacy accorded every successful institution. Certification of the quality of degrees awarded is one of the major barriers to entry to higher education. Strategies that require high standards for certification and that reinforce the value of brand names should be adopted to deter entry.

Rivalry can be restrained by cooperating on a number of fronts, including, for example, financial aid and faculty compensation. These sorts of strategies, however, are threatened by regulatory changes; to continue to employ them, institutions must lobby strenuously for antitrust exemptions. Another strategy is to form alliances between universities that have complementary assets, which will both improve cost efficiency and reduce rivalry.

Finally, colleges and universities would benefit from reducing buyer power. Perhaps the best strategy to accomplish this is to brand their product. Brand names are extraordinarily valuable as signals of quality, particularly for a product such as education, whose worth is apparent only after it has been purchased and used. While not all institutions can establish premier brand names, many could enhance their reputations by specializing in particular strengths, such as foreign languages, or premed courses.

Industry Dynamics

The evolution of the higher education industry can be predicted to some extent by studying other industries that have experienced similar structural change. Today, the future of higher education resembles that faced by industries that have been suddenly opened to deregulation (telecommunications, energy), new technologies (pharmaceuticals, computers), and foreign competition (steel, autos).

The most common transformation that industries facing extensive change undergo is to become more specialized and less vertically integrated. Whenever competition increases because of reduced entry barriers or the improved appeal of substitutes, or when a more economical way can be found to provide a similar service, industries tend to fragment. That is, firms tend to pull back, spinning off many of their functions, and focusing on their strengths. For universities, any similar pattern of evolution toward a more disaggregated and specialized set of providers will challenge the tradition of the integrated provision of higher education.

Conclusion

In response to their changing environment, colleges and universities should identify the full set of functions, or products and services they offer—from restaurants to undergraduate degrees to athletics and continuing education. The traditional strategic prescription would be to participate only in markets where an institution's strengths continue to offer a competitive advantage. This would lead to concession of entire market segments (such as the traditional physical library) to new entrants exploiting new technologies, and a retreat to core educational products that cannot readily be imitated or substituted. On the other hand, it could be argued that institutions should embrace the new technologies, delivery systems, and customer needs that the changing environment is generating by entering new markets such as distance learning.

The choice is a dramatic one, and there are no easy answers. However, university governance structures must allow leaders the freedom to act and institute change in time to preserve the vital role of today's colleges and universities in higher education.

David Collis is visiting professor of management at the Yale School of Management. Prior to joining Yale last year, he was associate professor of business administration at Harvard Business School, where he taught for 11 years. Collis has authored numerous articles and books on organizations, competition, strategy and management, and prepared dozens of Harvard Business School case studies.

Tenure Issues in Higher Education

Michael McPherson and Morton Owen Schapiro

The system of tenure that dominates American higher education has long been a source of controversy. Tenure has been attacked for entrenching a lazy professoriate and, on the other hand, has been defended as crucial for the defense of open intellectual inquiry. The controversy has sharpened in recent years, largely due to the abolishment of mandatory retirement in 1994, which has heightened concerns about the productivity of older professors who received tenure long ago, and also as a result of widespread concern over the steadily increasing cost of higher education. Michael McPherson, president of Macalester College, and Morton Owen Schapiro, dean of the College of Letters, Arts and Sciences at the University of Southern California, assess the tenure issue in terms of how the authority necessary to run a college or university is delegated.

Recent Tenure Controversies

Doubts about the efficacy of tenure have led to more and more frequent attempts to reform and limit it. The most visible recent example of such efforts is the case of the University of Minnesota, where the state legislature appropriated funds to the financially troubled health center with the provision that the tenure code be changed. Despite the alarm this action raised, it appears that the Board of Regents never contemplated abolishing tenure. Instead, more limited issues were considered, including:

- Does the university have the right to fire tenured faculty in the case of the elimination of departments, or must it reassign faculty members? The fundamental issue is where does tenure lie—at the departmental level, the school level, or the university level?
- What sort of salary protections come with tenure; at what point does a pay cut for a tenured professor effectively constitute discharge?
- How might some form of post-tenure review be implemented? What are the sanctions for a negative review, and is the ultimate penalty dismissal?

In the end, the University of Minnesota adopted a new tenure policy that included only modest changes relating to the firing of tenured faculty and reductions in salaries: If a department were to be eliminated, the university would be obligated to reassign or retrain faculty members, instead of laying them off, and a reduction in salary would be limited to situations involving "financial stringency."

Minnesota's new policy also instituted a system of post-tenure review, a topic that has been the focus of the reform agenda in most states where the issue has been raised. The University of Texas, for example, recently imposed a requirement that professors undergo post-tenure review every five years; two consecutive substandard evaluations could constitute grounds for dismissal. The University of South Carolina adopted a system in which faculty are reviewed once every six years; a substandard grade would lead to a set of specific goals, which, if unmet, could eventually lead to dismissal. Florida's post-tenure program calls for review every seven years. Some sort of post-tenure review is also in place at the Universities of Colorado, Georgia, Hawaii, Kentucky, Maryland, and Wisconsin, among others.

Data on the Tenure System

Change in the role of tenure in American higher education is taking place outside legislatures and institutional debates. A move toward part-time faculty—not subject to the tenure system—has long been underway. In 1970, 78 percent of instructional faculty (not including graduate students) were full-time; that figure has been declining steadily, to 66 percent in 1980, 64 percent in 1989, and to 60 percent in 1993.

"it is important to move beyond thinking of tenure as an all-or-nothing proposition"

"tenure may be most useful in achieving a balance of authority at research universities"

Table 1 shows data from 1992 on the percentage of full-time faculty by institution type and control. While the overall percentage of full-time faculty is the same for privates and publics (59 percent), public research, doctoral and comprehensive universities all use a higher percentage of full-time faculty than their private counterparts. The overall average in the public sector is brought down by the heavy reliance on part-time faculty at community colleges, where just 40 percent of faculty are full-time.

Table 1

Percentage of Instructional Faculty who are Full-Time By Institution Type and Control, 1992

Privates				
All	Research Universities	Doctoral Universities	Comprehensive Universities	Liberal Arts Colleges
59%	65%	62%	51%	64%
Publics				
All	Research Universities	Doctoral Universities	Comprehensive Universities	2-Year Colleges
59%	81%	72%	67%	40%

Note: Data are from the U.S. Department of Education's National Study of Postsecondary Faculty (1997).

The role of tenure in various types of institutions may best be understood in terms of its impact on the authority structure of the university. This line of discussion also illuminates some of the underlying justifications for tenure that go beyond academic freedom.

Tenure: Issues of Authority

Much current debate about tenure actually centers on issues of authority in the management of universities. Resolution of the tenure issue will determine how much of a voice faculty members have in key institutional matters such as:

- Who should teach and conduct research?
- What subjects should be taught and investigated?
- How should teaching and research be conducted, including issues such as class sizes, teaching loads, and research expectations?

