

The Virtualization of University Education: Concepts, Strategies and Business Models

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Abstract

This paper contributes to the current debate on the adoption of virtual education practices at universities by proposing there are separate but related modes of educational virtualization: technological virtualization, geographical virtualization and organizational virtualization. The paper argues that while each type of virtualization can develop in its own right, independently of the others, there are a number of practical forces at work that pressure most universities to simultaneously combine more than one type of virtualization. The really interesting challenge for educational managers and strategists is to discern some general principles governing the optimal pattern of the relationships between the three different types of virtualization. In taking the first step towards addressing this challenge some basic business principles associated with the virtualization of university education are outlined. The paper concludes by arguing the choice of educational mode should not be driven by naive and uncritical acceptance of the latest technology. The choice of technologies and the choice of technical systems by universities should be driven by pedagogical, organizational, and geographic considerations, together with a prudent assessment of appropriate business models.

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Virtualization — The New Wave in University Education

In the wake of the emergence of "virtual reality," the "virtual office," and "virtual organizations" — to name just a few of the catch phrases the new century has brought with it — has come the "virtual university." Almost every country in the world, and every regional educational authority, has at some time during the previous decade extolled the virtues of virtual education. Internationally, there has been an explosion in policy studies, experiments in inter-governmental cooperative

programs, and new initiatives in virtual education by universities, both private and public.

Some of the experiments are driven by the desire of quality universities to enhance their offerings and to differentiate themselves from lower tier institutions; some are driven by upstart universities seeking cost-effective means for expanding their student enrollments under conditions of constrained resources, in competition with the more established universities; while others are founded on public policy goals of expanding access to university education to social groups previously excluded from participation. Some are even motivated simply by the desire of universities to make money by serving new "markets" for educational services.

The time has come to take stock. We need to assess the variety of models extant so that we may discern which strategies are realistic and sustainable, in a pragmatic sense, and which strategies are educationally valuable for students. We also need to understand under which circumstances each of the ideal models may be feasible and, by implication, what concomitant resources and arrangements need to be put in place to ensure success.

The explosion of experimentation with the virtual university has taken place concurrently with the creation and rapid development of the World Wide Web. Many of the experiments have been founded on application of Web technologies and associated innovations in computing and information technology. The rapid pace of technological change has allowed little time for the development of solid theoretical frameworks to guide planning and decision making.

Many educational institutions have been swept up in a fashion of "technologizing" education with only minimal understanding of the pedagogical, managerial and financial implications of their actions. In short, the plethora of virtual education experiments we have witnessed during the last decade has been driven as much by opportunism, enthusiasm for new technology, and a desire to "let's try it and see what happens," as by careful consideration of pedagogical processes, educational goals, and organizational realities.

Following the maelstrom of virtual education experiments through which we have just journeyed it is now prudent to step back and reflect theoretically about the nature of the phenomenon. With this goal in mind, this paper will attempt to systematically map the variety of forms of university-level virtual education, identify various best-practice examples, and outline some of the strategic issues associated with selected approaches.

What is Virtual University Education?

The predominant image of "virtual education" found in the literature, and among practitioners, is that it is education delivered through the Internet or delivered via some other platform of information and telecommunication technologies. *In this study I define "virtual university education" as university education in which the relationships between the students and the primary faculty and facilities of the university are either extended spatially or mediated by technological or organizational vehicles.* In other

words, it is university education that takes place *indirectly* rather than through direct contact with the university's primary faculty and facilities at its primary location.

Rather than focus on just one type of virtualization — technology mediated education — I differentiate between three different categories of virtualization of university education: technological virtualization, geographical virtualization, and organizational virtualization. Each category has its own unique logic, its own distinctive advantages, and its characteristic problems. These categories may be characterized as follows.

Technological Virtualization of Education

Technological virtualization of education exists when the learning processes of students are mediated by technology. Technological virtualization is the creation of "virtual classrooms" through the use of technological frameworks such as Internet learning platforms, multi-media telecommunications systems, or other configurations of information and communications technology. Technological virtualization may take place either on the main facility of the university or as a component of distance education.

Geographical Virtualization of Education

Geographical virtualization is the distribution of educational activities (or the "classroom") over multiple geographical locations. In other words, physical space may mediate the relationship between the students and the primary faculty and facilities of the university.

Organizational Virtualization of Education

Organizational virtualization is the use of inter-organizational arrangements for the delivery of educational programs. In other words, a university may choose to cooperate with, or enter into contractual arrangements with, other organizations for part, or all, of the educational process. A third party may mediate the relationship between students and the primary faculty of a university, in whole or part.

In principle, as illustrated by various examples outlined below, each type of virtualization can develop in its own right, independently of the others. As a general tendency, however, most universities tend to combine more than one type of virtualization at the same time. From the perspective of strategy the really interesting challenge is to understand the general pattern of the relationships between the three different types of virtualization. In other words, while the three different types of virtualization are discrete categories, independent of each other, it may be that under certain circumstances the implementation of one type of virtualization may be necessary for the optimal implementation of another type.

For example, while it is certainly possible for a university to provide courses of study at multiple geographical locations, without the use of modern communications technology and without employing the services of other organizations as sub-contractors, there may in fact be good reasons to consider doing both of those things. While it is indeed possible for conventional "chalk and talk" classroom instruction, or classroom-based discussion modalities, to be employed in satellite locations, a university may nevertheless find that the quality of its students' education may be enhanced by combining remote instruction with technology-mediated learning or by utilizing the services of outside experts in that remote location.

The special challenge here, for educators, is to determine *when* is it appropriate to combine different types of virtualization and *how* the optimum mix can be determined for each particular situation. In this paper I seek to provide a first attempt to answer these questions. I do this by reporting our observations of some representative examples, using the categorization scheme I have developed. In particular, I seek to provide provisional answers to these questions by examining what kinds of organizational arrangements seem to be indicated when various combinations of geographical and technological virtualization are combined. In a sense, I view organizational arrangements as necessary aspects of *strategy* for successful geographical and technological virtualization.

Varieties of Technological Virtualization

The use of technology to mediate the relationship between students and the primary faculty and facilities of an educational institution is not new. The "School of the Air" in outback Australia is an obvious example. Under that system, which has been in operation for decades, real-time communication between students and teachers located in isolated outback stations, often hundreds of miles apart, takes place via two-way radio systems.

The use by universities of educational films or television broadcasts to complement conventional classroom lectures is a further example of time-honored technological extensions to traditional classroom lectures. It is the complexity, variety and ubiquity of technological media for education that makes the contemporary situation distinctive. The variety of forms of technological virtualization that constitute much of the new educational environment will now be reviewed.

Web-enhanced Conventional Education

Technology does not need to completely replace established teaching methods in order to have an impact. Conventional methods for delivering education — including classroom lectures, laboratory training, tutorials, group discussions and library research — can be augmented by the use of the Web as a vehicle for delivering complementary materials and exercises. Examples would include course bulletin boards, list-servers, on-line access to digital course materials (including multimedia documents), Web-based communication between students and teachers, and Web-based communication between students themselves.

The *WebCT* system developed at the University of British Columbia, or the *SmartWeb* system employed at Indiana University,

are examples. Use of Web technologies in this manner is quite widespread. A recent study by the University of Twente in the Netherlands identified almost three hundred cases in the USA, the UK, Australia, Finland and Belgium, alone, in which Web technologies were used by universities as complementary tools to conventional modes of instruction.¹

Conventional Distance Education Techniques

Long before the emergence of the Internet, conventional distance education was augmented by the use of technology-mediated communication. In conventional distance education, materials (e.g., textbooks, course readers, videos, software packages) are sent to students by the regular mail, and students' work is also submitted by mail. However, instructor-student communications that generally take place by correspondence, may be augmented by technological means such as telephone and fax. More recently, electronic mail has been added to the repertoire.

Murdoch University and Deakin University, in Australia, the University of South Africa, or the University of London (which has been offering distance education programs for at least 150 years) are examples of institutions that have made wide use of this approach during the last quarter century. While not particularly surprising or radical, these examples illustrate that technology has played a useful role in mediating educational communications for quite some time.

Television-enhanced Distance Education

Conventional distance education may be enhanced by the use of educational television broadcasts, either on standard television channels at non-prime times, or through special educational television channels. This approach has the advantage that it may reach a large audience in a standardized manner without investment in specialized infrastructure.

An outstanding example of a university that has made superb use of this tool is the Open University in the United Kingdom. The Open University, which has been in operation for about three decades, is Britain's largest university, with over 200,000 students and customers. The University is currently home to 22% of the nation's part-time higher education students. Nearly all of the Open University's students study part-time and about 70% of undergraduate students remain in full-time employment throughout their studies. The delivery techniques developed by the Open University are particularly suitable for part-time students.

Television has the disadvantage that it is not very flexible and it is generally only cost effective for large audiences of students studying similar or identical curricula. An example of an innovative attempt to overcome that obstacle is the Utah Education Network, a publicly-funded consortium enabling Utah's public universities and colleges to offer "telecourses" to over 5,000 students each year. Any one of the participating member institutions may offer a telecourse and, in most cases, students at other institutions that are members of the consortium may take that course for credit.

Uni-directional Audio-Visual Instruction

An alternative to television broadcasts is the employment of uni-directional transmission of audio-visual material to specific groups of students in specific locations. Lectures (either live or pre-recorded) may be delivered from the core campus to remote classrooms (by either direct satellite links or other broadband communications vehicles such as ISDN). This approach is superior to television when there are only a modest number of students in the educational program. It works best when students are clustered in one or two remote locations and may easily be assembled in a limited number of common locations to receive transmissions.

A good example of this approach is the *EngiNet* system of the engineering schools in the multi-campus system of the State University of New York. A variant on this approach is the distribution of videotapes of lectures to students in remote locations or to students who, for one reason or another, may not be able to attend normal campus-based classroom lectures. A disadvantage of this approach is that it does not allow for the human interaction that may be possible in a classroom setting. An advantage is that it may be more cost effective than replicating live classroom instruction at multiple locations.

Interactive Audio-Visual Communication

A solution to the problems of the previous approach, such as the *EngiNet* system, is to employ interactive audio-visual communications, or videoconferencing. In this solution, lectures, seminars and classroom discussions may be conducted synchronously at two or more remote locations, through the use of audiovisual telecommunications (normally by either direct satellite links, or other broadband communications channels such as ISDN). Two-way interaction may take place between instructor and students, or between students themselves.

A good example of this approach is the adoption of videoconferencing by the Fontainebleau-based business school, INSEAD, to link classrooms in its campuses in France and Singapore. This approach is educationally superior to the uni-directional video-transmission approach, but has the disadvantage of being more expensive to operate.

Conventional Distance Education Augmented by Web-based Services

A number of universities with a tradition of offering paper-based distance education are now augmenting their conventional services with Web-based services. Certain teaching resources (e.g., supplementary lecture materials or bibliographic references) are mounted on the Web, and limited use is made of bulletin boards and other forms of Internet communication for notices and student discussions.

Athabasca University, in Alberta, has over 20,000 enrolled students and is a leading Canadian example of a university that is gradually introducing online components to its courses, as either optional enhancements or as requirements.

