Virtual Universities and the Research-Centered Curriculum

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Introduction

In the United States, as in other parts of the industrial world, the past twenty years have witnessed two parallel trends in higher education. The first is a growing interest in educational or instructional technology (IT); the second is a shift in educational philosophy away from a "transmission" model toward one of "constructing" knowledge, where the student plays an increasingly important role in the learning process. These two trends have occurred simultaneously, and it is natural to think of them as complementary. In his introductory remarks, Professor Tanaka linked the more traditional model of transmission of knowledge to students with what he termed Model P1—educational technology as a complement of the modern university—and collaborative learning with Model P2, a more revolutionary vision of the Virtual University (VU).

But I would like to suggest that in the United States, at least, the pedagogical philosophy that underlies the most advanced experiments in learning in the United States is not always in harmony with the assumptions and demands of instructional technology. Or put another way, instructional technology, and especially distance learning networks, cannot support collaborative learning without a great deal of effort, ingenuity, and expense. When scientists collaborate on research, they generally visit one another's laboratories in person; when they wish to communicate the results of that research, they use internet hookups or give speeches carried live on television. As teaching and research increasingly converge, as they have begun to in the United States, this same division of labor is likely to hold true. Inquiry is promoted by physical proximity of a research group engaged in hands-on experience, while disseminating information gained by inquiry can be effectively handled by media of many kinds.

Models of Learning

Early experiments with instructional technology and distance learning in the United States were extremely well adapted to the most traditional form of teaching: the lecture, communicating information to students much as one might have done a hundred years ago. Transmitting a lecture over large distances requires only a single camera and one-way communication— the "talking head" approach, where an expert tells the viewer what he knows without involving the viewer in any more active participation than note-taking. In this sense IT fits comfortably with the mode of learning that Professor Tanaka has labeled Model 1: "transmission of knowledge to students," in which students receive but do not construct that knowledge themselves.

The most successful uses of IT in the future, on the other hand, will be those that embrance and enhance the parallel developments in our understanding of how students learn. So let me briefly turn to a review of what we think we know about student learning in the United States before returning to the question of whether VU is the future of our universities. The major function of the universities in the United States, as in other industrialized countries, is to pursue the twin goals of fostering research and teaching. In fact, the two activities are closely linked in the model that Johann Fichte and Wilhelm von Humboldt elaborated in Germany around 1800, where both students and professors were expected to participate in advancing the boundaries of knowledge. Humboldt, in the essay that served as the philosophical rationale for

creating a new university in the Prussian capital of Berlin in 1810, contrasted teaching in schools with teaching at the university. School teaching means passing on what it known, he argued, whereas university teaching involves investigating what is not yet known. And that is something that faculty and students can do together.

Learning may mean that the student absorbs the results of others' efforts, the fruits of research, so to speak. Or it may mean that the student participates in research, so that he or she learns not just subject matter, but techniques of inquiry. "Learning how to learn" is now a major goal of higher education in the United States—as it is, in all fairness, at lower levels of education (so-called K-12) as well. As you may know, there exists no national system of education in the United States, and therefore no national system of school funding. As a result, the quality of schooling up until college is generally weak—far weaker than in Japan or in Europe, on average. But this unfortunate fact has one unexpected advantage. Students arrive at university without having to be "deschooled"in the terms of Ivan Illich; that is, they are not burned out, but quite eager to learn.

And increasingly, that learning is done with a mixed regimen of lectures, group discussions, seminars, and research projects. Over the past ten years, Harvard University has invested millions of dollars in its instructional technology and distance learning infrastructure; but at the same time it has invested even more millions in recruiting new faculty. Although it is important to increase the university's research capacity, a major goal is to have every student participate in his or her first year in a research seminar guided by a faculty member.

The term that is most often applied to the cognitive model currently in vogue in the United States is "learner-centered." This corresponds to the Model 2 mode of learning mentioned by Professor Tanaka, where the learner actively constructs, rather than passively accepts, his or her knowledge. Collaboration among learners, and between learners and teachers, turns out to be an extremely potent way to gain what is sometimes termed "deep understanding," as contrasted with the "surface understanding" acquired by memorization. Further, the idea of "situated learning," in which the arena of instruction is no longer the classroom, but the real world (for example, an urban park for a biology class, or a hospital for medical instruction), has also gained currency as the boundaries between what is taught in the classroom and the knowledge one needs to succeed in one's profession are increasingly seen as artificial and inhibiting.

Collaborative Inquiry and Instructional Technology

Collaborative, "learner-centered" inquiry in a variety of contexts is thus emerging as a major goal of teaching at major American research universities. We hope thereby to stimulate student creativity and capacity for group work. Let us now return to the question of how well distance learning and IT support this aim. Early models of instructional technology, influenced by behaviorist psychological theories in the early 1980s, favored individual learning. "Self-paced study" featured appropriate rewards and reinforcement for correct answers and found favor in situations such as elementary language learning, where there was a large amount of memorization. Electronic communication trades access for enrichment. It is difficult to tell a person's tone in e-mail ("I loved your presentation" — is that sincere, or ironic?), but the message can be transmitted in seconds and received thousands of miles away. If one is transmitting certain kinds of information, say stock market prices, this "narrow bandwidth" is not a handicap. All we want to know is whether the price has risen or fallen. Estimating the degree of confidence with which one makes a statement, or measuring emotional affect is of little concern.

