

CHAPTER 1

Universities and the Global Village: An Introductory Overview

Werner Z. Hirsch

*Progress in Science [and Education]
thrives on cross-pollination across borders*

Joseph E. Persico

INTRODUCTION

The first universities were founded in the 12th century in Paris and Bologna. They had different origins—the University of Paris having been founded by scholars, the University of Bologna by students. Yet they shared certain common features, which survived for a long time (Powicke & Emden, 1958). Both were challenged by the church, and faculty and members in both had a cloistered existence and often were intellectually isolated. Disciplinary walls were erected which, in combination with the tenure system, led in many cases to serious intellectual isolation and structural rigidity. Change came only slowly. It was brought about by the founding of new, more adventurous universities and the competition that they introduced into higher education.

Today's universities, especially research universities in the Western world, are operating in an altogether different environment. The far-reaching information and communication revolution has been shrinking distances of time and space. As this revolution is erasing venerable physical and intellectual boundaries, the process of globalization has begun and is leading to the emergence of a global village, which deeply affects many aspects of life. Ancient

walls and barriers are being lowered, allowing world-wide utilization of comparative advantages in the production of goods and services as well as cross-fertilization of knowledge and ideas. Collaboration by individuals and by universities, firms, and governments has the potential of raising general well-being to new heights. Wide-spread collaboration in a virtually borderless world can stoke the engines of growth of new knowledge and understanding. Thus, it is likely that our time will be noted by historians for the emergence of a global village of trade, capital movement, and knowledge.

Not unlike the forces that generate positive results from trade globalization and free flow of capital are those that follow from the lowering of universities' internal and external walls. As a consequence, scholars and scientists of one discipline can readily cross-fertilize colleagues in others. They can do so not only within their own university and their own country, but also with respect to the outside world, including high-tech industry and cultural institutions as well as other universities. There exists, however, a fundamental difference between lowering barriers of trade and those of educational and scientific undertakings. Whereas globalization of world trade is an engine of progress and growth driven by all participants, that of globalization of education and science is driven mainly by universities. Their teaching and research, a celebration of the human spirit, are the instigators and incubators of society's progress. As both of these university functions are carried out, and the existing internal and external walls of academia are pierced and lowered, a global knowledge village emerges. Collaboration among scholars and scientists within the university and between it and the outside world plays a defining role.

Universities will have to perfect new mechanisms, at times even to adjust their structures, to become effective participants and even more pivotal key players. Particularly they must provide incentives to facilitate and nourish creative collaboration in teaching and provide opportunities for cross-fertilization. At the same time, they must transmit to students the value of these changes. Further, they must create an understanding among their students of the merits and efficacy of an interdisciplinary education. Clearly, this revamping of teaching and research toward greater interdisciplinary efforts should show respect, where appropriate, for teaching and research that concentrate on a single discipline. Much thought must be given to finding a flexible balance between the two thrusts.

While these technology-driven forces work on the supply side in stimulating the emergence of a global village, similar forces are at work on the demand side. For example, in the case of research universities, problems increasingly transcend the competence of single disciplines or departments. Therefore, researchers and students must become competent to engage in

interdisciplinary undertakings if they are to meet societal and scientific challenges.

In the search for promising ways to find its place in the global village and raise the levels of collaboration and bordercrossing, the solemn mission of the university must continue to serve as a guiding light. New arrangements must assure that faculty remain, to paraphrase John Maynard Keynes, the trustees of the possibility of civilization. The quality of education and that of unbiased research must remain as high as ever. Moreover, as external walls are lowered and more collaboration with industry takes place, the university must be vigilant to safeguard its academic integrity and resist unseemly compromises.

AS WALLS ARE CRUMBLING

Movement toward a global village of knowledge coincides with and is driven by the lowering of four venerable walls or barriers. These are barriers within the university, between universities, between universities and industry, and a combination of barriers that can impede outreach programs.