The United States Open University, a sister institution to Britain's Open University, has moved even further in this direction. It

provides its students with a password to access specialized course Web pages on the Internet, along with their other course materials. Students may view a course demonstration site and download a structured study calendar from the site. The course websites may also contain study assignments and other learning resources and allow computer conferencing with other students and with the personal associate faculty member allocated to each student. Submission of assignments, and provision of feedback and grading from instructors may also take place online.

Scotland's Herriot-Watt University, which originated in Edinburgh in the early 1800s as a school for engineers, is an example of a comprehensive research university that provides a flexible approach to learning in which students may choose between classroom, paper-based distance education and online education for their studies. Herriot-Watt offers a global paper-based distance-education version of its MBA degree, through its Edinburgh Business School. This global program involves an international network of local support services in a variety of countries, increasingly augmented by online services.

Web-based Delivery of Conventional Distance Education

Some universities have stepped beyond using the Internet as a tool to enhance conventional distance education by delivering whole courses or degree programs completely online. In this approach, all educational materials (e.g., textbooks, course readers, videos, or software packages) are made available to students in digital format, accessible over the Internet. Online degree programs are similar to conventional distance education in most other respects (e.g., lectures are not included as basic elements of the course). Correspondence between students and the instructor takes place mostly by email or occasionally by telephone, and students' work is submitted by email or through specialized Web-based platforms.

Capella University, founded in the United States in 1993 and accredited by the North Central Association of Colleges and Schools, is an example of a new type of higher education institution dedicated to helping working adults with busy lives to integrate distance education into their complicated schedules through "e-learning." Capella University offers over 400 accredited courses and degree programs over the Internet, in formats that are accessible to students at any time and from any location.

Other examples of the many universities that now provide distance-education courses and degree programs over the Web are: California State University at Chico (which provides a wide range of bachelor's degrees, minors and some master's degrees); Empire State College (part of the SUNY system in New York State, which provides customized degrees for non-traditional students); the State University of New York at Stony Brook (which offers a complete master's degree in educational computing, over the Web); the University of Maryland, University College (which offers its 63,000 students more than 70 different degree and certificate

programs online); or the Concord Law School (a recently created private virtual law school with over 800 students).

Interactive Education on the Web: Asynchronous Learning

Many universities — ranging from the University of Paisley in Scotland, to Charles Sturt University in New South Wales, Australia, the University of British Columbia in Canada, or Duke University, in North Carolina — seek to incorporate elements of the interactivity and communication of classroom or campus education into online education, using Web-learning platforms such as *Blackboard* or proprietary on-line learning services such as that provided by the Hong Kong-based company, OnLine Education Limited. With a variety of new Internet learning platforms, distance education can be delivered over the Web in a way that includes genuine discussion-style, or collaborative, learning. Students may engage in structured, archived discussions with each other or the instructor at any time of the day or night; participation may take place from anywhere in the world; and the timing of an individual's participation may be customized to match his or her convenience or work schedule.

One of the best international examples of this kind of technological virtualization is the New School Online University, based in New York City. In 1994, The New School (now the New School University) launched its unique distance learning program, DIAL, with fourteen courses drawn from across the School's curriculum. DIAL, which was recently renamed the "New School Online University" (NSOU), is an asynchronous, computer-conferencing teaching and learning environment available 24 hours a day, seven days a week from any computer that can be connected to the World Wide Web. Since its establishment as an online learning service, NSOU has evolved into an entire online university for the New School University — a virtual campus complete with courses, public events and programs, a library, student services such as advising, admissions and financial aid, and even several social venues for extracurricular discussions. Currently, more than 3,000 students each year participate in over 300 courses; student participants are drawn from throughout the United States and over 60 other countries.

NSOU students can participate in courses for degree credit, general credit courses (courses for transfer to other institutions), and non-credit courses. All NSOU interactions take place online, and all students are provided with a one-week online orientation to the environment prior to their first course. The NSOU currently offers courses in the social sciences, culture and society, humanities, science, lifelong learning, foreign languages, English language studies, theatre arts, music, fine arts, communication, business, computer applications, and culinary arts. Programs are also available through the NSOU from the Milano Graduate School of Management and Urban Policy, the Parsons School of Design, and the Eugene Lang College. All of the NSOU courses and online programs are fully interactive. Students and instructors "meet" asynchronously in classrooms and project areas where they share information, ask and answer questions, and complete assignments. The New School University, which (under its original name of the "New School for Social Research") was probably the first university in the world to focus attention on providing accessible

education for full-time working adults, is playing a pioneering role again by extending its original mission in the online mode.

Another pertinent example lies with the University of Phoenix, a private for-profit university that was founded in 1976. The university has rapidly grown to become the largest private accredited university in the United States, with over 100,000 degree-seeking students. The university claims to provide a "relevant, real-world education" to working adults, which is delivered at more than 107 campuses and learning centers in the continental US, Hawaii, Puerto Rico and Canada, and via the Internet.

In 1989, the university created the "University of Phoenix Online" as a vehicle to offer complete degree programs online. Students enrolled in degree programs through the University of Phoenix Online never have to attend campus. Every requirement, including registration, administration, purchase of materials and books, or counseling, in addition to the educational activities themselves, can be conducted online.

The University of Phoenix Online emphasizes group learning on shared Web spaces or, as the University prefers to describe the approach, online communication is "many-to-many" rather than "one-to-one." Each class shares its own group mailbox, which serves as an electronic classroom. While communication between individuals is common, each class uses a group forum where students put their work and ideas before classmates for comment. The University claims that this discipline upgrades the quality of most work before it is reviewed formally by the academic instructor. Students are also able to gain access to research materials from the University's Electronic Library.

The Online program is designed to benefit full-time working people in a number of ways. Classes are offered one at a time, in sequence. There are no semesters or terms, so students can begin a course of study during any month of the year. A student may concentrate on one subject at a time, and when a class is completed he or she may move on to the next class until all the degree requirements are met.

Each online class lasts five or six weeks. A student can sign on at any time of the day or night. Students tend to devote an average of fifteen to twenty hours a week to their studies.

Typically, on the first day of the week during an online class, the instructor sends introductory information on the week's topic and confirms the assignments, such as textbook readings, completing a case study, or preparing a paper on the topic at hand. The instructor typically also posts a short lecture or elaborates on the material, and provides discussion questions related to the topic. Throughout the week, students work individually on readings and assignments. In addition, students use the University's computer conferencing system to participate in the class discussion, to ask questions, and to receive feedback. Assignments are submitted online and instructors also return graded assignments, with comments, back to the students online.

Educational programs offered by the University of Phoenix Online are mostly practice-oriented or profession-oriented, in applied fields such as business administration or computer science. The New School Online University, in contrast, offers a broad range of liberal arts and professional courses online, ranging from humanities and music to design or urban policy. The University of Phoenix Online is an example of a recently created organization using technological means to pursue profitable new markets for educational services. The New School Online University, an independent non-profit educational institution, is an example of a university with a long tradition of seeking to provide enhanced access to liberal and professional education opportunities for those students who might not otherwise be able to participate.

In summary, a variety of Web-based software and hardware platforms are now available that allow universities to mimic or, in some cases, even improve on, the peer-to-peer and student-to-teacher interactions that have historically made orthodox classroom-based education pedagogically and emotionally more attractive than distance education. The asynchronous mode of Web-based educational communication allows considerable flexibility in the timing of students' participation. It also requires less investment in sophisticated telecommunications and computing infrastructure than is required for synchronous modes.

Interactive Education on the Web: Synchronous Learning

Despite the advantages of Web-based education, especially when asynchronous interaction is included as part of the package, some schools are resisting the temptation to jump on the online bandwagon. Chief among the reasons is their concern that the rich and subtle interactions, that are the hallmark of the best classroom pedagogy, may be compromised. Harvard University's Business School, for example, which has long been a leading proponent of discussion-learning and of the case-discussion method of classroom teaching, believes that its classroom educational experience could never be replicated online. For this reason, even Professor W. Earl Sasser, the director of Harvard Business School's *HBS Interactive* initiative, recently vowed, "We will never offer a Harvard MBA online."ⁱⁱ

One of the virtues of the well-managed classroom experience is the possibility of live multi-dimensional interaction, involving multiple people, in real time. The asynchronous mode of interaction, adopted by most universities in their online programs, has the advantage of allowing flexibility for participants. The value of the asynchronous mode *vis-à-vis* convenience is, however, counterbalanced by its neglect of instantaneous human interaction. For this reason, some Web educational platforms also allow for synchronous learning modes. In other words, they include software that allows genuine discussion-style, or collaborative, learning over the Web in real time. Synchronous learning, whether conducted in the conventional classroom or over the World Wide Web, lacks — by definition — the flexibility of the asynchronous mode, because students and instructors are required to be present in the "classroom" (either physically or virtually) at pre-set times.

At present there are over 100 technology platforms, including software and hardware and infrastructure, available to universities for use in online learning. In a sample of 50 of these technology

platformsⁱⁱⁱ reviewed for this study, 72% of the platforms include synchronous chat capability. They are: *WebCT*, *BlackBoard*, *Learning Space*, *IntraLearn*, *Authorware*, *First Class*, *Docent*, *Generation 21*, *LearnLinc*, *The Learning Manager*, *EduSystem*, *VCampus*, *Phoenix Pathlore*, *Serf*, *LUVIT*, *WebBoard*, *Mentorware*, *PlaceWare*, *SiteScape Forum*, *Eloquent*, *IVLE*, *Saba Learning Enterprise*, *InterWise Millennium*, *Theorix*, *Embanet*, *Jones e-education*, *Trainersoft*, *Prometheus*, *eCollege*, *Anlon*, *U4all.com*, *Click2learn ToolBook*, *MaxIT LearnerWeb*, *Learning Vista Express*, *Centra Symposium*, and *Educator*. It appears reasonable to conclude that the majority of producers of online learning technology believe providing synchronous learning capability to be an important component of their business.

Synchronous chat capability makes it possible for all participants logged in at a particular time to simultaneously view the text messages of participants. Synchronous chat capability is essentially real-time, live on the screen, instantaneous group email. Instantaneous text communication, however, does not allow the subtlety, complexity, and dynamism of communication — particularly tacit communication — that forms such an important part of live classroom discussions. The producers of some platforms have sought to remedy this deficiency by incorporating additional synchronous features, such as Web-based teleconferencing and videoconferencing. The following platforms (30% of the sample) incorporate both of these two features: *Learning Space*, *Docent*, *Generation 21*, *LearnLinc*, *The Learning Manager*, *Phoenix Pathlore*, *Mentorware*, *PlaceWare*, *InterWise Millennium*, *Theorix*, *Jones e-education*, *Trainersoft*, *U4all.com*, *Click2learn ToolBook*, and *Educator*.

