

# Share and Share Alike: The E-Knowledge Transformation Comes to Campus

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Every year, as summer turns to fall, thousands of faculty members across the United States will think about preparing a first-year calculus class. Thousands more will do the same for English literature. And most of them will not share their work. During the next year, tens of thousands of quiz questions will be written for introductory biology. Hundreds of Web sites will be developed for use by sociology classes. And virtually no questions and no Web sites will be shared. Those faculty members who do share their work typically find that they receive little or no official recognition or credit and retain little or no control over how their work gets used.

By contrast, tomorrow, about 240 Associated Press bureaus will produce over 25,000 pages of news copy. And all of it will be shared, with the author/source receiving due credit in each case. Similar sharing will occur in large corporations, government agencies, professional societies, and leading-edge organizations that are practicing an “enter once, use anywhere” approach to knowledge management. *What is the difference in higher education, why is the difference important, and what is being done about it?*

## Penetrating Information and Knowledge Silos

Information is often defined as *data* that is organized or placed in *context*. Similarly, knowledge can be defined as *information* connected or organized by *rules*, meaning the rules by which information can be understood and applied. Whereas sharing data is easy, sharing context and rules is much harder.

This difficulty has led to compartmentalization and departmentalization of information and knowledge. It works against sharing in areas where the contextual content of information is high, including almost all academic areas. Understanding a statement such as “Today’s high temperature in New York City is predicted to be 45 degrees Fahrenheit (7 Celsius)” is based on a more commonly held level of shared meaning and shared knowledge than is required for making sense of a calculus text, or a biology quiz, or a social-psychology research paper. The hurdles to sharing knowledge in academe are pervasive and significant. They start with the investment of time and effort required to gain

subject-matter expertise and include the lack of adequate recognition given for sharing efforts. Yet higher education cannot afford *not* to share. Campuses must make that commitment to get the payback.

In the research domain, the boundaries between academic disciplines are increasingly blurred, and growing numbers of investigations are being carried out by larger and more geographically distributed teams. Knowledge sharing is the *sine qua non* of collaborative research. If the results of such research are to be applied, they must be captured and disseminated in ways that facilitate their discovery by the people who are in the best position or have the greatest need to apply them.

The educational domain is often engaged in a massive and senseless duplication of effort. The gains resulting from saving an hour a week by sharing educational material are huge. There are more than 500,000 full-time instructional faculty members in the United States (and more than 400,000 part-time faculty members). If we assume an average salary equivalent to \$60,000 (all ranks, all institutions, according to data taken from the *Chronicle of Higher Education*) per year (2,000 hours), one hour of faculty time is worth \$30. One hour per faculty member per week, for 30 weeks per year, equates to over \$800 million dollars per year ( $900,000 \times 30 \times \$30$ ) in the United States alone. Yet cost is not the real issue: forgone opportunity is. Just think of the added educational value that could be derived if every faculty member in the nation could spend one more hour per week working with a student or bringing a unique perspective to a class instead of re-creating existing teaching materials.

The concept is simple. Suppose all of the knowledge content and context currently embedded in texts, course materials and notes, insights on workplace application, and other proprietary knowledge silos could be digitized, tagged, and arrayed in digital marketplaces where it could be stored, repurposed, combined, metered, and exchanged, with due credit given. Suppose vertical knowledge silos could be penetrated by horizontal marketplaces that enable content and context to be shared, combined, and used by current faculty and learners and by new users. What would that world be like?

## **Paths to Knowledge Transformation**

This future world is portrayed in the book *Transforming e-Knowledge*.<sup>1</sup> The book is an effort to understand what tomorrow's knowledge-centric enterprises will look like and how organizations can get there from here. The idea is not just about "enter once, use anywhere." It is also about achieving a quantum leap in the capacity of individuals and organizations to acquire, assimilate, and share knowledge and its creation. Even the manner in which we *experience* knowledge is changing in the wake of the digital revolution and the technologies that are in development or already in use. By the year 2010, individuals and organizations

harnessing these capabilities will likely also have succeeded in using their knowledge-sharing skills to establish important competitive advantages.

The transformation in how we experience knowledge will have substantial impacts on the processes of learning. The patterns and cadences of interactivity among faculty members, learners, instructional-development staff, knowledge-management staff, and expert practitioners will assume new forms. As the ability to generate just-in-time knowledge becomes more prevalent, the reliance on “canned,” static knowledge will decline. Pervasive, perpetual learning, richly supported by knowledge management, will become the new gold standard for many learner experiences.