The underlying purposes of academic freedom require that faculty members in a university have substantial authority over the who, what and how of teaching and research. It is useful to think of academic tenure as a set of constraints on the discretion of managers (the administration) over these various aspects of the academic enterprise. Tenure increases the ability of faculty to collectively shape institutional decisions through their actions in departments, colleges, or the institution as a whole.

While some observers uncritically assume that it is always most efficient for administrators to have control, there may be reasons why giving faculty more authority through the use of tenure is efficient. First, an important part of their work is to provide independent evaluations of performance, both of students and colleagues. The credibility of such judgments could be questioned if

faculty were not insulated from pressures in situations where, for example, some of the university's constituencies have a stake in the outcome. Perhaps more important is if faculty members were to fear retaliation from departmental colleagues for negative evaluations, as eventually they all may be called upon to evaluate each other. This consideration is particularly important as recommendations become less confidential, and as post-tenure review becomes more common.

Further, the relevant time horizon for a variety of decisions about the academic enterprise—for example, strategic decisions about scientific research—is quite long. Administrators (and funders of universities) may have a shorter, and less than optimal, time horizon than tenured faculty.

These factors suggest that tenure may be most useful in achieving a balance of authority at research universities, where decisions about research programs and graduate education involve high-stakes evaluations and long time horizons, and where personnel judgments involve highly specialized knowledge that administrators depend upon. These conditions are perhaps least prevalent at community colleges, where the time horizon relevant to most educational choices is relatively short and where administrators may be better qualified to evaluate personnel.

Conclusion

A major challenge facing higher education is to find ways to preserve the valuable protections afforded by tenure while taking advantage of opportunities stemming from new technologies for greater collaboration among faculty and more cost-effective use of faculty time. If tenure were generally inefficient, universities could raise faculty wages enough to compensate them for giving up tenure, and still be better off. In this regard, the fact that tenure—a voluntary system—still dominates in an environment of great competition is surely significant.

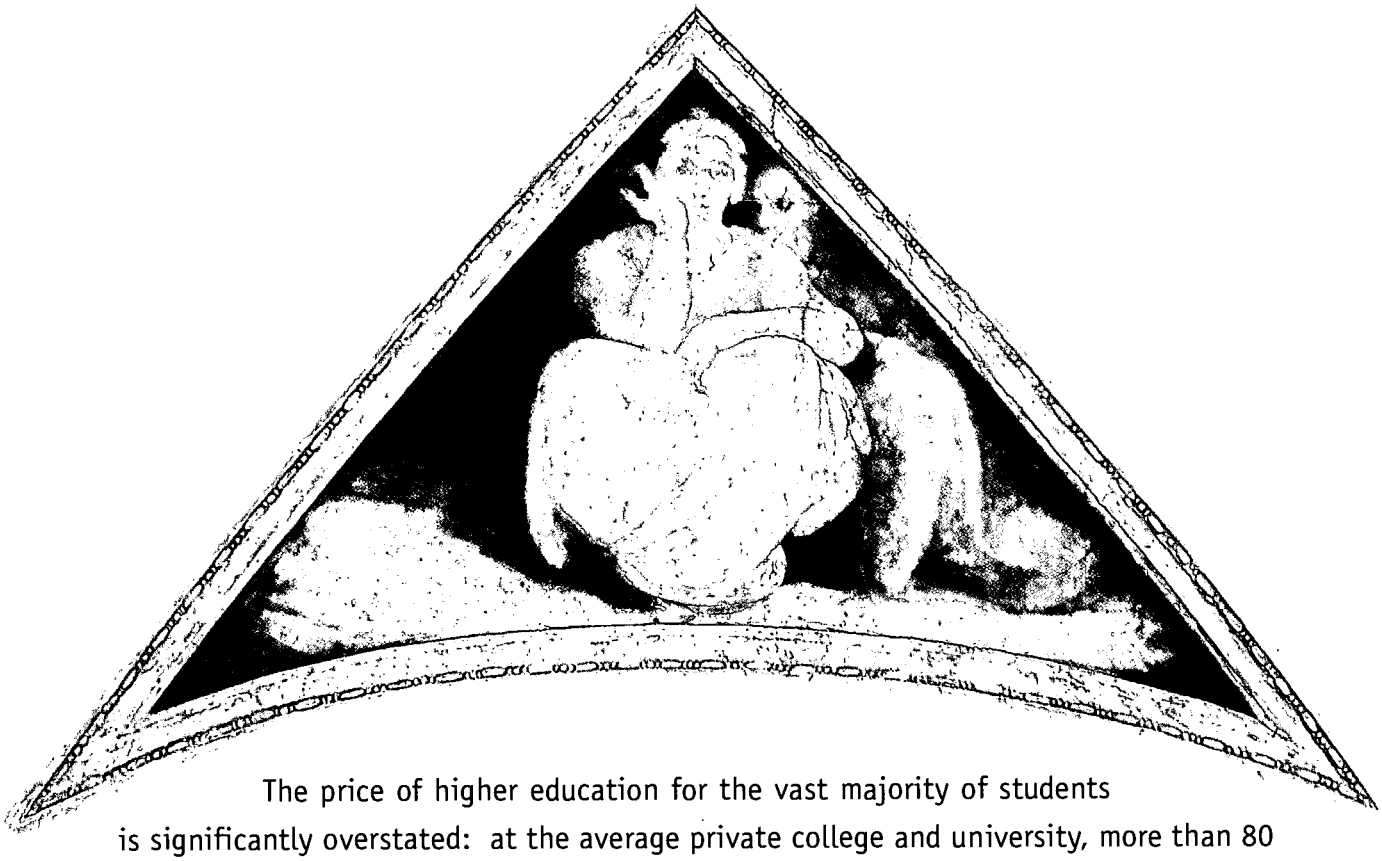
It is important to move beyond thinking of tenure as an all-or-nothing proposition, which is either valuable for all types of institutions or is simply wasteful. Successful resolution of the tenure debate depends upon a more nuanced understanding of what tenure is, and under what circumstances its use is most appropriate.

Michael McPherson is president of Macalester College. He is co-author or editor of seven books, including, with Morton Owen Schapiro, *Keeping College Affordable* (1991) and *The Student Aid Game: Meeting Need and Rewarding Talent in American Higher Education* (1998). Prior to joining Macalester, McPherson served for 22 years at Williams College as professor, chair of the Economics Department, and dean of the Faculty.

Morty Schapiro is dean of the College of Letters, Arts and Sciences at the University of Southern California. He has written numerous books, articles and papers, and is a commentator for Public Radio International's *Marketplace*. Prior to joining USC, Schapiro taught economics at Williams College, where he was co-director with Michael McPherson and Gordon Winston of the Williams Project on the Economics of Higher Education.

Private College Pricing: Are Current Policies Sustainable?