Real-time text communications can only replicate a certain amount of the classroom learning experience. The visual components of classroom communication — for example whiteboard/blackboard diagrams, Powerpoint presentations, live projection of computer graphics or computerized data analysis onto a screen, and other kinds of audiovisual aids — are critically important to a rich learning experience. In some of the currently available technology platforms (34% of the sample), this problem has been addressed by the addition of a virtual whiteboard function and an application-sharing function to the basic synchronous chat capability. Platforms that incorporate all three of these capabilities include: *WebCT*, *BlackBoard*, *Learning Space*, *IntraLearn*, *LearnLinc*, *EduSystem*, *Phoenix Pathlore*, *Serf*, *LUVIT*, *InterWise Millennium*, *Theorix*, *Embanet*, *Jones e-education*, *Trainersoft*, *Click2learn ToolBook*, *MaxIT LearnerWeb*, and *Centra Symposium*.

However, only 6% of the sample incorporate a broad and versatile suite of synchronous communication functions for the virtual classroom, including synchronous chat capability, a virtual whiteboard, application sharing, virtual space, and teleconferencing. These platforms are: *LearnLinc*, *Phoenix Pathlore*, and *Trainersoft*. None of the platforms (0%) in the sample incorporate a full repertoire of synchronous learning functions: synchronous chat, voice chat, virtual whiteboard,

application sharing, virtual space, group browsing, teleconferencing, and videoconferencing. To obtain a truly comprehensive, versatile and robust platform that makes possible a reliable multi-dimensional synchronous online communications capability, it currently appears necessary to turn to companies operating primarily outside the educational market. One example is *WebEx*, a company that supplies Web-based conference platforms primarily for the high-priced corporate meetings market. The *WebEx* platform, and others like it, is used by multinational corporations to facilitate corporate board meetings when board members are geographically dispersed or to enable multinational project groups to manage complex projects at a distance.

To conclude this brief review of synchronous online learning opportunities, we may conclude that there is a wide variety of platforms already available, and many more emerging, that make it possible for online education to mimic aspects of the real-time interactivity of the classroom learning experience. The choice ranges from those platforms that provide simple text-based chat capability to those providing complex multimedia communications capability. Despite the technological feasibility of rich synchronous online university education, it appears that very few universities actually make use of this capability in anything other than an *ad hoc* and experimental manner. It is virtually impossible to find a university that advertises the use of synchronous Web communications as part of its online course offerings.

There appears to be several reasons for this situation. First, the true multimedia synchronous learning platforms tend not to work properly unless they are accompanied by excellent technical support services (reliably available on-demand), wide-bandwidth communications channels, sophisticated computing skills amongst both students and teachers, and robust computing and communications infrastructure. Second, the best systems tend to be quite expensive and are generally beyond the range of any but the most wealthy of universities (or for specialized applications such as high-priced executive education programs). Third, it appears that the flexibility of the asynchronous mode (e.g., the freedom to log in at an time whatsoever) is sufficiently attractive to students, teachers and administrators to counterbalance the educational disadvantages of missing out on rich real-time virtual classroom interactions.

Technological means are already available by which virtual classrooms may mimic many of the functions of the traditional live classroom. It appears, however, that pragmatic, managerial and financial considerations, together with circumstantial preferences of the new online student audiences, are currently limiting the use of synchronous online educational tools. This situation may well change in the near future as technology matures, synchronous platforms become more affordable, and the necessary complementary technological capabilities of students, teachers and administrators, are more ubiquitous.

Multimedia, Mixed-mode, Synchronous and Asynchronous Learning

The evolution and convergence of complex digital communications and computing technologies, combined with advanced digital imaging and audio systems, has reached the point where competition between the virtual classroom space and the

conventional physical classroom space can no longer be ignored. Despite the very real limitations of both asynchronous and synchronous online educational platforms outlined above, some notable experiments in truly sophisticated technology-mediated distance education have already taken place. These presage the future of competition between universities in the digital age. One of the most interesting examples is an experiment in geographically-dispersed education for business executives recently conducted by the Wharton School, the business school of the University of Pennsylvania.

The Wharton School, as part of its executive education initiatives, developed a number of short not-for-credit courses in business administration for simultaneous delivery over several weeks to full-time working adults in multiple locations throughout the United States. In this program students met simultaneously in "electronic classrooms" in several cities throughout the country (e.g., New York, Atlanta, San Francisco, Seattle) at specified times and were linked live with professors from Wharton's main facility in Philadelphia. The classrooms were real, physical classrooms (not virtual classrooms), fully "wired" and networked together with the main facility in Pennsylvania through broadband multimedia communications links. Each classroom was equipped with remote-controlled cameras, microphones and audiovisual display systems; and each student had a personal computer networked with the whole system.

Wharton's instructors in Philadelphia gave lectures in a manner not unlike normal classroom lectures and students clustered across the country in the special wired classrooms received live broadcasts of the lectures. What differentiated this system from normal broadcast lectures was the degree of interactivity incorporated into the program. Throughout the classroom sessions students could send questions or comments to the instructors by email, in real time, analogous to the manner in which students in normal classrooms would raise their hands to ask questions. A team of trained teaching assistants at Wharton would answer the students' questions immediately, by email, as the lectures were in progress. However, at the behest of either a teaching assistant or the main instructor, a question from a particular student could be selected for special attention. The instructor, who had access to a console from which the whole system could be controlled, could choose to focus a camera on the student in the remote location who asked the question. All of the students, in the several different locations, were able to hear and see both the student speak and the instructor respond. The instructor could also use the computer network to take instant polls from the students, or to administer live quizzes, during the session.

In addition to the synchronous multi-media communication that took place throughout the distributed electronic classrooms, the Wharton system also involved the use of asynchronous Web-based learning during the periods between live physical-cum-virtual classroom lectures.

In short, the Wharton system was an exciting example of distributed education (distance education) that combined real classroom contact between students with both asynchronous learning and synchronous virtual learning. It was a sophisticated system that managed to allow an extraordinary level of real-time interaction between students and between students and the instructor.

The system was deployed to only a limited extent, on an experimental basis only, mainly for price-elastic corporate-sponsored audiences. At present, Wharton is no longer deploying the system. The constraints of the system are that to fulfill its extraordinary potential it requires an extraordinary level of infrastructure, support staff, coordination, marketing and managerial ability. It is also expensive to establish and operate. In short, it requires resources and a skill set not normally found among faculty in a typical academic setting. The Wharton School is one of small number of educational institutions that does indeed have to the capability of making an experiment like this one succeed. The fact that the program has not been continued reveals just how challenging it is to deliver the equivalent of high quality classroom experiences through a technologically virtual classroom space.

In conclusion, the Wharton experiments in mixed-mode, multi-media virtual learning, along with the other examples of technological virtualization described above, reveal three key lessons. First, it is already technologically feasible to mount virtual learning programs that rival conventional classroom programs, more or less, in educational quality and interactivity. Second, the challenge for educators is no longer to discover whether or not such programs are feasible; but, rather, to develop prowess at matching the mode and mix of technologies to the particular goals and circumstances of the institution and its students. Third, embarking on the technological virtualization of an educational program requires the prudent assembly of complementary assets and services, such as adequate funding, organizational capability, technical support, and managerial acumen.

Varieties of Geographical Virtualization

While the desire by university leaders to provide distance education to students is often the primary reason used to justify experiments with technological virtualization, the technological virtualization of education and the geographical virtualization of education are conceptually distinct modalities. As we have seen, technological virtualization can, and does, happen in programs where the students and the university are co-located. All students at Wake Forest University, in North Carolina, for example, receive laptop computers and are required to interact in a virtual classroom space as an integral part of their studies.

Geographical virtualization, which occurs when physical space mediates the relationship between the students and the primary faculty and facilities of the university, may happen with or without technological virtualization. Herriot-Watt University, as I earlier observed, has conducted a paper-based MBA program internationally for a number of years prior to the introduction of technological learning media. Before proceeding to analyze the nature of the relationship between technological virtualization and geographical virtualization, I will briefly survey the variety of ways

in which universities can organize the geographical distribution of their students.

Single Integrated Campus (Not Virtual)

The simplest form of geographical organization of educational services is the conventional approach to university education in which instructors, students and most basic educational resources are co-located on one campus, or in one central location. In fact, this form of organization is so ubiquitous and so well established that the word “university” is often used synonymously to describe both the institution and the place. Recent developments in higher education, worldwide, are prompting more care with nomenclature. The word “university” should denote the institution, not the physical space where the institution has historically been headquartered.

University with a Main Campus and Some Satellite Facilities, Under Single Public Jurisdiction

A variant of the conventional single-location university is the university with a single main campus and one or more satellite facilities, organized under one public jurisdiction. In this approach academic systems are largely centralized on the main campus, and student enrollments are generally centrally organized, but a variety of activities or programs are distributed at specialized facilities (not full campuses) at remote locations.

A typical example would be Technische Universität München, operating under the auspices of the State of Bavaria. It has a main “campus” — or facility — in central Munich, and some subsidiary facilities at Garching and Weihenstephan, both also located in Bavaria. Another example would be Cornell University, with its main campus in Ithaca in upstate New York; it also has branch facilities elsewhere in New York State, including an agricultural field station on Long Island and a medical complex in Manhattan. A third example would be the Prince of Songkla University, in Thailand. PSU’s main campus is located in the southern city of Hat Yai, with specialized branch facilities in Phuket and Pattani, also in southern Thailand.

Multiple-campus University, Under Single Public Jurisdiction

Another model is the centralized university with multiple campuses, each located in a different place and each covering a broad array of academic fields and programs. In some cases, each campus may develop a special set of competencies unique to that campus, but in all cases the scope of academic expertise on each campus is wide. Each campus co-locates students, instructors, and basic educational resources. Each campus has a degree of autonomy (in some cases great autonomy) but certain managerial functions remain at a central campus, or central location. This model is basically that of the single integrated campus, replicated in more than one place, but governed through a centralized system. Typically, the

multiple campuses are located within one common geographical territory, such as a state or province, under a single public jurisdiction such as a provincial government.

A shining example of this model is the University of California. The University of California (“U.C.”) is a state university consisting of ten discrete campuses and several specialized academic centers (such as the Hastings Center for the Laws, a law school located in central San Francisco). Some of the campuses, such as U.C. Berkeley and U.C.L.A., are extraordinary centers of learning with an international reputation that transcends the system within which they are located. All of the campuses (including U.C. Irvine, U.C. San Diego and U.C. Davis, etc.) are quality comprehensive research universities in their own right (i.e., *de facto* universities within a university). The university also manages a number of prominent federal research laboratories, such as the Lawrence Berkeley Laboratory and the Lawrence Livermore Laboratory. While each U.C. campus effectively operates as an independent university, certain policies and procedures, such as tuition levels, admissions policies, financial rules, or intellectual property management functions, are centralized in the University of California System-wide Administration, headquartered in Oakland. The system-wide administration also manages selected academic and quasi-academic activities, such as the University of California Agricultural Issues Center, which is physically located on the Davis campus.

Similar examples in the United States can be found in the multi-campus systems of the University of Colorado, the University of Wisconsin, the University of Texas, or the University of Maryland. Typically, the central university administration in each of these systems plans and manages the whole system to fulfill state government educational policies. These policies may involve distributing quality higher education equitably across the state, ensuring that areas of academic specialty are clustered in appropriate locations to achieve a critical mass, or seeking to ensure that certain regional community needs are properly addressed.