If there is such a great incentive to share knowledge and transform learning, why aren't educational and research institutions doing so everywhere? Organizationally, the mainstream answer is that we're not ready. And at least three major drivers of change have to evolve further before transformative knowledge sharing is possible:

1. The capacity of the global information/knowledge networks must continue to expand. This includes new technologies, interoperability standards, and the development of e-knowledge repositories and marketplaces.
2. Educational and research institutions – indeed, all organizations that produce and process knowledge – must develop their enterprise technology infrastructures and their processes for digitizing, atomizing, interacting with, and recombining knowledge to the point that the processes become automated, routine, and substantially less expensive per unit of content. Moreover, they need to change and develop their knowledge cultures and the capabilities of individuals and organizational teams.
3. Best practices, business models, and strategies for knowledge must continue to be reinvented. Higher education, associations, corporations, and public organizations are in the throes of this process now. Sharing digital knowledge may be only in the proof-of-concept phase, but even today, innovators are evolving new practices that will change strategies and business models for knowledge sharing and e-learning. Over the next few years, these new models and strategies will proliferate, stimulating further, continuous innovation.

These three drivers of change are creating interconnected spirals of innovation. These innovations are driving wedges into the existing model and culture of individualistic and proprietary knowledge silos. Over time, the results will be transformative.

## **E-Learning, Standards, and the Open Knowledge Initiative**

In 1997, the Educom (now EDUCAUSE) National Learning Infrastructure Initiative (NLII) spawned the IMS Global Learning Consortium (IMS). The goal of IMS has been to enable technology components to successfully and easily share information, and its approach has been to develop specifications for encoding information in ways that can be mutually understood by cooperating technology systems.

Notice that we said “information,” not just data. In fact, the specifications developed by IMS, as well as those developed by other organizations, have as much to do with context as they do with data. The Learning Object Metadata (LOM) standard, now a standard of the Institute of Electrical and Electronics Engineers (IEEE), is designed to enable the versatile application of “learning objects” in a range of contexts, which may be digital or non-digital. The Advanced Distributed Learning Initiative’s Sharable Content Object Reference Model (SCORM), based in part on IMS work and also being standardized by the IEEE Learning Technology Standards Committee, is designed to allow digital resources to be exchanged among cooperating systems in ways that allow the systems and the content to exchange information about the learner and eventually to adapt the delivery to the context of the learner.

The Open Knowledge Initiative (OKI) is addressing a different part of the problem: that of sharing technological innovations as well as learning content itself. OKI is creating standardized architecture and technical interfaces among educational and other components of an academic technology-enabled environment, with the goal of greatly reducing the cost of developing and increasing the ease of sharing everything from open-source learning management systems to specialized domain-specific educational technologies. OKI is the precursor of even greater efforts to leverage, share, and experience knowledge resources in ways that have never before been possible.

And knowledge management is playing a greater role in e-learning than ever before. Indeed, e-knowledge is all about the *fusion* of e-learning and knowledge management into a new discipline for supporting the pervasive, perpetual utilization of knowledge.

### **Bringing E-Knowledge to Campus**

The frontlines in the efforts to transform e-knowledge are forming in organizations across the globe. To support these efforts, *Transforming e-Knowledge* includes a section titled “10 Ways to Accelerate Your Readiness for e-Knowledge,” a full set of initiatives for developing infrastructures, processes, capacities, and cultures for e-knowledge.<sup>2</sup> To illuminate the potential for advancing e-knowledge on campus, let’s focus on a particular challenge:

developing the capacity to create and utilize institutional knowledge repositories. Action that needs to be taken in two areas: digital asset management and standards:

- *Digital Asset Management.* Digital asset management technology supports repositories of knowledge objects and associated metadata, together with context-based search and discovery. At the University of Southern Queensland, the use of digital asset management is changing the behaviors of students and faculty and the institutional culture relating to knowledge sharing and reuse; importantly, these advances focus on students' needs and their abilities to harness the technology. Educators are reusing and repurposing existing learning content, and communities of reflective practice are sharing knowledge and building knowledge bases. Educators and students alike are demonstrating that the value of knowledge increases as it is shared, and they are undergoing the transformation from "it's all mine" to "it's all been captured and contextualized and is available to anyone who has a need for it, including me."
- *Standards.* Academia is an ecosystem of diverse technologies. If these technologies do not interoperate, knowledge exposed by one cannot be of use to another. This is why standards are essential. For example, the eUniversity in the United Kingdom, funded with hundreds of millions of dollars, is building capacity by allowing universities to both contribute course content and deliver courses. What makes this plan work with a broad range of participants is that both the content and the delivery systems must adhere to standards. And the eUniversity is not alone. Large government-education partnerships in the European Union, Canada, and Australia are relying on standards and standards-based products to create distributed yet interoperable learning content repositories.