David Breneman, Lucie Lapovsky and Daniel Meyers



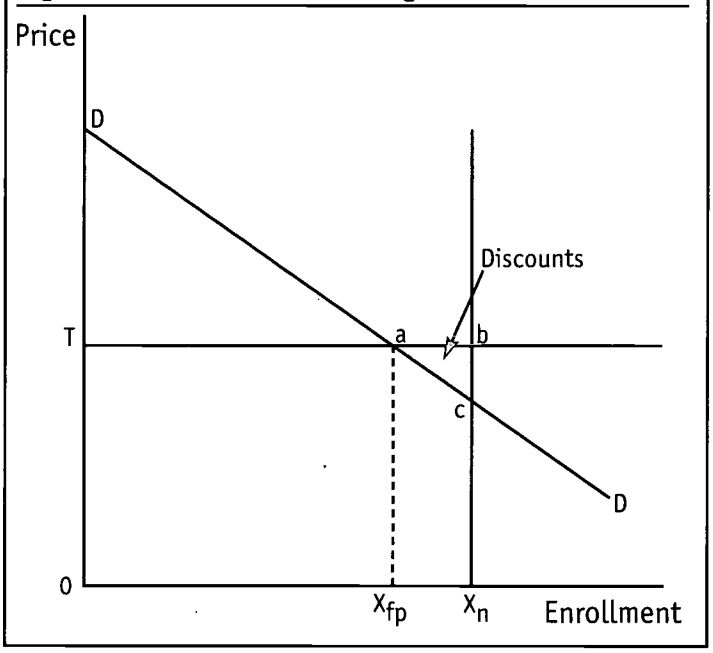
The price of higher education for the vast majority of students is significantly overstated: at the average private college and university, more than 80 percent of students receive financial aid. In recent years, institutional student financial aid has shifted from largely need-based formulas to those that include merit and other criteria. Today, financial aid is commonly referred to as tuition discounting, and price competition is widespread—even among selective institutions—as aid is used as an incentive to attract students to enroll. David Breneman, Lucie Lapovsky, and Daniel Meyers describe this phenomenon and the often confusing interaction of tuition, financial aid, and enrollment. They raise several questions for the higher education community regarding current pricing policies and their potential long-run ramifications.

Tuition Discounting

The theory of tuition discounting is rather straightforward, as illustrated in Figure 1.

Because prospective students do not see colleges and universities as fully interchangeable, each institution faces a downward sloping demand curve, as shown by line D in the figure. Each college is assumed to seek enrollment of Xn students at price T; it finds that only Xfp (full pay) students will enroll at price T, leaving a gap of size Xn – Xfp. Rather than limit enrollment to Xfp, the college begins selectively discounting its price, working down the demand curve until enrollment of Xn is reached, with the last student paying price c. Discounts total the area abc, net tuition revenue totals the area OTacXn, and the ratio of abc to OTbXn equals the institution's discount rate.

Figure 1 Tuition Discounting



In reality, a number of variations of this simplified model exist. For example, a highly selective institution's demand curve would be shifted far to the right, such that it could enroll all full-pay students if it chose to do so. In this case, student aid can be viewed as an educational investment in quality and diversity rather than as a price discount. For these institutions, student aid increases revenue. Another possibility is that an institution could raise its price to the point where just one student pays full tuition and the rest are discounted down the demand curve. In fact, some colleges are reaching that point.

The logic of tuition discounting provides a rationale for steadily rising sticker prices, which breed bad publicity and hostility on the part of the general public. The relationship between the published tuition price and what students pay, the net price, has been declining, and the American public understandably perceives tuition as significantly higher than actually it is.

Why are institutions pursuing pricing strategies that bring on the wrath of Congress and the press, while netting significantly less than published increases? The answer lies in the fact that many private higher education institutions face an excess supply of places in their entering classes relative to the ability or willingness of families to pay the posted price. Discounting is one way to fill those places.

Tuition Discounting Data

The data summarized herein are derived from the NACUBO financial aid database for 1990 through 1997, which contains information on 213 private institutions. Those institutions are segmented based on *U.S. News and World Report* rankings into three groups: 1) 24 top liberal arts institutions; 2) 12 top universities; and 3) the remaining 177 institutions.

Net tuition revenue as a percent of the tuition sticker price for the top liberal arts institutions and universities has

declined since 1990, bottoming out in 1996, and recovering a bit in 1997 to 70 percent and 73 percent, respectively. The remaining 177 institutions are still experiencing a decline in net revenues, nearing 60 percent of tuition sticker prices.

Figure 2 shows percentage increases in tuition and net freshmen tuition revenues from 1990 to 1997 in the aggregate for all 213 colleges and universities.

While tuition increases steadily declined, changes in net tuition revenue were erratic, although overall there were positive increases each year. In 1996-97, the increase in net tuition exceeded the increase in tuition. For that to occur, the amount of institutional financial aid needs to decline, which happens when an institution is decreasing its discount rate. The data don't tell us whether access for low income students was reduced, or if perhaps merit aid was cut back between 1995 and 1996.

Data for individual institutions reveal that in some instances both tuition and enrollment increased, yet net tuition from the entire class declined. Such examples reveal the difficulty of using merit aid effectively.

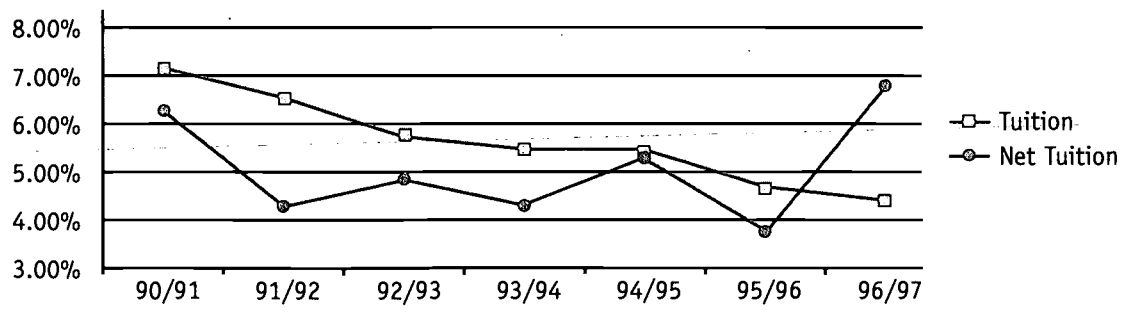
Can Institutions Control Their Discounting?

It is difficult to draw conclusions about the price a student will pay when the published price increases smoothly while the net price moves erratically. Further, the relationship between the number of freshmen receiving financial aid and changes in enrollment is unclear. It is not uncommon for institutions to experience increases or decreases in a freshmen class of more than 8 percent from year to year; the majority tend to experience freshmen enrollment swings between plus and minus 4 percent.

Figure 3 on the next page shows the percent of freshmen receiving institutional grants from 1990 to 1997. At the remaining 177 institutions, that figure has been steadily rising, such that in 1997 over 80 percent of the freshmen class received institutional grants, whereas at the top liberal arts institutions, fewer than 50 percent did so.