An extreme example of the multi-campus university system under a single public jurisdiction is the State University of New York. The University, known by its acronym “SUNY,” consists of over 60 separate campuses controlled from the central SUNY administration in Albany (the seat of the New York State government). The remarkable thing about the SUNY system, besides its size, is that it encapsulates a full spectrum of higher-education institutions. These range from the elite research universities, such as SUNY Stony Brook or SUNY Buffalo, to specialized educational institutions such as the Fashion Institute of Technology, in Manhattan, and a huge array of colleges, institutes, and specialized facilities throughout the State of New York, in remote and metropolitan locations. The incredible variety of organizations within the State University of New York creates very interesting managerial and political challenges as the State seeks to maintain unity within diversity.

Multiple campus universities have also emerged in other countries, such as Australia, in recent years in response to changes in government education policies and new opportunities in the education market.

Central Campus with Wide Geographical Distribution of Students

A third form of geographical virtualization is the university with a single, or primary, campus, but with students distributed over a wide geographical territory. In this case students are not clustered in particular locations, but are dispersed spatially in a random or semi-random manner. Under these circumstances, students tend by necessity to be connected to the main campus through distance-education systems and technologies.

The Open University in the United Kingdom is probably the best example of this kind of virtualization. A small sample of other representative examples in this category include: Deakin University (Geelong, Australia), Athabasca University (Alberta, Canada), Arizona State University (Tempe, Arizona), Auburn University (Alabama), Washington State University (Pullman, Washington), The University of London (London, England), The Empresarial University of Costa Rica (San Jose, Costa Rica), The University of Guelph (Ontario, Canada), or Rochester Institute of Technology (Rochester, New York).

In this form of spatially distributed education, it is almost impossible to create the kind of complex multi-dimensional learning experiences associated with conventional campus-based learning.

Central Campus with Students Clustered in One or More Remote Locations

In another model there is one central campus, or primary campus, and remote students are clustered in certain distinct satellite locations. The geographical clustering of remote students means that some conventional classroom-based pedagogical methods may be employed in the educational process in addition to, or instead of, various distance-education technologies and systems. There are at least four variants of this model that universities may follow in delivering educational services to remote clusters of students: (a) one or more satellite locations with no dedicated facilities; (b) one or more satellite locations with modest facilities, dedicated to one program only; (c) one or more mini-campuses at satellite locations, with a variety of programs; and (d) one or more substantial campuses in satellite locations. I will review each one of these variants.

Central Campus with Satellite Locations but No Dedicated Facilities

In this model, a university offers one or more educational programs in specific remote locations, but no serious capital outlay is made, and no investment is made in dedicated facilities under the control of the university. This is not distance education, in the sense in which the term is normally understood; it is conventional classroom instruction in remote locations. Classroom space and office space may be leased from another educational institution, or may even be rented from corporations, hotels, or other kinds of organizations. In

addition, the university may purchase educational support services and logistical support services from local suppliers.

A typical example of this model is the Helsinki School of Economics and Business Administration (which offers a series of specialized MBA degree programs in Seoul, Korea). Other examples include: the New York Institute of Technology (which offers MBA degrees in Taiwan and Egypt); Utah State University (which offers an MBA degree in Taiwan); the State University of New York at Stony Brook (which offers a Master of Science degree in Seoul, Korea); and the University of Western Australia (which offers a variety of management degrees, including the MBA, in Singapore and Jakarta, Indonesia).

Central Campus with Modest Facilities at Satellite Locations, One Program Only at Each Facility

In this model, a university offers one program only (e.g., an MBA program), or a set of programs in one field (e.g., business or technology management), in a specific remote location. Modest investment is made in a dedicated facility of the university in that location. It may consist of classrooms, office space, and dedicated support staff under the employ of the university. This approach requires more commitment and more investment by the university than required under the previous model; nevertheless, it is narrow in scope, thereby limiting risk and allowing the university to experiment in a relatively low key manner.

An excellent example of this approach is the recent establishment of facilities in Singapore and Barcelona by the Graduate School of Business of the University of Chicago, primarily for its MBA degree program. Related examples, also in the field of business administration, include: the establishment of a facility in Santa Clara County, California ("Silicon Valley") by the Harvard Business School; the establishment of a facility in San Francisco by the Wharton School; and, the establishment of a facility by INSEAD in Singapore.

Examples in a field other than business administration might include the Paris and Tokyo facilities of the Parsons School of Design or the Milan facility of the Fashion Institute of Technology.

Central Campus with a Mini-campus and Multiple Programs at One or More Satellite Locations

In this model the university seeks to provide something of a more balanced and rounded educational opportunity for its students in remote locations. It does so by offering multiple academic programs, probably in complementary or related fields, in a specific remote location. Mid-level investment is made in a dedicated facility of the university in that location, capable of accommodating a wide variety of educational activities and pedagogical methods. The investment may consist of classrooms, office space, and other facilities designed to house an array of activities other than simple instruction. Dedicated support staff will be employed by the university and a modest level of services and facilities required across academic fields will be provided in the satellite location.

This model differs from one other model discussed above (a "university with a main campus and some satellite facilities, under single public jurisdiction") in one respect. It involves operating

across the boundaries of at least two public jurisdictions. This fact brings with it a number of legal, diplomatic, administrative and managerial challenges. However, it also brings with it some potentially valuable opportunities for cross-cultural educational enrichment.

It is difficult to find successful examples of this form of geographical virtualization, probably because the risk-benefit trade-offs are so great. The Tokyo campus of the Philadelphia-based Temple University and the Australian campus of the University of Notre Dame, based in Indiana, are probably the best examples. The proposed venture by Technische Universität München to establish a science and engineering oriented campus in Singapore may be another example.

Central Campus with One or More Substantial Campuses in Remote Locations, Multiple Public Jurisdictions

This model is similar to another model discussed above ("multiple-campus university, under single public jurisdiction"). However, in this case the remote campus, or campuses, may be located in a different country, or within a different public jurisdiction, subject to different laws, different educational traditions, or different market conditions. Typically, the remote campus will cater to a full range of academic activities (not just teaching) and will be provided by the University with a substantial repertoire of support services and infrastructure, catered to the activities of the satellite campus.

There are few fully-fledged examples of this mode of virtualization. However, it is entirely plausible that the current wave of international collaborations and experiments between universities (as evidenced by the recent activities of prominent institutions such as Columbia University, the London School of Economics, New York University, HEC Paris, and Duke University) may lead to some interesting multinational universities in the not-so-distant future.

At present, the two best examples of this ambitious category of geographical virtualization lie with RMIT University, in Australia, and the Monterrey Institute of Technology, in Mexico. RMIT University (based in Melbourne, Australia, and previously known as the "Royal Melbourne Institute of Technology") is currently establishing two full satellite university campuses in Vietnam, in Ho Chi Minh City (Saigon).

The most advanced example is the Mexican university, Instituto Tecnológico y de Estudios Superiores de Monterrey (also referred to as "ITESM," "Tec de Monterrey," or by its English name, "Monterrey Institute of Technology"). ITESM is a high-quality private university with 26 full campuses in 25 cities throughout Mexico. These campuses are spread throughout multiple public jurisdictions (states and cities). ITESM also has a total of nine campuses in other Latin American countries (including Brazil, Chile, Peru, Colombia, Venezuela, Ecuador, and Panama), and two in Europe (Dijon, France, and Maastricht, The Netherlands). Campuses are also under development in Vancouver, Canada, and in the United

States (in Boston and Washington, D.C.). The ITESM system is headquartered at the university's main campus in Monterrey, Mexico.

The remarkable national and international expansion of the Monterrey Institute of Technology presages what will probably be a new phenomenon in spatially dispersed education: multi-mode education in multiple locations, combining the best of traditional classroom instruction with the best of contemporary technology-mediated learning.

Multiple-campus University, Under Multiple Public Jurisdictions (No Central Campus)

The final category of geographical virtualization is the university with multiple campuses across multiple public jurisdictions but with no obvious hierarchy between programs in the main campus and programs in the satellite campuses. The only example I have identified in this category is the University of Phoenix, which currently has 106 campuses throughout the United States (including Hawaii and Puerto Rico) and one in Canada. As I discussed above, the University of Phoenix offers a variety of programs online (though its subsidiary, University of Phoenix Online,) but its main business (at least until recently) has been in providing classroom-based, on-campus education for full-time working adults. While the university does indeed have a campus in Phoenix, Arizona, that may in some formal manner qualify as a primary campus, that campus really has no more priority from the students' experience than do any of the other campuses.

It is not clear whether the model created by the University of Phoenix will be imitated elsewhere. It is currently almost exclusively American in style and scope. In addition, the range of subjects covered is currently rather limited, suggesting that the model might not work so well for universities seeking to offer a more comprehensive scope of academic subjects or a traditional liberal education. The verdict is still out.

Varieties of Organizational Virtualization

Inter-organizational arrangements are an important part of virtual education. In most real-life cases of technological virtualization and geographical virtualization, there is more than one organization involved. Universities almost always enlist the help of other universities, or of specialized service providers, to implement their virtualization plans. Such arrangements range from purchasing Web-based educational software and infrastructure services from independent technology companies, to cooperating with a foreign university for access to suitable classroom facilities for offshore programs, or even to contracting out the delivery of entire degree programs to other educational organizations, through franchising agreements of various kinds. In short, organizational virtualization may also be seen as a central part of a university's strategy for implementing technological virtualization and geographical virtualization.

As stated earlier, organizational virtualization of university education may be defined as the mode of delivering education that

exists when a third party mediates the relationship between students and the primary faculty of a university.

Before discussing some strategic organizational issues faced by universities when implementing technological and geographical virtualization, I will briefly summarize the basic categories of organizational virtualization.

Integrated Sole Venture (Conventional University Management System)

The simplest, most familiar, and most orthodox organizational arrangement for the delivery of university education is the vertical integration model where the university owns and directly controls all assets and resources required for the delivery of its programs. The university operates its activities in each location entirely in its own right, without a venture partner. This principle may be applied at any location, whether it is at the core campus or at the site of a satellite venture. In the pure form of this model the university also directly controls and owns all of its own non-academic operations such as janitorial services, food services, accounting, information systems, utilities management, and building maintenance.

In the era when their faculty, facilities, students and administrators tended to be collocated in one central location, and when their educational environment was relatively stable, this organizational model — the totally integrated sole venture — was probably the natural choice for universities to follow. As the era of virtual education has emerged, however, universities face many pressures to embrace alternative organizational patterns for the delivery of educational services. I will now briefly review some of these alternatives.

Sole Venture, with Some Non-academic Services Contracted-out

In the alternative that lies closest to the orthodox model the university operates its activities in each location entirely in its own right, without a venture partner, whether at the core campus or at the site of a satellite venture. However, it chooses to purchase certain non-academic services (e.g., supply of offices or laboratory space, secretarial services, marketing services, legal services, accounting, janitorial work, provision of student accommodation, and perhaps even recordkeeping) from outside organizations. In some cases, a sole-source provider may be used; in other cases, a different supplier may be chosen for each service.

