

Project Report to the Atlantic Philanthropies

Education in the Digital Age: Leadership, Linkages, and Roadmaps

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Executive Summary

During the past six months we have continued our efforts to build and work with new leadership networks at the university, state, national, and international level, including a new Digital Strategy Council within the University of Michigan (exploring open source strategies with several other universities); an organization of liberal arts colleges; coordinating groups such as AAU, NASULGC, and NSF at the national level (in close coordination with the National Academies project); and through the Glion Colloquium of university leaders in Europe and the United States. In addition, through recent publications and extensive involvement in workshops and presentations, we are communicating the early results of our efforts.

We are now turning to the final phase of the project aimed at developing strategies for regional learning infrastructures based on digital technologies. Here we have decided to apply the technology roadmapping process developed in the electronics industry and used with success by major federal agencies such as DOE and NASA. More specifically, the aim is to develop a technology roadmap that addresses the life-long educational needs of citizens and workforce skills necessary for a region to flourish in a global knowledge economy.

Narrative

To summarize the purpose of the project: we are exploring the impact of information technology on higher education by launching a series of regional experiments to build networks among various types of educational institutions, developing supporting resources, and constructing a process aimed at developing technology roadmaps. The first 18 months of the project have been aimed at building the necessary knowledge networks, developing various supporting materials (including two books) to support these conversations, and communicating the early results of the project to other constituencies at the national and international level.

We are now launching the third stage of the effort by implementing the process of technology roadmapping to produce a plan for regional actions. Although this roadmapping effort is focused on the Midwestern United States (and more specifically, the state of Michigan), we believe that both the process and the roadmapping template will be of considerable interest and utility to other regions and perhaps nations.

Leadership Linkage Groups

During the past six months we have intensified our interactions with the presidents of Michigan's liberal arts colleges, building strong interactions both among these institutions and with the University of Michigan in several key areas: 1) using the resources of the research university to enhance the ability of liberal arts colleges to acquire, manage, and utilize information technology, particularly in instructional and administrative areas; 2) creating a collaborative of library directors exploring the uses of technology to share resources, with a particular focus on electronic media; 3) developing new technology based joint curricular efforts in both undergraduate and graduate education.

After some preliminary work, we have concluded that the diversity of regional public institutions makes a similar state-based regional collaborative awkward. Hence we have limited our interactions to selected institutions aimed primarily at providing input for our technology roadmapping effort. In a similar

spirit we are interacting with the leadership of Michigan's community college organization rather than building a separate collaborative.

Within the University, the provost has been willing to lead a major series of workshops to explore future technology strategies very much along the lines of those outlined in our earlier reports. In particular, the University has formed a Digital Strategy Council focusing on the implications of digital technology for communication, collaboration, and communities, with the first major outcome being a new consortium involving Michigan, MIT, Indiana, Stanford, and uPortal in building a new open source technology platform for higher education. Over the longer term, the University is exploring a bolder concept of an "open source university", representing a major extrapolation of MIT's OpenCourseware initiative.

At the national level, our regional efforts have been closely coordinated with the Atlantic Philanthropies sponsored project at the National Academies. However we have taken on additional responsibilities at Michigan for propagating our studies to the national level, the first of these being our response to an NSF request to arrange a major tutorial on digital technology and learning for the leadership of the Foundation (to be held later this month).

We have also had some opportunities for exploring similar networks at the international level. In July, we participated in a major workshop in Switzerland consisting of university leaders from the United States and Europe sharing their perspectives of the future of the research university, in which technology issues played a major role. I co-chaired this workshop (and will co-edit a resulting book to be published next spring) and have been asked to co-chair a series of similar workshops in the years ahead. We have also continued our interactions with Canadian universities, and I have been asked to brief the provosts of the Canadian research universities in November. Finally, working closely with Daniel Atkins, we are exploring the implications of our work along with that of the NSF Cyberinfrastructure study for forming global higher education collaboratives (including the possibility of a "world university" based on digital technology).