The unpredictable relationships

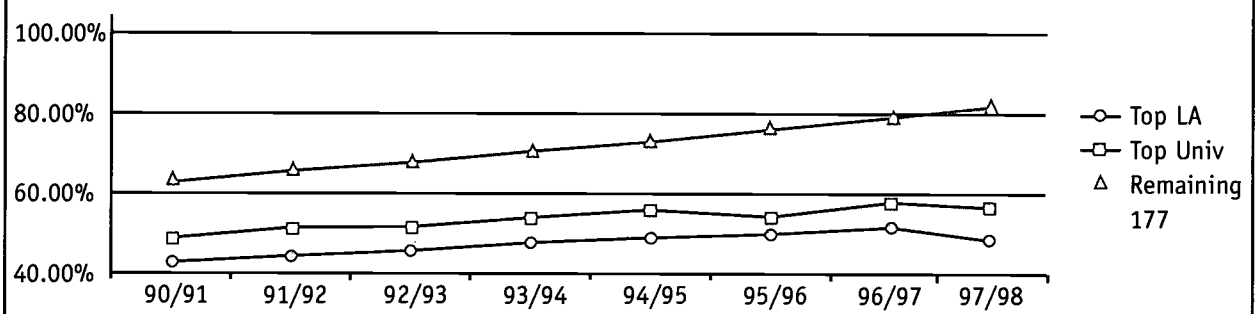
Figure 2 Increases in Tuition and Net Freshmen Tuition



among freshmen class size, tuition, and net tuition revenue make it difficult for institutions to maintain financial equilibrium. Swings in these critical variables from year to year can be enormous, even at selective colleges and universities. For most institutions, deviations from year to year in net tuition revenues lead to significant fluctuations in available revenues.

Tuition discounting is the current method of choice for filling spaces in freshmen classes. Active review and discussion is crucial to determine whether such policies are in the best interests of students and higher education in the long run, and whether there are economically viable alternatives to tuition discounting.

Figure 3 Percent of Freshmen Receiving Institutional Grants



Conclusion

Tuition discounting policies can produce effects that are simultaneously good, bad and ugly. Questions raised by the data include, among many others:

- To what extent is merit aid reducing available aid for students with need? Is access being reduced?
- What is the impact of merit aid on resources available for programmatic expenditures at an institution?
- Is it appropriate that published tuition is a price without much meaning at many institutions?

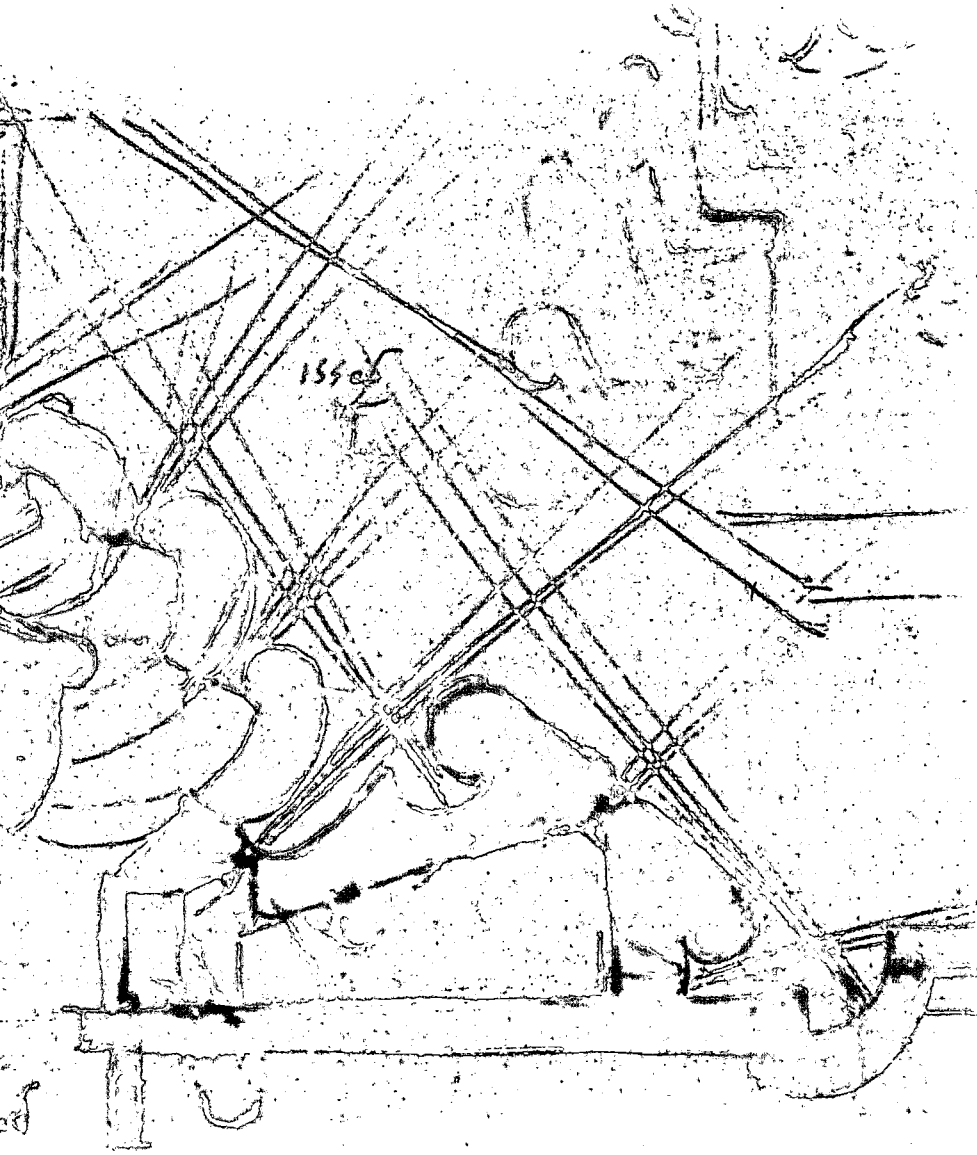
David Breneman is university professor and dean of the Curry School of Education at the University of Virginia. From 1983 to 1989 he served as president of Kalamazoo College. His books include, among others, *Strategies for Promoting Excellence in a Time of Scarce Resources* (1996) and *Finance in Higher Education* (1993).

Lucie Lapovsky is vice president for finance and a member of the faculty at Goucher College. She serves on many professional committees, including chair of the Tuition Discounting Committee of NACUBO. She is the author of numerous articles and presentations on tuition discounting and budgeting and resource management in higher education.

Daniel Meyers is chairman and CEO of First Marblehead Corporation. He has been involved in education financing projects since 1986, and has lectured extensively on finance and ethics.

Intellectual Property Meets Information Technology

Dennis Thompson



Among the many challenges that information technology is posing to universities, none is more contentious than the issues it raises for intellectual property. The controversy pits administration against faculty, scientists against humanists, and academic values against financial interests. Dennis Thompson, chair of Harvard University's Committee on Information Technology, believes that much of this controversy is misplaced. He maintains that changes in intellectual property policies should address more than products of information technology. Further, some of the problems that may seem to be about ownership go beyond the province of intellectual property.