This model, while a departure from tradition, has nevertheless been adopted widely, especially in the United States. In most cases, it is perceived simply as a prudent arrangement for the management of institutional resources rather than as the virtualization of traditional university functions. While the motivation of university administrators may simply be one of cost cutting, this model is, strictly speaking, an incipient form of the virtual university.

Sole Venture, with Some Academic Services Contracted-out

In a second version of the sole venture alternative (i.e., where the university operates its activities in each location entirely in its own right, without a venture partner), the university contracts-out certain activities that come close to the core educational mission of the institution. As with the previous model, it probably chooses to purchase certain non-academic services from outside organizations. However, in this case it also contracts-out some academic activities, such as certain teaching assignments, evaluating (or pre-evaluating) student applications for admission, grading student work, providing counseling services to students, or day-to-day organization of classroom activities. In this model, the university maintains formal control over all academic functions, but allows other persons or organizations to conduct some of the university's normal academic business, under supervision.

Universities with satellite programs in remote locations often adopt this approach. For example, the primary university may recruit faculty from local universities in the remote location to teach courses in an adjunct capacity, but the university will retain full control of the curriculum. The university may also recruit teaching assistants from the local community to grade student papers or exams, but university faculty would normally supervise those assistants. While this kind of contracting-out of educational activities may appear to be somewhat radical compared with the first alternative, it is only marginally more aggressive than the common practice of universities employing part-time and adjunct faculty rather than regular academic faculty to teach courses, or of employing outside agencies to administer student admissions tests such as the GRE, the GMAT or the TOEFL tests. The general practice of contracting-out a variety of academic activities is particularly pertinent to universities with distance education programs, but it is actually also commonly found — at least at modest levels — amongst conventional single-location universities.

A remarkable example of where a university has developed the contracting-out of academic services into a finely tuned system lies with the largest private university in the United States, described earlier. That organization, the University of Phoenix, offers standardized and centrally-designed programs and curricula throughout its more than one hundred campuses in North America; yet it contracts-out the teaching of almost all of its classes to non-tenured adjuncts, most of whom hold regular jobs elsewhere. The University of Phoenix, in short, manages to offer its degree programs without employing a normal body of regular full-time academic faculty. In other words, the university operates in an almost completely *virtual professoriate*!

Joint Venture with Another University, Subserving Venture Partner

With the growth of international distance education during the last decade, partnerships and joint venture relationships between universities have become quite common. This represents a further step down the pathway of the virtual university. The most common expression of this phenomenon has been the situation in which one university (the primary university) operates its activities in a satellite location as a joint venture with another university (the secondary university). The secondary university may own a campus

at that location it makes available to the primary university for the delivery of that university's satellite programs. The secondary university will probably provide administrative services and various kinds of logistical assistance to the primary university.

Typically, the secondary university will also provide academic faculty to teach courses for the primary university, and the primary university may even incorporate pre-existing courses from the secondary university into its own program. However, in most cases the degree remains the property of the primary university; and the primary university carefully guards the control of its curriculum and its academic standards. In one variant of this model, the secondary university delivers the lower-level courses of the degree (say, the first two years of a four-year degree) onsite in the remote location on behalf of the primary university; and the students then move to the home location of the primary university to complete the latter two years of the degree.

Under the variety of expressions of this model, the secondary university is a subservient partner who is prepared to enter in to the relationship because of reasons such as: financial advantages, access to expertise that would otherwise not be available, the opportunity to attract more students to the institution, or because of some perceived academic prestige associated with the primary university.

Examples of such arrangements include: the State University of New York at Albany (a public university in New York State) with Fudan University (in Shanghai, China); Syracuse University (a private university in upstate New York) with the University of Shanghai for Science and Technology (in Shanghai, China); the University of Illinois at Champagne-Urbana with the education and training division of Tata (the diversified industrial and technological conglomerate of India); California State University with the International Youth University, in China; and, the Helsinki School of Economics and Business Administration (mentioned earlier as an example of a European institution with international satellite locations, but no dedicated remote facilities of its own) with the Institute of Industrial Policy Studies (a quasi-university institution based in Seoul, Korea).

Joint Venture with Another University, Equal Venture Partners

A variant of the above partnership model involves two universities acting as equal partners rather than one being subservient to the other. A university based in one location operates its activities in a satellite location as a joint venture with another university. The second university may own a campus at that location, which it makes available to the primary university, or the two universities may decide to pool resources to establish a new facility.

Under this model, the two universities consider themselves to be academic equals, even if the academic and practical repertoires of the two institutions are not identical. The two universities may offer a joint degree of some kind, officially

cross-articulate their respective degrees, or agree upon some kind of structured protocol for addressing matters of curriculum design, entrance requirements, and performance standards. Examples of this model include cooperation between: the University of Southern California (in Los Angeles) with Yonsei University (in Seoul, Korea) in the fields of real estate and city and regional planning; Pepperdine University and the California Institute of Technology (both private universities in Southern California) for graduate studies in the management of technology; and the recently formed joint venture between the graduate schools of business of Harvard University (in Massachusetts) and Stanford University (in Northern California) for the delivery of executive education programs.

Joint Venture with a Non-Academic Institution, "Equal" Venture Partners

One difficulty with the previous model, the joint venture between two equal academic partners who are competent in the same general field, is that there is an intrinsic risk of conflict or instability over questions of which institution ought to assert primary control over curricula and pedagogy. The model is also intrinsically prone to instability created by the challenges of integrating the different academic cultures of each partner. In other words, while the model has the advantage that the similar strengths of each institution may be pooled to create economies of scale or greater academic depth, it carries the persistent problem of potential academic territory disputes between each university.

One solution to the problems just described lies with the formation of a joint venture relationship based upon complementary capabilities rather than equivalent capabilities. In this alternative model, the university operates its activities in a satellite location as a joint venture with another organization, but the organization must not be an academic institution. For example, the partner organization may be an industrial company, a not-for-profit institute, a government instrumentality, or some other kind of business enterprise.

Even though the two organizations under this arrangement may be quite different in style — in terms of assets, capabilities, public image, or ways of doing business — they must be equal partners, in the sense of investing equal stakes in the venture, taking similar or equivalent risks, and expecting equivalent returns. The key advantage of this model of cooperation is that the risk of conflict over academic authority and academic territory is almost non-existent. It also has the advantage that each organization contributes something to the partnership that represents its unique and strongest asset (e.g., educational prowess, university brand name, financial capital, or logistical and management expertise).

An example of this model is the contractual agreement between the State University of New York at Stony Brook (a comprehensive research university in Long Island, New York) and the China Weal Business Machinery Corporation, Ltd. (a private information technology company based in Guangzhou and Nanhai cities, in China) for offering a master of science degree in management to employer-sponsored students from private companies and state enterprises in Guangdong province. At a local level, SUNY Stony Brook has also entered in to a joint venture with Long Island based Symbol Technologies corporation to offer an in-house graduate

engineering degree in “mechatronics” for employees of the company.

Many other universities now offer such customized, or semi-customized, in-house educational programs for companies. Stephens Institute of Technology, in Hoboken, New Jersey, is a superb example of a school that has developed the delivery of such programs into a fine art. The Institute offers graduate management degrees and specialized technology-oriented degrees, as in-house programs for companies such as AT&T and Paine Webber.

A particularly interesting illustration of this model of cooperation lies with a program jointly developed by FT Knowledge (a private British company, associated with the Financial Times group) and the Wharton School of the University of Pennsylvania. The program, “eBusiness: Models and Applications for eCommerce,” is a five-week online executive education program designed to allow executives from all over the world to learn about the application of “eBusiness” strategies in business. The program is self-paced and is taught entirely over the Internet, involving online interaction with Wharton faculty, fellow students, and “eLearning” specialists and administrators from FT Knowledge. The program is also characterized by the fact that the mode of delivery of the program (“eBusiness”) is simultaneously also the subject matter of the program. From an organizational point of view the important point to note here is that, despite being unusually well endowed with resources, the Wharton School has chosen to collaborate with a non-university partner to deliver the program rather than to do so all alone as a sole venture.

Meta-program Based on a Group of Geographically Distributed Universities

An alternative that bears some similarities to the “joint venture between academic equals” model, but which moves more completely in the direction of virtualization, requires no new campus to be created and no new facility to be constructed. In this model, each member-university of a group of geographically dispersed universities makes its resources (tangible and intangible) available to contribute to a “virtual university” that transcends the boundaries of each individual university, yet draws upon the assets of each member in each place. In other words, a meta-university is created in which one or more academic programs are delivered in multiple locations simultaneously, drawing upon the equivalent academic capabilities (or, at least, complementary academic capabilities) of each university in each location. In one variant of this model, there would be a “lead university” in a primary management role; in another variant there would be some kind of flat or distributed management structure.

This form of organizational virtualization of university education, while still somewhat unusual, has recently begun to flourish. For example, Columbia Business School (the business school of Columbia University, in New York) and the London Business School (in London, England) now jointly offer an “Executive MBA – Global.” In this air-travel-

intensive program executives alternate their time between attending concentrated classroom sessions in New York and London, while maintaining their normal managerial work at whatever location in the world they are based. Columbia Business School also offers a similar “bi-coastal” executive MBA program with the Haas School of Business of the University of California at Berkeley (in the San Francisco Bay area).

An even more ambitious example of a global educational meta-program lies with the TRIUM program, which is a joint venture of New York University (New York City), the London School of Economics (in London, England), and HEC (in Paris, France). In this program students shuttle between classes taught at the facilities of each of the three universities, while continuing with their regular executive responsibilities at whatever location or locations they are based. The TRIUM program also involves the periodic participation of an additional partner university, selected each year by agreement of the three primary universities. The fourth university in the group changes annually and provides a further location — normally in Latin America or Asia — to which students travel as part of their program. Graduates of the program are awarded a degree simultaneously from all three primary partner universities in the program.

A strictly European meta-program, similar in style to that of the TRIUM program, has also been created by three universities in three separate countries: the University of Groningen (The Netherlands), University of Stirling (Scotland), and the CERAM Graduate School of Management and Technology (Sophia Antipolis, France). Graduates of that program are awarded a Master of Science in International Business degree, conferred jointly by the three participating European universities.

The University of Groningen has augmented the triumvirate model by expanding the geographical scope of its cooperation beyond the boundaries of Europe and by selecting specific universities appropriate for jointly offering a more specialized program than it offers together with Stirling and CERAM. Its second meta-program is a joint venture together with Uppsala University (Sweden) and the University of Florida (United States), in which students are awarded the degree of Master of Science in International Financial Management. The three university partners confer the degree jointly.

Joint Venture Between Co-located but Academically Distinct Universities

The final alternative model of organizational virtualization of university education also requires no new campus to be created and no new facility to be constructed. In this model, each member-university of a pair (or group) of academically different universities, contributes resources to build a new program that would otherwise not be possible. For example, a university with a strong medical school may collaborate with a university with a strong engineering school to develop a new joint program in bioengineering. Alternatively, a university with excellent technology-oriented faculty could collaborate with a university with excellent management faculty to create a joint program in management of technology.