Barriers within the University

For a long time universities have been predominantly concerned with imparting and advancing a liberal education—that body of knowledge and culture most worthy of knowing. At one time it was referred to as universal knowledge. Toward this end, they carved the large territory into discrete parts, which have evolved into independent fields and disciplines most often housed in separate departments. But as Clark Kerr, president emeritus of the University of California, has suggested, universities “could, however, provide some ‘broad learning experience’ that would help students think in terms of more than one discipline in approaching broad issues. Students’ academic majors orient them toward vertical thinking, but throughout their lives as citizens and also at higher levels in their careers they need to think horizontally”. Kerr offers as thematic examples the environment, Asian civilization, and the origins and impact of the city on human development (Kerr, 2001).

In short, as challenges facing society become increasingly complex, multi-dimensional, and multi-faceted, education must stimulate horizontal, thematic thinking and exploration. Emphasis on interdisciplinary curricula and research is thus in order.

Make no mistake, there was a rationale in carving up the huge knowledge territory. Using departmental subdivisions as building blocks has enabled universities to construct rather effective governance structures. Faculty with specialized interests join departments, which in turn are combined into schools or colleges. Department chairs report to the college’s dean, who in

turn reports to a vice rector or vice president concerned with academic affairs.

The lines setting apart departments are drawn on the basis of a common methodology, which has facilitated the formulation of a coherent core curriculum. At times though, it has led to overspecialization. More significantly, this structure tends to interfere with inquiries at boundaries of disciplines, just the area where important learning and world class research increasingly takes place. Crossing disciplinary boundaries and engaging in interdisciplinary undertakings, both in the classroom and in the laboratory, will enable universities to better meet tomorrow's challenges. Productive collaboration and interaction will enrich both teaching and research. It also will meet the expectations of the body politic, whose appreciation of academia is essential for the allocation of the necessary financial resources.

How can universities function in a world where their internal walls are becoming increasingly permeable and in some instances are being dismantled altogether? What changes in structure are needed to promote freer wandering over disciplinary divides in education and research?

Many universities are already facilitating academic border crossing in undergraduate education. Some offer thematic courses, team-taught by members of two or more departments. Others go further. For example, the University of California at Los Angeles has revamped its undergraduate program and has introduced a thematic cluster system of general education for the first two undergraduate years.

On the graduate level in Europe and the United States more interdisciplinary courses and programs are being offered. Examples are Law and Economics (at the University of Oslo and Oxford University), Neuro-chemistry, and Economic and Environment Sciences (at the University of California at Santa Barbara).

In regard to faculty, research team undertakings of multi-disciplinary faculty joined by graduate and post-doctoral students are becoming common. Such teams can tackle research problems at the border of a number of disciplines and at the same time train the next generation of scientists. In some areas teamwork is nothing new. For example, "clinical research is most often carried out by multi-disciplinary teams of investigators led by physician-scientists who can bridge the gap between basic research and the health of patient or the public" (Ceck *et al.*, 2001). In some instances, these arrangements take a more formal shape, i.e., institutes and centers. Their faculty, drawn from a number of disciplines, explore subjects of mutual interest, at times with a thematic focus. The latter can be stimulated by offering financial support, which can be particularly helpful to faculty in the humanities and arts, who often have difficulty in finding funding. While the initial support tends to come from the university itself, success is often followed by out-

side funding. A particularly interesting experiment is the University of California BioSTAR Project. It is an industry-university matching grant program to support new bio-technical research on nine campuses and at three National Laboratories, and since 1996 it has awarded \$23 million.

Inter-university Barriers

In the past, institutional barriers have impeded the mobility of students between universities. Other barriers, though less pervasive, have impeded faculty mobility, thereby reducing faculty's ability to collaborate with their counterparts in other universities and research institutes. There is much to be gained when students are exposed to different environments, experiences and faculty. By mingling with students in other institutions all gain intellectual stimulus and, at times, cross-cultural experience, so important in the global village. They also are likely to receive a better education if their university is relatively small and thus unable to afford a faculty of sufficient size and diversity. By joining forces with other universities these shortcomings can be remedied.