"a simple shift of perspective"

Beyond Information Technology

"Is a CD-ROM more like a textbook, or more like an invention?" Most intellectual property policy grants faculty ownership of copyrightable work (such as textbooks), but gives the university the option of taking title to most patentable products (such as inventions). Clearly, the question has a high-stakes answer. It is, however, precisely the wrong one to ask, because it focuses attention on the nature of the product instead of the way it is created. A simple shift of perspective—from the attributes of the product to the circumstances of its creation—is an essential step toward developing a coherent policy for information technology products.

The more appropriate question is, "Has the university contributed substantially and specifically to the making of the product?" If so, the university should share in its profits and have some control over its uses. This principle in some form is widely accepted, and is at least implicit in many existing university policies. Additionally, in the absence of a specific contribution, there may be other factors, such as effects on the university's reputation, which could justify some control over the product.

The extent of the university's contribution may be assessed based on three types of support: financial, intellectual and reputational. Each provides a basis for some claim by the university on an intellectual product; the claim, however, goes beyond information technology products, and is not necessarily one of ownership.

Financial Support

What should count as a substantial and specific financial contribution may be contestable in particular cases, but a general distinction is clear enough: On one side, the ordinary benefits of employment such as academic year salary, office, usual library resources, usual facilities and office staff, and personal computers, should not count. On the other side, facilities assigned to an individual faculty member, such as a laboratory, should count.

In terms of sharing revenues once a substantial and significant institutional contribution has been determined, the best approach may be to adopt a general template for dividing royalties and fees and negotiate departures from it. The important point is that the negotiations focus on the nature of the university's contribution, not the character of the product.

Intellectual Support

Intellectual resources provided by a faculty member's students, colleagues, and the shared activities of university life often are neglected in disputes about intellectual property. This is understandable, given the diffuse nature of the contribution and the difficulty of capturing it in a policy. Nevertheless, intellectual support is clearly linked to some particular works, such as a catalogue of a special collection in a university museum, or a video of a concert by the university orchestra. In these types of cases, the university has a legitimate claim.

The role of students in the production of work deserves special attention, not only so that students receive fair compensation should the work have commercial value, but more importantly to ensure that the role of the student—as well as the use of the product—is consistent with the educational mission of the institution.

Reputational Support

In the case of most faculty members, the value of the name of their institution is at least as great as their own. Any commercial fruits of a university's reputation are largely attributable to the contributions of many generations of faculty, students, alumni and staff; therefore such revenues should be allocated for the benefit of the university as a whole, and its individual members present and future.

The value of an institution's reputation is clear when publishers and producers actively seek—perhaps even as a condition of production—to identify a faculty member's institution, sometimes to increase profits or at least audiences, or sometimes just to enhance the authority of the content.

Beyond Intellectual Property

To address the emerging problems generated by information technology, intellectual property policy should embody principles that apply beyond information

"reputational interests are a key concern"

technology. Such problems are not best addressed by policies that speak mainly the language of ownership and control.

Perhaps the most salient example of an emerging issue is what may be called the courseware problem—the control of lectures, syllabi, exercises and exams prepared by faculty for their own courses, but offered in various forms, virtual and otherwise, to students at home or at other institutions. This issue is best approached not in terms of faculty rights to their own creative products, but rather in terms of their responsibilities to their students, colleagues and institution. Thus, general policies dealing with conflict of interest and conflict of commitment become more appropriate instruments for addressing the courseware issue.

Following that approach, once again financial, intellectual and reputational considerations come to the fore. At this point, though, the question is not so much whether the institution has provided support in each area, but rather whether the institution's interests along these lines are being served.

An intellectual property policy could address an institution's financial interests if it grants the university some claim to profits when substantial and specific support for developing the courseware has been provided. More important are the intellectual interests of the institution: faculty commitment could be compromised by involvement in the production of courseware, distracting them from giving full attention to teaching at their own institution. It is equally important to ensure that any outside arrangements faculty make to distribute courseware do not affect its availability to students at their home university.

Finally, reputational interests are a key concern. The reputation of any university is a collective good, easily damaged by the actions of individuals, to the detriment of other members, present and future. In regard to courseware, the effect of the use of the name of an institution on the university and its members may be sufficiently controlled by an intellectual property policy that limits the use of the university's name. For example, use of the name could be prohibited unless the faculty member entered into partnership with the university to produce the courseware, as in a licensing arrangement. Universities would be well advised to provide institutional support to faculty in producing and distributing courseware.

Conclusion

To meet the challenges posed by developments in information technology, attention should focus on the significant financial, intellectual and reputational interests of the university as they affect its central educational mission. From that vantage point, it is clear that changes in intellectual property policy should embrace principles that go beyond information technology, and further, that problems of information technology call for policies that go beyond intellectual property.

Dennis Thompson is the Alfred North Whitehead Professor of Political Philosophy at Harvard University. He is also associate provost of the university and the founding director of the universitywide Program in Ethics and the Professions. He has written several books, including *Ethics in Congress: From Individual to Institutional Corruption* (1995), which was designated as one of the "best academic books" of 1995 by *Choice* magazine.

Inside Internet2: Advanced Networking for Research and Education

Mark Luker

The Internet of the future, it is claimed, will energize and transform learning, commerce, scholarship, design, entertainment, and many other activities. Mark Luker, a primary architect of Internet2 for the National Science Foundation (NSF) prior to joining EDUCAUSE as vice president, describes a vision of the world in which every person, every source of information, and vast numbers of other objects of interest are interconnected by a communications system of truly staggering proportions that is easy and affordable to use.

"walking through their data in a three-dimensional virtual world"

What is the Advanced Internet?

There are many technical ways to describe a qualitative leap in capabilities of an advanced Internet, but these approaches have not proved very useful: technology can advance in leaps that quickly leave the old descriptions behind, and such technical definitions speak only to technicians. It is far better to describe desired and potential services from the point of view of the user.

The chief needs of the user are assumed to be convenient and affordable access to a network that provides simultaneous, high-quality audio and visual communications between all parties of a conversation, in addition to links to the world of instruments and information. Such a network will evolve from today's Internet in a step-by-step fashion. Lack of high quality access outside campus local area networks (LANs) is perhaps the greatest deficiency in today's academic Internet.

Applications

Two academic applications arise in nearly every discussion of an advanced Internet.

The first is collaboration for research. This calls for a complex system of communication and information tools that make it appear that all the collaborators and their instruments, libraries, and technical assistants are in the same place. At one extreme, this could mean connected CAVEs—cave-like automatic virtual environments with video walls, floor and ceiling in which participants work together by literally walking through their data in a three-dimensional virtual world.