An example of an innovative approach to cooperation between two universities located in the same city — with each one being similar, in the sense of being a comprehensive research university with a roughly equivalent range of subjects, but unique in its respective academic character and institutional history — lies with the University of Sydney and the University of New South Wales, both located in Sydney, Australia. These two universities recently merged their graduate schools of management to form a single management school simultaneously affiliated with both universities. In other words, this arrangement has created not just a new program, operated as a joint venture, but a completely new hybrid institution. This arrangement allows for the distinctive strengths and reputations of the two separate universities to be retained, while enabling the creation of a nationally prominent set of programs within a coherent framework, drawing upon the strengths of each partner. The arrangement also represents a creative way of avoiding the intrinsic tendencies towards instability and conflict that are associated with the “Joint Venture with Another University, Equal Venture Partners” model discussed above.

Another variation of this model involves two universities of very different character, located within the same region: Westminster College, located in Salt Lake City, Utah, and Utah State University, located nearby in Logan, Utah. Westminster College is a small, high quality, private university in the American liberal arts tradition offering both professional graduate programs, as well as traditional programs in the arts and sciences. Utah State University is a comprehensive land-grant university, with an established reputation in agricultural science and technology, agricultural extension, and aeronautical engineering. Utah State University also has depth of capability in biotechnology, especially industrial biotechnology and agricultural biotechnology. Westminster College’s business school has special strengths in technology commercialization and entrepreneurship. The two universities are engaged in exploratory discussions to offer a joint Master of Science in Biotechnology degree with half of the content (the scientific material) provided by Utah State University faculty, and the other half (the technology commercialization material) provided by Westminster College.

The Sydney example represents an organizational arrangement aimed at deepening capabilities and extending the market share of two distinct but similar universities operating in the same general field, within the same region. The Utah example represents an organizational arrangement aimed at creating a completely new and distinctive program by linking together the complementary academic capabilities of two universities within the same region but exhibiting remarkably different profiles.

Some General Principles of the Virtual University

A number of general principles may be discerned from the lessons of universities who have experimented with the

virtualization modes described above. The following principles are provisional, drawing upon the practical observations and insights of the author, gained through direct experience in managing virtualization projects and through interviews with a variety of university managers involved in such programs. These provisional principles may form the basis for subsequent detailed research and analysis. This list is meant to be indicative rather than exhaustive.

Principle 1: Virtualization Categories are Discrete but Related

While each of the three basic types of virtualization are discrete categories and while, in principle, they may each be pursued in their own right independently of the other two, in actual practice it is almost impossible to pursue one without also pursuing at least one of the others. In other words, in practice, the relationship between technological virtualization, geographical virtualization, and organizational virtualization is not random. The relationship is one of loose coupling rather than tight coupling.

Principle 2: Geographical and Technological Virtualization

There is an inverse relationship between the degree to which students are clustered in particular geographical places and the need for universities to adopt technological virtualization initiatives. In other words, the more that students are distributed randomly over a wide geographical space, the greater the pressures become for universities to deliver education in a technologically-virtual mode.

Principle 3: Time Schedules and Technological Virtualization

There is an inverse relationship between the degree to which students are able to attend classes at regular specified times and the need for universities to adopt technological virtualization initiatives. In other words, the more students’ lifestyles require them to adopt erratic or abnormal schedules for studying, the greater the pressures become for universities to deliver education in a technologically-virtual mode.

Principle 4: Organizational, Geographical and Technological Virtualization

There is a positive relationship between the degree to which universities adopt either technological virtualization or geographical virtualization and the degree to which they will face pressures to also adopt organizational virtualization of education. In other words, universities will generally not be able to avoid organizational virtualization without threatening the health of their endeavors in technological virtualization and geographical virtualization.

Principle 5: Space, Time, and Organizational Virtualization

The less that their students are clustered in specific geographic localities and the less that their students are willing and able to attend classes at specific and regular times, the more universities will face pressures in the direction of organizational virtualization. The fifth principle is a corollary of the first four principles.

Principle 6: Jurisdictional Boundaries and Organizational Virtualization

There is a positive relationship between the degree to which universities offer educational programs across the boundaries of

public jurisdictions, especially national boundaries, and the pressure they face to move in the direction of organizational virtualization.

Principle 7: Wealth Differentials and Demand for Virtual Education

In general, there is a positive relationship between the size of the gap between the *per capita* wealth levels of two countries and the demand by students in the poorer of the two countries for education from universities in the richer of the two countries.

Principle 8: Affordability of Virtual Education

There is an inverse relationship between the size of the potential demand by students in foreign jurisdictions, especially foreign countries, for educational services from universities in the home jurisdiction or country, and the ability of the recipients of the services to pay. In other words, students in the best position to pay for virtual educational services are probably not the ones most likely to seek the service. The eighth principle is a corollary of the seventh principle.

Principle 9: Financial Creativity and Virtual Education

There is inevitable pressure for universities to adopt different financing and revenue models for virtual education programs — especially those targeted at foreign locations — than they normally follow for programs on their primary campus at the home location. The ninth principle is a corollary of the sixth, seventh and eighth principles.

Principle 10: Local Resources and Geographical Virtualization

It is necessary to utilize local resources from the foreign location where a geographically virtual program is delivered in order to ensure that the program is appropriately attuned to the local environment and to properly address the challenges created by the financial constraints expressed in the eighth principle.

Principle 11: Maintenance of Inter-organizational Relationships

The inter-organizational relationships that, in general, are necessary for the success of technological virtualization and geographical virtualization, will not be sustainable without a great deal of attention and effort from managers and leaders from all of the participating parties. In other words, organizational virtualization requires a lot of work. Such work includes proactively managing the relationships between each organization, investing substantial resources in nurturing the organizational relationships, building mutual understanding between key people in the participating organizations, and building and maintaining trust between those same people.

Principle 12: Strategic Intent for Successful Organizational Virtualization

Unless substantial human and organizational talent, enthusiasm, intelligence, and commitment is directed by universities at organizational virtualization, their efforts at technological virtualization and geographical virtualization will tend to fail. The twelfth principle is a corollary of the previous eleven principles.

Elements of Business Models for Virtualization

The twelve general principles of the virtual university just enunciated reveal how important it is for universities to carefully think through strategies for funding their virtual programs and for structuring the financial relationships with their partners. The sixth, seventh, eighth, ninth and tenth principles, in particular, raise this challenge. The following are brief summaries of some of the main options available to designers of virtual education programs.

Sources of Funding for Virtual Education Programs

Most universities have stable, traditional methods for raising revenue to cover the cost of running their programs. However, such methods are often inappropriate for virtual education programs, and university administrators are forced to grapple with alternative revenue systems to fund the new activities. I will now review some of the main options, ranging from the most conventional to the somewhat less orthodox.

The State as Sole Funding Source

In many countries, the provision of free university education by governments to their citizenry is a central tenet of public policy. In some cases this is restricted to a privileged group of highly qualified students, and in others a much wider sector of the population is eligible. Although this system is gradually being abandoned or weakened by a number of governments, it nevertheless remains widespread.

For universities relying almost exclusively on state funding for their budgets, it may be very difficult to adjust to the new rules of the virtual university environment. There are several reasons for this. First, the institutional culture of state-funded universities may lead to a kind of inertia regarding the search for opportunities for alternative sources of funding ... why trouble yourself with the precarious and potentially stressful struggle for revenue from the open market when you can rely on the benevolent hand of the state to provide your funding in a stable and familiar manner?

Second, the administrative systems and bureaucratic regimes of state-funded universities develop a kind of rigidity that may be difficult to realign, even if their leaders may be genuinely interested in doing so. The entrenched systems and rules of such universities may not be suitable for handling the complex realities of the virtual environment, but the people whose careers may have grown on the back of those systems may be resistant to change.

Third, governments are normally under pressure for the funds they have raised from taxing their citizens to be expended on programs that are perceived to be of direct benefit to the same population from which the taxes are drawn. Traditional university programs

generally fall easily under that framework. However, virtual education programs, by their very nature, tend to benefit people who may fall outside the tax paying population to whom the government is beholden. While legal and procedural remedies may be available to address this problem, the challenges of doing so are sufficient that many governments may be reluctant to move wholeheartedly in the direction of one hundred percent funding of virtual education programs.

Fourth, as indicated earlier in this chapter, most successful virtual education programs involve participation of private companies in the provision of technical, organizational or even academic services. Many governments are reluctant to deal with the potentially awkward accountability problems of mixing what amounts to private and public business activities in the one pot, financed completely by public funds.

For these and other reasons, virtual education programs may require funding by alternative methods than those enjoyed under the traditional one-hundred-percent state-funding model.

Combined Tuition and State Funding (State Universities)

In many countries, the dominant model for funding university education is to combine state funding — typically based on some kind of standardized “per student” formula — with tuition paid by each student. The trend exhibited by state universities, world-wide, in recent decades has been for the percentage of funding coming from tuition and fees, rather than state funding, to increase. This situation provides more room to move to cover the exigencies of virtual education; but state universities operating under this system still face many of the same constraints found in universities that enjoy total state funding for education. Those constraints have become almost ironic, in some instances, where the percentage of the total budget of a state university coming from the state itself may be quite small; yet, the state still retains control.

Combined Tuition and Endowment Funding (Private Universities)

A variant on the above formula may be found with private universities, in which the operating expenses of the university are derived from a combination of tuition and fees, on one hand, and income from endowment funds, on the other hand. This model is particularly strong in the United States, where the size of the endowments of some of the elite private universities are enormous, providing great opportunities for them to pursue new initiatives without the constraint of having to pursue negotiations with government authorities with tight-strapped budgets.

Private universities, by their very nature, have greater flexibility in the way they may approach innovative projects and educational modalities because they do not face quite the same accountability problems as the state universities. This means that, in principle, private universities are in a better position than state universities to pursue the full range of virtualization options described in this chapter. Private universities face their own constraints, such as the need to

cover their costs without the guarantee of state subsidies, the need to please their “customers” (the students and their parents or sponsors who pay the fees), or perhaps certain restrictions on the way that endowment funds may be used. State universities, on the other hand, may be able to find creative ways to isolate certain virtual education programs from the normal state budgeting system. However, as a general rule the growth of virtual education may create pressures, internationally, for movements in the direction of private funding, or quasi-private funding, of university education.

Tuition and Fees Only (Private Universities)

Some private universities have very small, or virtually non-existent, endowments. This fact forces them to rely almost entirely on tuition revenue to fund their activities. That, in turn, means that such organizations must be very responsive to the needs and demands of their students, at the risk of becoming financially unviable if they fail to do so. This is true for both the traditional not-for-profit private university (the vast majority of all private universities) and the new breed of for-profit private universities, such as the University of Phoenix.

Tuition-driven universities, as we may refer to this particular group of organizations, may be able to augment their revenues by obtaining grants from various charitable and government organizations to fund certain specific virtual education programs. On the whole, however, they must fully fund their initiatives from the tuition revenue each program brings in. In short, they must be run as businesses, whether for-profit or not-for-profit. This may become a constraint because of the natural tendency of such a university to avoid programs that may force it to sustain a loss; yet, it may also become a source of new flexibility and opportunity, as the university is forced by the need to survive to pursue initiatives that truly meet the demands of a complex and discerning population of potential “customers” for education.