In regard to inter-university educational cooperation on the undergraduate level, Western European universities have taken many more initiatives than have American. Thus, one observes both regional cooperation and cooperation among European Union members. For example, since all four Scandinavian countries are relatively small, they have initiated regional collaboration—eleven universities in Sweden and Denmark have established Øresund University, a network of autonomous universities in Sweden and Denmark, including the Universities of Lund and Copenhagen (Smith, 2001). Joint programs as well as shared classes, libraries, and technical resources have been arranged. Students either commute or stay for a time. With the purpose of being exposed to the richness of cultural diversity in Europe, the European Union sponsors the Erasmus Inter-university Cooperation Projects and the Tempus Joint European Projects. Moreover, extensive institutional networks have been sponsored by universities, e.g., the Coimbra Group, UNICA, CAESAR and NATURA (Van Ginkel, 1999).

In the United States, a few cooperative efforts exist. One is the Claremont Colleges in Southern California, where a number of liberal arts colleges and one graduate school have joined forces. Many colleges and universities have a "Study Abroad" program, where some of their undergraduates spend a year at a foreign university. Drake University seeks to eliminate foreign language programs, which have been declining in enrollment and replace them with languages learned in their "Study Abroad" program (Smith, 2001). Some American medical schools place their students as interns in a number of affiliated hospitals.

The situation is much better in regard to research, where faculty mobility is significant. Collaborative arrangements, many informal, exist between faculty members of many universities and formal ones exist between some universities. Such collaboration has become necessary in the physical and natural sciences as well as in medical research, where very costly instrumentation is essential to carry out research. This precedent has spilled over to many other fields. An American example is the UCLA-UCSB California Nano-System Institute, a collaborative research effort by members of a number of departments on two campuses of the University of California (Robak, 2001). A Western European example is the Ferrara Health Industry Policy Forum in which faculty from a number of departments of the University of Ferrara, University of Bologna, and the University of California collaborate.

Barriers Between University and Industry

The place of universities in the global village and their contribution to it is being supported by their close collaboration and formation of alliances with the high-tech industry. This development has taken place as a result of universities' expanded research efforts and, more recently, their increasing reliance on private funds to support research (Kerr, 2001). At the same time, high-tech firms have begun to outsource cutting edge research to universities, thereby benefiting from contributions of top-ranked university scientists and engineers, whose services would otherwise not be available to them. This collaboration enables universities to better fulfill their societal responsibilities.

Collaboration is beneficial to both the university and the high-tech firm. The university gains from faculty joining in research with scientists in industry who are used to work on real world problems, who often have vast experience, and who have developed a unique culture and way of thinking. Industry often brings to the table expensive world-class equipment and instrumentation as well as financial resources. Such alliances also facilitate the placing of the university's graduates.

But industry also benefits from collaboration with research universities. The latter tend to have on their faculty world-class scientists who have made important discoveries and inventions, who own many valuable patents and have the distinction of having developed a creativity-stimulating environment. These assets are especially valuable to high-tech pharmaceutical, semiconductor and computer software firms. They have in common extremely high development and start-up costs, inordinately low production costs, and yet rapid obsolescence.

For example, bringing a new drug to market can cost between half and three quarters of a billion dollars. The high cost is related to the fact that for every 5,000 compounds evaluated for treatment, only five will make it to

clinical trials, of which just one will make it to market. Usually this takes many years. The same holds for semiconductors and software, whose useful life is about a year and a half.

The greatest rewards in many knowledge-based enterprises go to those who innovate at a rapid pace and obtain the largest possible market share for their new product. Consequently, such firms are consumed with a defining drive to innovate and achieve monopoly power, however temporary it turns out to be. Toward this end, firms seek to collaborate with research universities and locate in their vicinity. Universities are thus increasingly surrounded by geographic clusters of symbiotic enterprises which benefit from synergies and positive externalities on the demand side and from cost savings on the supply side.