Knowledge Resources

The recent publication of our book, *Higher Education in the Digital Age: Technology Issues and Strategies for American Colleges and Universities*, as well as the release of the National Academies report, *Preparing for the Revolution: Information Technology and the Future of the Research University*, have provided useful resources for our efforts. Over 400 copies of the first publication and several thousand of the latter have been sent to university leaders throughout the nation and abroad. The book containing the papers from the Swiss conference mentioned above will provide additional useful materials.

In addition, during the past six months I have been involved in numerous presentations and workshops based on our project both at a number of universities (e.g., University of Southern California, Ohio State University, University of North Carolina, Texas A&M University, the University of Texas, Carnegie Mellon University, the University of Missouri, the University of California) as well as major national meetings (the Society of College and University Planners, The Midwest Colleges Association, the National Association of State Universities and Land Grant Colleges, the Association of American Universities, the University Consortium on Atmospheric Research, the national Science Foundation).

Roadmapping

The final phase of this project involves developing a regional plan to address the challenges and opportunities provided by digital technology. More specifically, we proposed the development of a planning process aimed at crafting a vision for a future technology-based learning environment, developing a plan to move toward this vision, building the necessary leadership networks linking the public and private sectors to execute the plan, and identifying and articulating the key public policies and necessary public and private investments to achieve this objective. Although this planning effort was intended to be focused on the State of Michigan as a specific case, the process would be

developed in such a way that it could be propagated to other states and regional areas.

In approaching this phase of the project, we have decided to implement the process of *technology roadmapping*, familiar from the electronics industry and major federal agencies such as the Department of Energy and NASA. This process proceeds through four steps: 1) a needs assessment, 2) a mapping of existing resources, 3) a identification and analysis of resource gaps, 4) the development of a roadmap to eliminate the gaps and address the needs. The key to roadmapping is to make extensive use of a wide array of inputs from experts in various areas related to the project.

The focus of our technology roadmapping effort will be to develop a roadmap for building a regional learning ecology based on digital technology, that is, a learning environment (primarily concerned with higher education but linked to other elements of the learning enterprise) that is both adaptive and evolutionary in nature. More specifically, we have launched a process to develop a plan for a learning infrastructure for a regional area such as the State of Michigan that meets both the life-long educational needs of its citizens and the workforce skills necessary to flourish in a global knowledge economy.

We have begun the needs assessment effort, drawing both on our existing leadership networks and various experts, to determine those skills and knowledge that a 21st Century citizen will need (and a 21st Century workforce will require). Here we have set aside the constraints imposed by existing educational systems (schools, colleges, workplace training) and policies (state, federal, private sector) and instead adopted a blank slate approach. Some of the key themes in this phase are to approach learning as a seamless web of lifelong opportunities, coordinating existing institutions with new resources, linking communities to learning, taking advantage of new technologies such as knowledge networks, and assuming that any plan will involve public-private partnerships and financing.

The resource mapping effort will assess not only conventional resources such as K-12 educational systems, colleges and universities, and workplace training but also informal learning through libraries, museums, and other cultural resources and community organizations such as 4-H, scouting, and

extracurricular activities. It will assess as well existing public policies and both public and private investments.

The gap analysis is aimed at identifying missing resources necessary to achieve the vision for a 21st Century education, including the need for new types of institutions, providers, resources (e.g., “teachers”), policies, investments, and, perhaps most important, a new culture of learning.

The final phase will involve the development of a roadmap to build a learning infrastructure (heavily technology dependent) capable of responding to the identified needs. This will include suggested policies and necessary investments. We see this roadmap effort as targeted at key leaders of the public and private sectors, including the governor, the leaders of existing educational institutions and organizations, the heads of nonprofit foundations, and the leaders of business and industry in the region.

It is our goal to complete the first draft of such a roadmap by next summer. The next phase of assessment will focus heavily on both the process and the outcomes of this roadmapping exercise.

Summary

In summary, we believe that we have made good progress in the first two elements of the project: building leadership networks and developing the supporting knowledge resources and communications efforts. We are now moving into the next phase of technology roadmapping, drawing heavily on our earlier efforts, with the aim of developing both a process and a template that can be used to address the challenges and opportunities of the digital age by states, regional areas, and perhaps nations.