Single Corporate Sponsor (In-house Program)

An increasingly popular alternative to the traditional sources of university funding (government appropriations, tuition (paid directly by students or their parents), private endowment funds, or charitable grants) is the corporate sponsor. Under this system, a university will enter into a contract with an outside corporate sponsor (typically a private corporation, but possibly also some other kind of organization, such as a labor union, an industry association, or a not-for-profit political organization) to offer an in-house program as a service to that sponsor.

In an in-house program, only students who are employees or members of the corporate sponsor’s organization will be permitted to enroll in the program. Often the program will be delivered inside the facilities of the sponsor rather than at the location of the university’s normal facilities. In some cases, the curriculum and pedagogy will be identical to that of the normal program of the university, but often a special customized program will be delivered, tailored to the particular demands of the client (the sponsoring corporation). Many large corporations have created their own internal “corporate university” to provide customized education and training to employees. Some of these corporate universities choose to contract-out the delivery of some of their

programs to more recognizable “authentic” universities. Nevertheless, it is not uncommon under the in-house corporate sponsorship model for the university to modify its regular curriculum or pedagogy (either surreptitiously or openly) to accommodate the needs of the corporate sponsor.

Under the simple (in-house) corporate sponsorship model just described, a total price for the delivery of the whole program is negotiated in advance; sometimes variable pricing formulae are used and sometimes the contract will involve a fixed total price. In contrast to the conventional educational setting, where the tone may be one of the university providing education to students, with the funding somehow being left in the shadows as a subject not very fitting for discussion in a scholarly environment, in the corporate-sponsorship setting the tone may be one of paying an agreed price for the delivery of a specified (albeit, educational) product.

Multiple Corporate Sponsors (Executive Program)

A variation on the in-house corporate sponsorship model is where multiple corporations concurrently enter in to agreements with the university to provide a specified program of education for selected members or employees of their organizations. These kinds of programs are generally referred to as “executive education” programs. While there are a wide variety of contractual and organizational formulae used by universities under the “executive education” rubric, the typical arrangement involves a group of “executives” from a group of corporations going through a program of study as a single cohort. A standard protocol typically exists by which the agreement between the university and the employer/sponsor of each individual student is structured.

The multiple-corporate-sponsorship model generally provides for a more diverse and complex mix of students than is possible under the single-corporate-sponsorship (in-house) model. The range of students is, however, still restricted to employees or members of the sponsoring organizations.

An advantage of both kinds of corporate sponsorship models (single and multiple corporate sponsors) is that, within the constraints of the corporate agreement, the university has a great deal of freedom to structure virtual education programs as it best sees fit ... without needing to be unduly concerned about the constraints and accountability problems of the state-funded programs discussed above.

Single Corporate Sponsor (Open Program)

There is another model of corporate sponsorship of university education that seeks to combine the simplicity and business-structure of the single-corporate-sponsorship (in-house) model with the openness and complexity of the traditional individual-student-tuition model. In this model, an independent organization (perhaps a private corporation, or a not-for-profit institute) will enter in to a contract with a university to pay the university a fee, according to a predetermined schedule, in return for delivering a specified program of education to a body of suitably qualified students delivered to the university by the sponsoring organization. The sponsoring organization

will then enter in to whatever arrangements it deems appropriate to recruit students and to collect payments (from whatever source) sufficient to cover both the cost of the fee to the university and its own expenses.

Mixed Mode Funding

Finally, some universities may choose to offer a standardized program, or suite of programs, to students who have been funded from a variety of the above sources. In other words, regular state-funded students may sit together in the classroom with corporate sponsored students, both learning the same material, even though the contractual conditions under which they entered the program may be entirely different.

This model has the advantage that it may help create economies of scale for universities in the delivery of programs and it may also help to promote a degree of variety amongst students that might not normally be possible with typical corporate-sponsored programs. However, the model also has some disadvantages. Awkward dynamics may arise between students over differences in the financial terms of their enrollment and over differences in expectations about the nature of the learning environment, study discipline, performance standards, or pedagogy. In addition, many universities may be hampered by legal and accountability restrictions imposed on them by their respective governments.

There are no doubt other models extant. The important conclusion to be drawn here is that university administrators contemplating the adoption of virtual university programs will probably be forced to grapple with designing a funding formula that artfully chooses from among the above alternatives. That might not be easy for conservative universities that have become used to a particular time-proven and simple method of funding their activities.

Financial Transaction Arrangements for Virtual Education

Most of the innovative kinds of funding mechanisms for virtual education involve cooperative agreements between the university and at least one other organization. In addition to identifying new kinds of funding sources for virtual education, university administrators need to think carefully about the detailed arrangements they need to put in place for handling financial transactions between themselves and their partner organizations. Poorly designed financial structures may damage cooperation and trust between venture partners and, ultimately, may undermine the viability of the actual programs.

Flexible and Timely Access to Resources is Essential

Perhaps the most important consideration when designing the financial system for a virtual education program is the need to ensure that program revenue is channeled in such a way that its managers are able to deploy sufficient funds, in a timely manner, to effectively operate the program. Virtual education programs create many challenges that need to be addressed in an agile and efficient manner, sometimes immediately. Urgent expenses may be created in the area of extraordinary adjunct faculty expenses, accommodation and travel requirements, telecommunications expenses, corporate negotiation exigencies, or other logistical matters. Typically, such expenses may not be met — at least with

sufficient speed — under the frameworks of conventional university budgeting systems.

The normal arrangement under conventional university budgeting systems is that planning exercises take place annually (or perhaps even every second or third year) in which academic departments may negotiate for resource allocations (especially faculty lines) from the university's central administration to cover projected activities during the coming years. If the negotiations are successful, and once the resources are allocated, the department will need to work within the constraints of those resources until the next round of budgeting and negotiations takes place. In most cases revenue from delivering degree programs (e.g., tuition or government allocations) goes in to a general revenue fund, controlled tightly by either by the state or by the central university administration. It is not uncommon under the conventional system for a disjuncture to exist between the need for resources by academic departments and their access to resources from the central university administration or the State.

Under the conventional (non-virtual) approach to organizing university education, this system was probably quite satisfactory, despite its problems. However, the speed, complexity, and flexibility required in typical virtual education programs makes the conventional system very inconvenient, and probably even non-viable. Virtual education programs in many of the categories described above will only be managed properly if funds are placed in a special account to which access may be granted in a timely and convenient manner, with minimal bureaucratic obstacles.

In addition to addressing the main issue just described, managers of virtual education programs will need to judiciously structure the mechanisms for transferring funds between all key parties. They may draw upon some of the options that I will now describe.

Simple System (Primary University Controls all Funds)

In the simplest system for handling finances in an organizationally virtual education program, all revenue, from whatever original source, comes directly to the primary university. The primary university then allocates funds according to its discretion, either internally, or for the purchase of services and supplies from external organizations and individuals, entirely at its discretion. This arrangement, while apparently quite simple and probably also attractive to the primary university itself, has the disadvantage that it may not be attractive to the university's venture partners. That problem may, in turn, threaten the feasibility of the program itself.

Primary University Channels Funds to Venture Partner

Under the terms of a second system for handling finances, all revenue, from whatever original source, also comes directly to the primary university. However, in this case, the primary university will purchase a significant array of services from the main venture partner according to terms laid out in a

cooperation agreement. This arrangement has an advantage over the "simple system" just described, in that it guarantees greater benefits for the venture partner, thereby creating some incentives to keep the collaboration healthy.

Simple Franchise Structure

A third possible system is a kind of franchise arrangement. It is quite different from the first two systems in that all program revenues, from whatever source, go directly to the venture partner rather than to the primary university. The venture partner will then send the primary university a fee according to a schedule defined in the cooperation agreement. This fee is a form of licensing fee transferred to the primary university as a payment for the right to deliver all or part of the primary university's program. It has the advantage of being rather simple; but with that simplicity comes an obligation for the primary university to provide all the support systems and services normally expected of franchisors. The primary university carries the primary responsibility to ensure that its normal systems are properly administered by the venture partner, or venture partners.

Venture Partner Channels Funds to Primary University

A fourth possible model system is more radical than the simple franchise system and may be viewed as the inverse of the second system described above. Under this model, as was the case with the simple franchise system, all program revenues, from whatever source, go directly to the venture partner rather than to the primary university. However, in this case, the primary responsibility for managing the program lies with the venture partner rather than with the primary university. The venture partner will purchase a significant array of services from the primary university according to terms laid out in a cooperation agreement. These services may include such things as providing the basic curriculum structure, allowing use of the university's name, issuing degrees, providing an official repository for student records, and sending a certain number of teachers from the primary university's regular faculty to teach courses in the program.

This kind of system will probably be very attractive to the venture partner because of the freedom it allows for that organization to utilize its capabilities to the fullest and to exercise opportunities to make money through association with the primary university. It may also be attractive to the primary university because it is a relatively "no hassle" way of extending its reach and of earning some extra revenue through the work of the venture partner. However, depending upon its culture and policies, the primary university might also feel somewhat uncomfortable with this arrangement because of the lack of direct control it may exert over its "own" program. The question might also be raised as to what extent the program really belongs to the primary university, since the majority of the work in managing the program may have been exerted by the venture partner.

Genuine Equal Joint Venture

A fifth possible system, that has the potential to overcome most of the disadvantages of the previous four systems, is a genuine joint venture where each party has equal stakes in the venture. Under this arrangement, a special joint venture account is established in to

which all program revenues, from whatever source, are deposited. Payments are allocated from that account to whatever purposes are deemed appropriate under the joint venture agreement, no matter where, or by whom, the expenses are incurred. At the end of the program, or at the end of a defined period of time, surpluses remaining in the account may be appropriated by each venture partner (one of which is the primary university) according to pre-agreed terms.

While this system has real advantages over the previous four, those advantages come with a cost. The genuine joint venture requires great commitment by managers of both parties to nurture mutual understanding and mutual cooperation by all parties involved. It also requires great care and integrity by both parties for the joint solution of problems that inevitably arise in the administration of the program.

Variation on the Joint Venture Arrangement

A variation that may be added to either the fourth model system ("venture partner channels funds to primary university") or the fifth model system ("genuine equal joint venture") is as follows. In either of these systems, an agreement may be reached whereby the teaching of courses in the program may be shared between teachers based in the primary university's regular faculty and teachers recruited or provided by the venture partner for the program. The share of teachers coming from each source may be equal or it may be based on some other mutually agreed distribution; it may even be variable, depending upon the exigencies of the program. Under this system, the amount of money transferred to the primary university will be proportional, in some way, to the percentage of teaching conducted directly by regular faculty of that same university.

This variation allows for the cooperation to be perceived as fair by both parties in the sense that the transfer of funds to the primary university bears some perceivable relationship to the actual amount of direct educational contribution it makes. However, the system also carries with it an intrinsic risk: either party may attempt to manipulate or influence the distribution of direct teaching responsibilities for the purpose of influencing the balance of funds moving between them, rather than because of genuine educational or logistical considerations associated with the program itself.