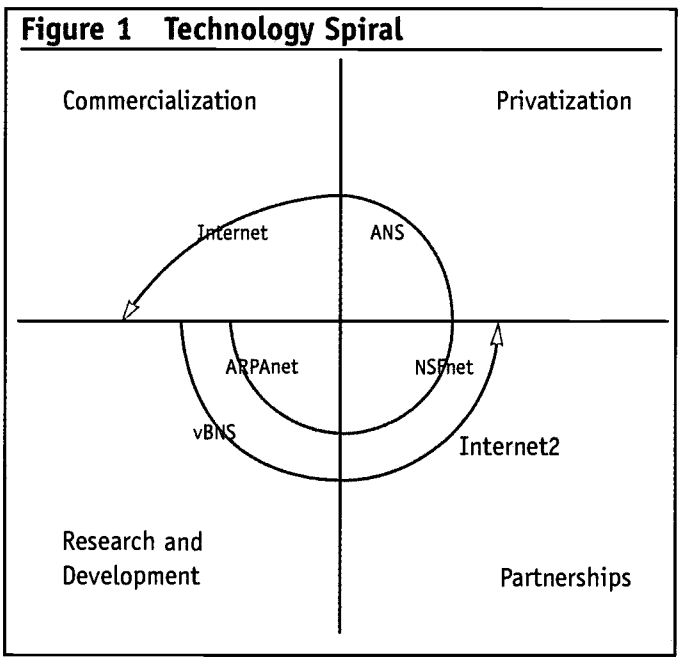
Collaborative research is already a success story of today's Internet; however, two key improvements would greatly advance current efforts. First, the Internet needs general improvements to allow ultra-high performance networking of machines that will bring about revolutionary progress. One example is the connection of a grid of remote telescopes that, working together, are larger than any single one could ever be. The other avenue of improvement in remote collaboration is much more problematic: networked access to libraries is crucial to progress, but today access is mostly to library catalogues, not their actual contents. This step demands the introduction and regular operation of digital libraries. It is expected that digital libraries and an advanced Internet will completely change the authoring, publication and distribution of all types of information.

The second application most often cited is distance learning. In today's Internet, this field has moved beyond the talking heads of broadcast television to a more flexible, asynchronous approach in which students interact with lesson material and solve problems at their own pace through the Web. A complete solution would require the support of high-quality communications and collaboration between students and teachers as well, reflecting the basic network requirements of collaborative research. The major hurdle facing the advancement of distance learning today is affordable access. The ideal—access anytime, anywhere, for every learner—multiplies capacity requirements far beyond the performance of today's Internet. Higher education is fortunate, however, that the same basic capabilities and distribution requirements are necessary for electronic commerce and even entertainment.

"access anytime, anywhere, for every learner"

Access to distance learning is just a first step. Once technology makes it possible, the current lecture-based system may largely be replaced by a very different mode of instruction, with a rich variety of on-line experiences, tutoring, and group studies conducted through the network.

Figure 1 Technology Spiral



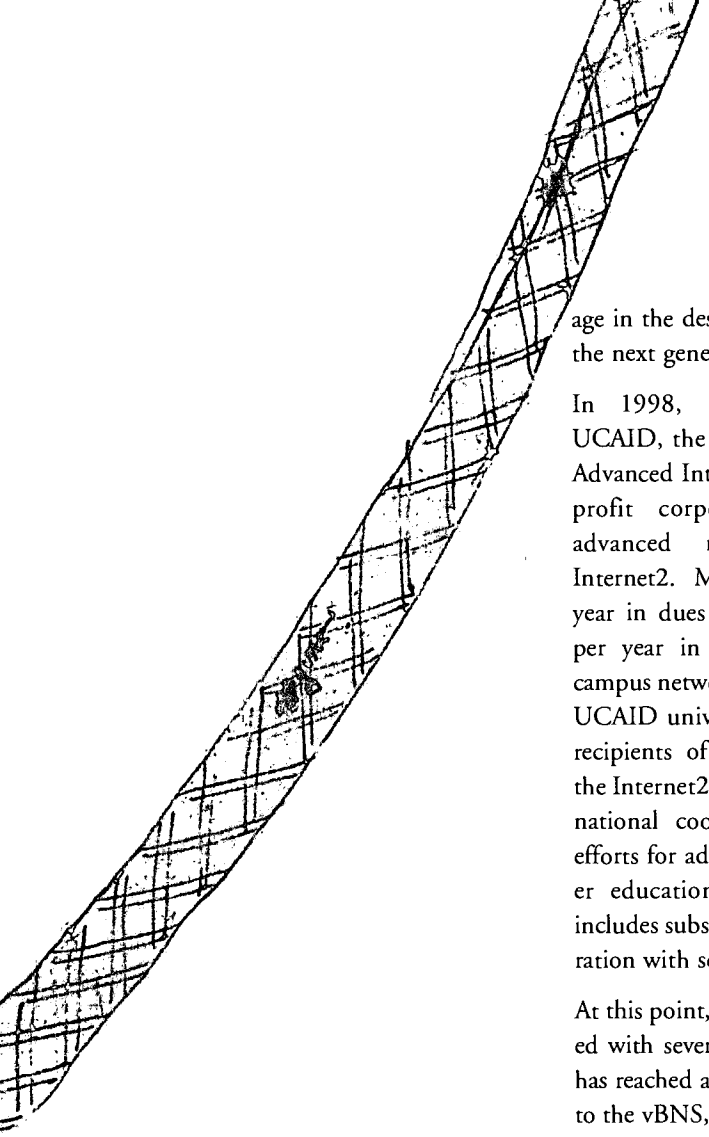
How Can We Achieve an Advanced Internet?

A group of prominent national leaders at an NSF sponsored workshop hosted by EDUCAUSE recently agreed, as have others before them, that an academic/government/industry partnership remains essential for the support of advanced networking for science and engineering, as well as for the science of networking itself. The spiral diagram in Figure 1 illustrates the role of the different players and economics at each stage in the development of a new technology.

Early government funding of the ARPAnet and NSFnet led eventually to today's largely privatized and commercialized Internet. In 1997, the vBNS (very high speed backbone network service) became the core network supporting a new NSF supercomputing program called the Partnerships for Advanced Computational Infrastructure (PACI), which unites dozens of universities and two major supercomputer centers in joint research projects. The government also has instituted a new program called the Next Generation Internet, or NGI, whose goals are to develop network technology at least 1,000 times better than today, to link over 100 universities with a research network at least 100 times better than today, and to develop a new family of important applications that highlight and depend on advanced networking.

The Higher Education Response

Higher education no longer enjoys the status of dominant customer of the commercial Internet. Research and development projects in advanced networking, however, can still have considerable lever-



age in the design and implementation of the next generation.

In 1998, 130 universities formed UCAID, the University Corporation for Advanced Internet Development, a non-profit corporation focused on an advanced network project called Internet2. Members invest $25,000 per year in dues and a projected $500,000 per year in development of advanced campus networks and connections. Since UCAID universities include most of the recipients of NSF connections awards, the Internet2 project is a natural locus for national coordination of development efforts for advanced networking in higher education. UCAID strategy also includes substantial and essential collaboration with some 30 corporate partners.