### **Sharing Control: A New Look at Digital Rights Management**

To effectively exchange content and knowledge, higher education must come to grips with digital rights and the extended lifecycles of intellectual property in the digital world. Attempts to put large quantities of educational or scholarly literature online all run into the inadequacies of existing print-world rights-management approaches.

These inadequacies are in part due to the nature of digital content. Digital content can be divided and shared without losing substance or utility. This is wonderful for dissemination but terrible for control. Once a digital object has been copied, controlling what the new custodian does with it is exceedingly

difficult. Very few communities favor a world in which creative works are made once and distributed arbitrarily – often with no remuneration, no attribution, and no restriction as to their use.

This situation has spawned a need for *digital rights management*, or DRM – the management of rights through digital or technological means. DRM attempts to restore control of the use of an object to the creator, distributor, or holder of the rights to that object. To date, however, DRM has primarily been concerned with *enforcing* copyrights and licenses when a user attempts to view, print, modify, or distribute a digital object. Commercial products such as Adobe Acrobat or Microsoft Office allow authors to protect documents so that a password is required to perform any of these actions. File systems, course management systems, portals, and other technologies require users to authenticate and grant or deny access to a document based on the user's role.

These forms of DRM allow multimedia publishers, software distributors, and other commercial entities to maintain a business model based on individual or site licenses. They also allow institutions to conform to legislation such as the Technology, Education, And Copyright Harmonization Act (TEACH Act). They are, however, arguably inappropriate for a networked world.

Digital libraries, institutional repositories, and the Internet grant access to knowledge with no advance indication of who might use it or how it might be used. Content does not have a single manufacturer – it is aggregated and transformed as it is downloaded, modified for new contexts, and redistributed. Conditions of use extend beyond physical acts like viewing, printing, and copying; attribution is important, and so are other professional ethics, such as not quoting material out of context.

The current popular view of DRM is based on a view of digital content as a physical, consumable object. A more appropriate view is that of digital content as a dynamic, shared quantity and of rights themselves as dynamic, shared quantities. Is this view possible to implement? In fact, yes. The commercial world is producing DRM technology that allows *persistent* rights management, whereby rights travel with – and change with – content as it moves among systems and is processed in different ways. In higher education, these technologies are being explored in experiments such as the COLIS (Collaborative Online Learning and Information Systems) project in Australia.<sup>3</sup>

Emerging DRM technology is based on two parts: *expressing rights* and *enforcing rights*. Enforceable rights are still very much in the range of physical actions (open, print, forward) and do not address matters such as proper attribution (aspects that can be covered, for example, by using an appropriate Creative Commons license). But many rights in higher education are enforced by social and professional conventions anyway. It is now time to deal with the first part of emerging DRM technology: to endow digital content with the ability to express rights, digital repositories with the ability to read and edit such expressions, and end-user software with the ability to display the rights. Doing

so will not be simple, but neither is it impossible, and it is an important first step in moving toward a networked world of shared knowledge.

## Conclusion

Leading-edge institutions worldwide are transforming themselves from knowledge silos to communities of knowledge sharing. They are doing so through technology and through cultural change. The educational world has the opportunity – and indeed the imperative – to play a leadership role in the rapidly emerging e-knowledge transformation. Those educators who answer the call will gain a competitive advantage for themselves and their institutions by following the motto of “share and share alike.”

## Notes

1. Donald Norris, Jon Mason, and Paul Lefrere, *Transforming e-Knowledge: A Revolution in the Sharing of Knowledge* (Ann Arbor, Mich.: Society for College and University Planning, 2003). See <http://www.transformingeknowledge.info/>.
2. Ibid., 141-50.
3. For information on COLIS, see <http://www.colis.mq.edu.au/>

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