Benefits can accrue not only to participating universities and firms but can spill over into their region as well as to the nation, if not the entire world. To stimulate growth and wealth creation, for example, the United Kingdom has created the Higher Education Innovation Fund. It funds universities to work closely with firms in the private sector and transfer new knowledge to industry. However, removing barriers between research universities and high-tech industry, according to Donald Kennedy, president emeritus of Stanford University, leads to “some major benefits along with significant cost” (Kennedy, 2001). Among the costs are faculty’s potential conflicts of interest as well as commitment. Both can significantly weaken the university’s ability to carry out its core mission and endanger its integrity. The issue is so serious that recently the Association of American Universities formally called on its members to require of their researchers financial disclosures (Kaiser *et al.*, 2001). Moreover, the New England Journal of Medicine has been forced to relax its recently instituted conflict of interest review rules, since it cannot find enough qualified manuscript reviewers with no ties to drug companies. A further threat is curriculum imbalances between academic units that do and those that do not benefit from funding of collaborative research with industry.

Barriers to Outreach Programs

In the global village, everybody’s knowledge, work, cultural experience and well-being are affected by everybody else’s. Efforts to update knowledge culturally enrich citizens and assist communities in effectively fulfilling their responsibilities. Universities are increasingly seeking to meet these great challenges by offering continuing education and to work with communities and industry.

As the half-life of basic knowledge in more and more spheres is becoming shorter and shorter—today it is at most five years—yet the need to be up-to-date becomes ever greater, so lifelong learning opportunities must play an

increasing role (Walshok, 2002). This need is reinforced by the fact that life expectancy is increasing and with it the population that seeks to be intellectually and culturally engaged during extended retirement.

In today's dynamic world, achieving a financially secure and intellectually and socially fulfilling life is becoming increasingly demanding. Challenges are becoming increasingly complex, multifaceted and multidimensional, particularly as breathtaking change makes today's knowledge and way of thinking obsolete tomorrow. Under these circumstances, interaction with the premier producer and interpreter of new knowledge and culture—academics—becomes a basic need of society. Thus, universities that once used to educate the young must tool up and address themselves to the educational needs of a mature and older clientele.

Some universities are experimenting with even more ambitious programs, which reach to the outside world to assist members of the local community to gain leadership and management skills needed in the private, public and not-for-profit sectors. A few have even developed programs to assist local residents in founding start-up high-tech companies and in aiding existing firms.

This need for local orientation can clash with the major goal and *raison d'être*, particularly of research universities. Their research and scholarship have a global orientation. It is the general community of colleagues with whom they interact and compete for distinction. This clash between local and global orientation can make it difficult to attract into the outreach programs the very best faculty. As a consequence, the esteem in which lifelong learning programs are held can be affected. This would be unfortunate, since successful efforts in this area require interests and skills that often are quite as scarce as are highly qualified scientists and scholars.

CONCLUSIONS

The world energized by the information and communication revolution is piercing venerable partitions and barriers. As a consequence, global villages are emerging. One is that of higher education and its institutions. Universities, though often loath to change, are beginning to realize that they increasingly operate in such a global village. They are extending themselves to meet the resulting challenges, by reorganizing themselves both internally and externally. While collaboration can work to their advantage, they can also incur costs associated with lowering their external walls and collaborating with industry. The latter has altogether different objectives, ethos and ways to carry out its function from the research university.

While universities face a number of risks as they collaborate with industry—e.g., intradepartmental imbalances, limiting faculty rights and

compromising the university's financial stability and integrity—two further ones can be much more damaging—faculty conflicts of interest and commitment and interdepartmental imbalances.

Conflicts are best avoided by the university working with faculty to develop protocols and model master contracts. They can signal to firms seeking university research collaboration what the university's minimum conditions for collaborating are.

Major interdepartmental imbalances, which can result when industry finances research in the university, can skew priorities among academic units, usually to the disadvantage of the humanities and arts. It can be remedied by the administration taxing units with major research contracts to fund units that by their very nature cannot attract much outside funding. Moreover, the latter units might be encouraged to collaborate in interdisciplinary undertakings with financially favored units.

Taking such and similar steps to protect the integrity and excellence of the university in the global village of knowledge can assure net benefits from collaboration both within the university and with the outside world.

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