At this point, higher education is presented with several unique opportunities. It has reached a critical mass in connections to the vBNS, the world's first major higher performance network for research and development. It has successfully organized UCAID and its advanced network project Internet2, and has built solid relationships with a variety of industrial partners who wish to participate and contribute their skills. It can anticipate possible increases in government support for advanced networking. Perhaps most important is a broad and growing appreciation for the vision of advanced networking.

Conclusion

Many varied issues related to technology, economics and politics must be addressed throughout the quest for advanced networking. Vociferous debate continues at the levels of engineering and marketing over which technologies will prove best in the end. Pricing discussions are complicated by philosophical questions over social values and rights to access. The extent of the government's role in stimulating progress, and just whom the advanced network should be designed for are also subject to debate.

Although the costs and opportunities for advanced networking may seem very uneven at this point, one need only look at today's Internet to see that in the long run, these activities will prove to be a great equalizer. All are empowered once they gain access, however distant; all benefit from the access of others. When the dust settles after the construction of advanced networks, the real challenge will shift to the providers of information, communications, and knowledge services, including higher education. All will have the opportunity—indeed, the imperative—to rethink and transform their services.

Mark Luker served as program director for advanced networking at the National Science Foundation and the federal Next Generation Internet project prior to joining EDUCAUSE as vice president. At EDUCAUSE, he heads a thought-leadership coalition of university CIOs and state network directors whose goal is to advance national networking for research and education through joint projects and federal policy.

Asynchronous Learning Networks: Strategies for On and Off Campus Network-Enabled Learning

John Bourne

The purpose of Asynchronous Learning Networks, or ALNs, is to enable people to learn anywhere and at anytime, free from the constraints of time and space. ALNs are on-line learning venues that emphasize people-to-people communication, combined with traditional and information technology-delivered learning tools. John Bourne, professor of electrical and computer engineering at Vanderbilt University, believes that ALNs can reduce costs by increasing productivity, and by scaling up to permit teaching larger numbers of learners without a decrease in quality of instruction. ALNs also should increase the capability of higher education to reach new markets, both for life-long learners and for learners in industry.

Components of ALN

ALN activities typically include:

- conferencing to provide asynchronous interaction between many people,
- synchronous communication, usually between two or very few individuals,
- self-learning through the use of on-line course materials, and
- computer based training involving simulations and demonstrations.

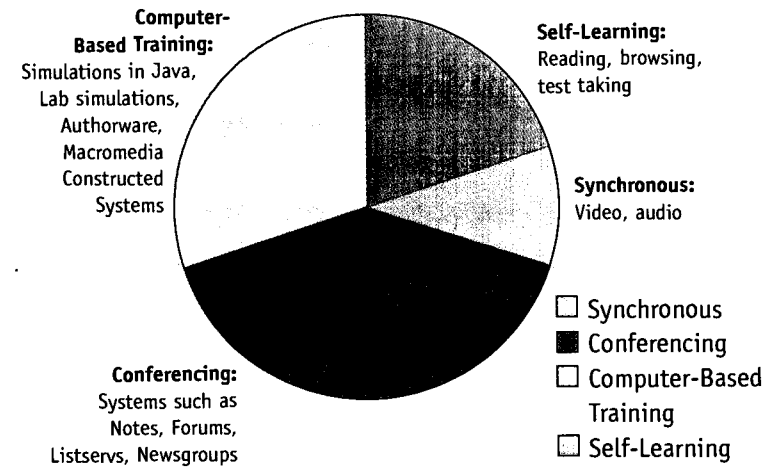
Figure 1 below shows the approximate apportionment of these elements. Note that there is roughly a 50/50 split between interaction among people—most of which is asynchronous—and self-directed learning activities.

As the components of learning evolve via the adoption of ALN, so too will the role of faculty. Faculty will spend considerably less time on stage, in front of their classes delivering lectures, and significantly more time mentoring by working individually with students. Time spent testing and evaluating can be reduced dramatically by automation, and time previously devoted to course navigation also can be reallocated, since course directions can be built directly into on-line materials.

Cost Analysis

Although little research has been done to calculate the true costs of creating and maintaining Web-based courseware, it is possible to build a simple economic model that is somewhat useful. While many variables are possible, this analysis makes the following assumptions: 1) a typical semester course meets three hours a week for 15 weeks; 2) instructor preparation and delivery in Year 1 is estimated at 16 hours per week for a traditional course; 3) following significant development time, delivery of an ALN course is estimated at six hours per week; and 4) delivery of traditional and ALN courses in subsequent years requires modest content revisions. Finally, the analysis uses hours rather than dollars due to wide variations in the cost of faculty and instructors' time.

Figure 1 Net-Learning Components



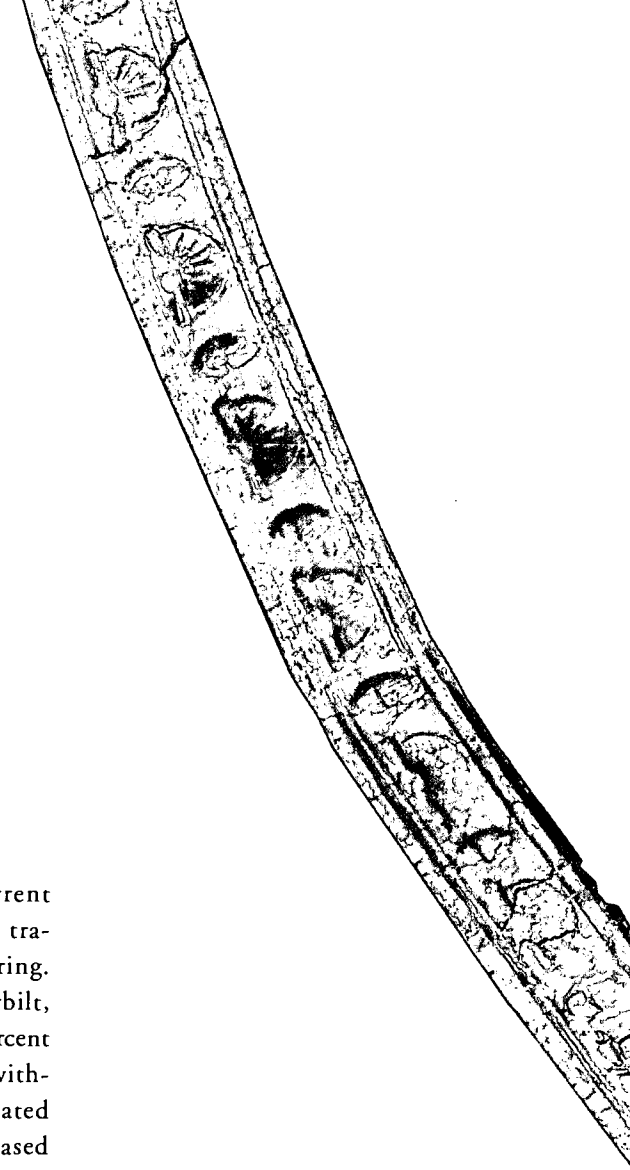


Table 1 Cost Analysis				
	Year 1	Year 2	Year 3	Total time requirements for three years
Traditional Course	16 hours* 15 weeks = 240 hours (including writing lecture notes)	150	150	540
Net-Learning: Delivery	6 hours * 15 weeks = 90 hours	90	90	560
+ Development Time	250	20	20	

These estimates indicate a gain in productivity after the third offering of a course, as shown in Table 1 above. If a course is offered in multiple sections at once, though, savings can be immediate. Clearly, given high initial development time, Net-learning will not be economically useful for courses in which material must be significantly changed each year. This analysis, however, permits approximately 20 percent of each course to be updated annually.