Managerial Lesson

Probably, none of the above model systems for structuring financial transactions should be touted as the ideal system for all educational programs involving more than one party. However, even this brief review reveals how important it is for managers of universities engaging in virtual education initiatives to evaluate alternative financial systems in the light of their circumstances and goals. A poorly designed system for handling finances between partners in a virtual university program may undermine the viability of the program itself.

Strategic Issues in Virtualizing University Education

Before concluding with some key themes associated with managing the virtual university, I will briefly list a number of potential strategic issues faced by universities as they embark on the virtualization of their programs. There is not space here to articulate rigorous responses to these issues. Rather, they are raised here to signal the type of managerial acumen and leadership qualities required of leaders of the virtual university.

Focus on Money Rather than Education

Many universities see the establishment of virtual education programs as an easy way to make money outside of their normal operations. If universities focus too strongly on money-making objectives, rather than broader educational and institutional goals, there is a risk that the program will not receive the care and attention it needs in order to thrive.

Achieving the Right Balance of Power

Successful cooperative arrangements in virtual education require that an artful balance of power be created between the venture partners. If the power is biased too far in the direction of one partner rather than the other, then the relationship is likely to be unstable and the venture might not survive.

Second-Class Status of Virtual Programs

There is risk in geographically-virtual projects that a program in a remote location may be perceived as being "less genuine" or less important than normal programs at the main location of the university. This attitude may lead to students in the remote location being treated as second-class members of the university, thereby undermining the value of the program for its recipients. Unless a university manages to integrate a geographically-virtual program, attitudinally, into the main repertoire of the institution, then its perceptions towards the program are likely to have an insidious effect on its viability.

Maintaining Uniform Academic Style Across Diverse Programs

There is a natural tendency for virtual programs to develop a distinctive character of their own, framed by the individual contributions of students, teachers, circumstances, and systems associated with the program. This tendency, in turn, creates a challenge for the university to maintain a sense of unity of academic style and philosophy across the diversity of its programs. The university's leaders will need to consider the degree to which they wish to retain uniformity in content and form across nominally equivalent programs offered in different locations and modes.

Pricing Programs for Students from Less Wealthy Communities

Universities from relatively rich parts of the world offering programs to students in relatively poor parts of the world will almost always find difficulties in structuring the pricing and budgeting of those programs in an identical manner to the manner employed at the home location. In addition, because of the need to deploy resources from the home location as part of the program, it is almost always necessary to price the programs at a higher price than is typical for local programs in the remote location. Hence, the

remote program will almost always appear to be too cheap from the vantage point of the home location, but too expensive from the vantage point of the remote location. Managers of such programs will need to be creative and flexible in the manner in which they solve this and related problems.

Geographical Virtualization and Technological Virtualization

Some universities are reluctant to move in the direction of technological virtualization for reasons of their educational philosophy; but, at the same time, may be happy to move in the direction of geographical virtualization, so long as traditional pedagogies are maintained. However, once geographically-virtual programs are established, subtle pressures may be experienced that push the university incrementally in the direction of technological virtualization, despite its formal opposition to such a thing happening.

Maintaining Brand Image

The organizational virtualization that almost always accompanies technological and geographical virtualization may inadvertently dilute the brand image of the primary university if the program is not actively managed with the maintenance of its academic brand image in mind.

Potential Conflict Between Research and Education

In strong research universities, some kind of practical conflict, centered around resource allocation decisions, may be experienced between the research goals of the institution and the educational goals of the institution. In situations where virtual programs are focused on education rather than research, political forces arise within the university that may undermine the viability of the virtual programs. For example, the programs may be viewed simply as a "necessary evil" to raise money to subsidize the research programs.

Difficulty of Offering Rich Multi-dimensional Educational Experience in the Virtual Mode

It may be difficult for a university to offer a full repertoire of services, programs, and ancillary activities at a remote location or in the virtual mode. This fact may weaken, subtly, the educational value of virtual programs. Universities need to be vigilant in finding ways to build sophisticated milieux and rich experiences for students in virtual programs, rivaling those of regular programs at the primary location of the university.

Language Challenges

It is common for the primary language of students in virtual programs to be different from that of students and teachers at the primary location of the university. There are a number of ways that a university may deal with this reality. These range from teaching the program in the primary language (or languages) of the students, to requiring all students to be completely competent in the home language of the primary location. Hybrid arrangements are also possible where a mixture of languages is employed, or where students may

enter the program not fully competent in the university's primary language but may take advantage of the program to gain such competence.

There are many other ways of dealing with language issues, with or without the use of translators. Which approach is superior will depend upon the particular goals and educational philosophy of each university. It is important to recognize that unless the language challenges are addressed directly and boldly, an insidious process may unfold that has the potential to threaten either the quality of the educational experience, the reputation of the program, or the satisfaction of the students. Universities who choose take a "language purist" position may find that they are faced with either a shortfall in student numbers or an uncomfortable gap between the official and unofficial language realities of the programs. Diligence and creativity will be needed, in most cases, to address these problems.

Intellectual Property Rights

Making textbooks, course packages, lecture notes, and other educational materials available to students in virtual programs may inadvertently place students, faculty, and the organizations involved in ambiguous situations regarding intellectual property rights. The ensuing difficulties may be exacerbated by inconsistencies in the laws and traditions of different communities *vis-à-vis* intellectual property rights.

Faculty Compensation Differentials

In order to solve financial problems associated with virtual programs, it may be necessary to apply unequal compensation rates to various faculty, depending upon the source from which they are drawn. However, if the differentials are too great, dissension and poor morale may emerge amongst the financially disadvantaged faculty. It will probably be necessary to carefully structure and continually monitor such differentials in order to sustain a healthy and productive faculty group.

Monitoring and Maintaining Academic Standards

It is important for the primary university to maintain adequate academic supervision of both student performance and the performance of faculty. This may be difficult to do in the virtual environment ... yet it must be done if the university is to maintain the value and good reputation of its degrees. However, the implementation of the university's policies in monitoring and maintaining performance standards must be conducted with great sensitivity in cases where adjunct faculty have been recruited from other universities who consider their academic status to be at least as meritorious as that of the faculty at the primary university.

Academic Scope

It appears that while, in principle, virtual education systems can be employed in any academic field, the vast majority of practical examples tend to fall in to what may be called "professional" or "application" oriented fields, such as finance, or business administration. Examples do exist of virtual education programs in various fields of the arts and sciences (e.g., the Open University or the New School University); however, such programs appear to be

in the minority. The challenges of financing virtual education programs outside of normal funding mechanisms may be one reason for the apparent emphasis on professional-practice subjects, which may be able to attract higher per capita revenues than traditional programs in the arts and sciences. University leaders should determine whether it is strategically important to their educational missions to offer a broad range of academic subjects in the virtual mode or whether the current emphasis on “high-value-added” professional-practice subjects is acceptable ... or even inevitable.

Conclusion: Managing the Virtualization Process

Given that so much of what is going on in university virtualization is centered on the use of new technology, it is important to place the technological dimensions of the process in a normative context.

First, it is imperative that choices of educational mode not be driven by naive and uncritical acceptance of the latest technology. The choice of technologies and the choice of technical systems by universities should be driven by their educational, organizational, and geographic goals, together with a prudent assessment of their business circumstances — not the other way around. It is particularly important that educational considerations be given the strongest weighting in the decision making and design of virtualization strategies.

Second, while early experiments in the virtualization of education were hampered by crude or clumsy technology, I may confidently say that, by the turn of the millennium, some sophisticated and robust technological platforms have finally been produced that make realizing the dream of quality virtual university education possible. In other words, technological systems have been developed that are powerful enough to mediate teacher-student and student-student relationships in a manner that truly competes with the best of conventional face-to-face classroom learning. However, I cannot overstate how important it is to recognize that such technological systems will only work properly as educational media if the right supporting factors, or complementary assets, are put in place. These supporting factors include:

- adequate financing arrangements
- adequate technical support staff
- appropriate organizational systems and routines
- sophisticated training for educators and administrators
- committed and competent program managers
- properly planned integration, or coupling, with the general systems and traditions of the university
- a strategy for managing the evolution of the systems
- enlightened leadership

In the absence of such supporting factors, major investments in the technological virtualization of university education will, at worst, result in embarrassing and costly failures or will, at best, lead to inferior educational experience for students.

Third, university leaders and managers should be aware of the risk that poorly planned, or poorly implemented, programs for technological virtualization may inadvertently be used as a substitute for good education rather than as a vehicle to enhance the educational experience of students. In the most egregious form of this phenomenon, modern information and communication technologies may be used as little more than delivery mechanisms for the digital equivalent of textbooks, while authentic teacher-student or student-peer interactions disappear behind a glossy, yet superficial, façade of Web-based instruction. In its more benign form, poorly planned or poorly implemented technological virtualization may result in otherwise excellent teachers inadvertently shifting their professional balance from being educators towards being *de facto* system administrators. It is important that university leaders and teachers be watchful to ensure that technological virtualization be properly approached as a means of deepening the educational experience of students, rather than as an unintended means for undermining educational standards.

Fourth, and finally, while I insist that innovation in the application of educational technology should be driven by educational considerations, rather than the other way around, I also wish to caution against rigidity in the maintenance of traditional pedagogies. In other words, technological innovation may actually pave the way for valuable modifications to traditional teaching that might not otherwise have been envisioned. Valuable improvements to education may sometimes be gained by modifying teaching methods to accommodate technological advance. While educational principles should always have primacy, management of the technological virtualization of university education should artfully recognize the dual direction of the influence between educational innovation and technological innovation.

ⁱ Betty Collis and Marijk van der Wende, Eds., *The Use of Information and Communication Technology in Higher Education* (Enschede, Netherlands: Center for Higher Education Policy Studies, Universiteit Twente, 1999).

ⁱⁱ W. Earl Sasser, quoted by William C. Symonds in “Giving it the Old Online Try,” *Business Week* (December 3, 2001), 80.

ⁱⁱⁱ The 50 platforms reviewed for this study are: *WebCT, BlackBoard, Learning Space, IntraLearn, Top Class, eCollege, Click2learn ToolBook, Authorware, First Class, Docent, LearnLinc, Virtual-U, SiteScape Forum, Generation 21, Phoenix Pathlore, Saba Learning Enterprise, Knowledgesoft, VCampus, EduSystem, Serf, LUVIT, Mentorware, The Learning Manager, QuestionMark, Eloquent, Trainersoft, WebBoard, Convene.com, Quest, PlaceWare, Embanet, Educator, IVLE, Integrity eLearning, InterWise Millennium, Theorix, Jones e-education, Prometheus, Anlon, Class Act!, Colloquia, Southrock, U4all.com, Yahoo! Education, Centra Symposium, Trivantis Lectora Publisher, MaxIT LearnerWeb, Learning Vista Express, Manager's Edge, and Designer's Edge*. Data source: Center for Curriculum, Transfer & Technology (British Columbia, Canada), *Online Educational Delivery Applications: A Web Tool for Comparative Analysis*, November 2001 (<http://www.ctt.bc.ca/landonline/>).

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