But with the increasing emphasis on group learning, the IT focus has shifted and some problems have become apparent with distance learning

networks. When these networks are audio networks only, or when the video network links faculty with groups of learners but does not connect the groups with one another, then group members know relatively little about one another. It is therefore relatively easy for group members to adopt a "persona" that is an idealized conception of self, or that departs from reality in some other way. (Students who exchange messages via e-mail or internet chat rooms often employ the same strategy.) At the same time, students "fill in" the missing information with their own, imagined or projected, ideas of what the other students must be like. A group that has met only online, and then later meets face-to-face, often experiences a difficult transition, as students are forced to reevaluate their initial impressions. In our experience, remote sites equipped with group video systems, rather than audio or simple video, are the ones that best support collaborative learning.

Group work also requires attention to group dynamics. One of the issues that we confront at the Derek Bok Center at Harvard University is uneven group participation. Ideally, all members of a discussion group would participate equally; in reality, many need assistance at first to do so. When students are physically present in a classroom, the sense of collaborating in creating a collective intellectual structure—better understanding Freud's theory of the unconscious, for example, or the possible impact of globalization—is relatively strong. But even then, the discussion leader may have to coax or challenge students to contribute. Online instruction, in our experience, makes it easier for students to "opt out" of the collective learning experience. Students do not receive the same visual cues that they would in one another's presence, and have therefore to be more carefully directed by the teacher. We have found that increased faculty training is unavoidable if we want discussions to work well over a network, and even then the rate of participation falls below that of face-to-face classes.

It is commonly accepted that distance learning, even with the most sophisticated electronics currently available, provides a less "rich" environment for learning than does the traditional classroom. One solution to this relative impoverishment is enhanced visual design. Instructors can switch between live video, for example, and visual support materials—maps, graphs, or streaming video clips. They can also annotate computer graphics, just as one might annotate an overhead projection in a traditional lecture. Another option is to provide materials at the remote site that learners can handle themselves—handouts of various kinds that may stimulate discussion or provide an overview of a crucial concept. But since the main vehicle of instruction is neither the lecture nor the visual components, but rather the group experience, there are limits to how well supplemental materials can offset the restrictions on group interaction imposed by distance learning.

Interaction remains the most powerful way to engage American students in the learning process. And interaction with a live instructor, face-to-face, is still the preferred way to accomplish this at Harvard. A study by Professor Richard Light from our Faculty of Education concluded that a personal exchange on a topic of common intellectual interest was the single most positive element in undergraduate education at Harvard. Attempting to replicate the conditions of group research, where students and faculty interact and exchange ideas, is certainly possible. But the requirements that networking maintain student interaction, and that enhanced visual design make up for the absence of other inputs,

It is now a truism that the 21st century will see an increased need for continuous learning. The question we are asking in the United States is, what form of instruction best promotes the skills required for such continuous or lifelong learning? The answer—and this would not have surprised Wilhelm von Humboldt—seems to be research. Collaborative problem-solving efforts in class under the guidance of

an instructor both hold student interest better than traditional forms of "transmission" teaching (the mode of learning offered by Professor Tanaka as Model 1) and enable students to continue learning more readily once they have graduated and received their degrees. Clearly the level of research cannot compare with that undertaken by "real" academic specialists. The world has moved on in the two centuries since Fichte and von Humboldt dreamed of collaboration between students and faculty on the frontiers of knowledge. Our students are not, for the most part, discovering knowledge that is new. But it is new for them. And how they discover it—inductively rather than by transmission alone—turns out to be as important as what they discover. Process, as we sometimes say in English, here turns out to be as important as product.

Conclusion

So to return to the provocative question posed by Professor Tanaka in his introductory remarks. Is VU the future of our universities? My short answer would be: no, certainly not the most important part. My more extended answer would be that the Model 2 mode of learning put forward by Professor Tanaka—students participating in the creation of knowledge and in collaborative group learning—is definitely the future of our universities. But to link this mode of learning too closely with the internet would be an error. The internet is a tool, not an outcome; a means, not an end. In this sense I believe that Model P1—networked learning as a complement of the modern university—belongs with Model 2 just as much as with Model 1.

Put another way, there is no need to use the internet alone to accomplish collaborative group learning. In many ways it hinders as much as it enhances group research by reducing the inputs from the participants. Therefore, distance learning networks, at least in the United States, are most successful where they allow universities to do what they otherwise could not do: offer instruction to students who are far from campus, for example, or bringing two classes in different universities together for a common project. Since there is a strong tradition of residential education in the United States, the substitution of distance learning networks for residence is often resisted, and I believe on good grounds. There is simply no reason to make a distance learning network the primary vehicle for collaborative group learning when the group can assemble in a single place. The fact that these two developments—the growth of instructional technology and the move toward active or research-based learning—have occurred simultaneously turns out to be a historical fact, but not a logical necessity. We should consider them as potential partners, but not as inseparable. After all, when the University of Berlin was founded in 1810, it was possible to conceive of *Wissenschaft* without the internet.