Revenue Analysis

Table 2 below shows how revenues might change in an ALN-enabled learning environment. Current income is pegged at 1.0 for the traditional on-campus course offering. Based on experiences at Vanderbilt, it is possible to add about 50 percent more students to such courses without much additional cost (estimated here at 20 percent more for increased faculty time). Off-campus courses can double enrollment while adding approximately 40 percent to costs, as shown.

Results show that income from off-campus courses is increased by 60 percent over traditional on-campus courses.

Table 2 Revenue Analysis			
	Income	Additional Cost	Net Income
On-Campus Traditional	1.0	0.0	1.0
Traditional + 50% off campus	1.5	.2	1.3
Off campus	2	.4	1.6

"an integral part of higher education"

Strategies for Change

Strategies for implementation of the ALN learning environment include strong administrative support: individual, faculty-driven models tend not to be as successful as top-down imperatives for change. Faculty must be brought on board through continuous education as to what is possible and how learning can be improved. Further, institutions should avoid hiring students to create on-line courses for faculty, and instead upgrade faculty skills, which will payoff in the long-run. Selection of a good authoring tool for faculty to use is crucial. Finally, choosing the right faculty members to set the pace and influence others is important, as is choosing the right courses to put on-line. Large classes are good choices; ALN works better with more people participating.

Different types of institutions will want to employ different strategies for using ALN. For example, comprehensive public institutions may find that ALN can be used as a means for managing large classes. Small private liberal arts colleges, on the other hand, can focus on creating an on-line community that includes alumni, who represent a rich learning source for current students, and who at the same time can be drawn closer to the institution. Research universities can use ALN to more effectively deploy their intellectual capital to learners both on and off campus. It appears that community colleges, which generally are more vulnerable in the marketplace, are embracing ALN more than most other types of higher education institutions, so that they can reach a more geographically dispersed student body.

Conclusion

In the future, ALN likely will become an integral part of higher education—not replacing current methodologies, but simply changing them. The importance of life-long learning will increase dramatically, as will competition among institutions to offer courses to such learners. Institutions that produce the best courses will be the winners; the casualty will be to those who cannot meet the market's needs.

ALN can reduce costs, free faculty time, and enable institutions to do more with less. As with any innovation, acceptance will be slow. The impact on higher education, however, will be powerful.

John Bourne is professor of electrical and computer engineering at Vanderbilt University. He is the author of several books, including *The Influence of Technology on Engineering Education* (1995). He is editor of the *Journal of Asynchronous Learning Networks* and *ALN Magazine*, both publications of the ALN Web. He created the ALN Web in 1996 with funding from the Alfred P. Sloan Foundation.

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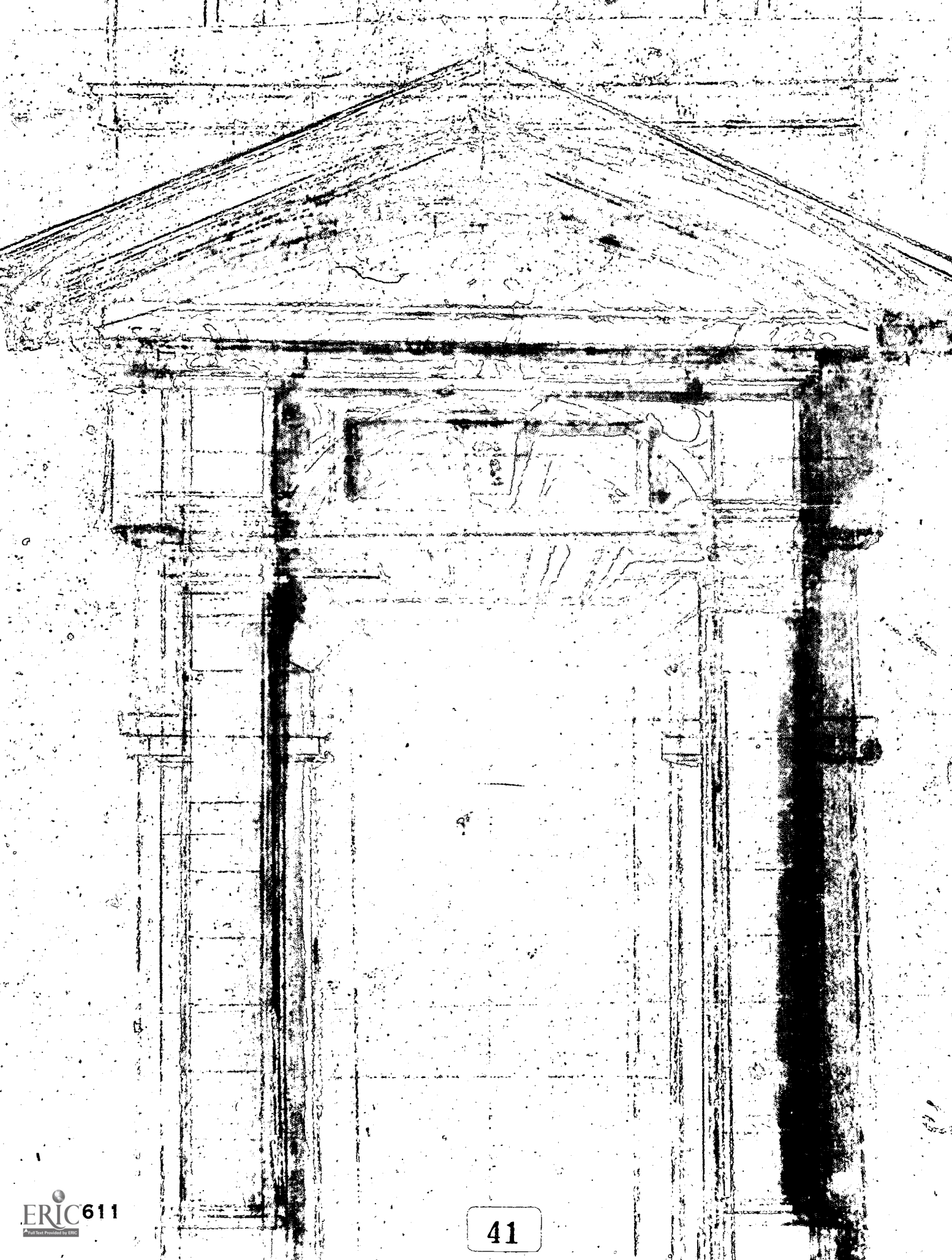

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