Research Study on a Knowledge Exchange Network for Exemplary Teaching in Ontario Higher Education

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Online discussion of this report:
http://knowledgexchangenetwork.edublogs.org

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Executive Summary

This research study explores the concept of a *Knowledge Exchange Network for Exemplary Teaching* to support the Higher Education Quality Council of Ontario in its objective to "identify and promote exemplary teaching practices". We use the term *Knowledge Exchange Network* for the technical and social infrastructures emerging in Ontario and elsewhere to enable communities of higher education teachers to access, share, extend, and mobilize online knowledge representations and resources to enhance teaching and learning. These evolving tools and support structures use the power of the Internet, including access to resource repositories and Web 2.0 collaborations, to extend the impact of our exemplary teachers and to engage faculty with world-class knowledge about their students' learning processes outcomes (and are beginning to address how to document and demonstrate processes and outcomes for assurance of learning quality).

How *Knowledge Exchange Networks* Can Support Exemplary Teaching Practices: the first section describes the current online artifacts and community infrastructures which mediate knowledge exchange to identify and promote exemplary teaching:

> ➢ Reflections by individual faculty on their experiences and directions as teachers;

> ➢ scholarly work to document and demonstrate pedagogical content knowledge for teaching in a discipline area;

> ➢ collections of learning resources and associated teaching expertise;

> ➢ collaborative work by project teams addressing teaching issues across institutions;

> ➢ shared resources for developing teaching capability; and

> ➢ resource and community networks supported by provincial, state, and national agencies to enhance teaching practice and the quality of student learning.

These examples illustrate what "could" happen if the success factors in these current models and the future directions in the supporting research are enabled in Ontario.

Our second section presents an **Analysis and Lessons Learned from Current Models and Related Research,** including chapters on studies of existing repositories of shared digital learning resources, the role and importance of communities of teaching practice and supporting services in *Knowledge Exchange Networks,* and usage scenarios which can aid our understanding of strategies to foster *Knowledge Exchange Networks* and mobilize knowledge for exemplary teaching. A key consideration in the usage scenarios is the provision of services to meet the differing needs of regular interactions amongst expert teachers, short-term use by collaborative project teams, and periodic use in response to specific instructional problems or institutional and departmental priorities.

The final section of the report, **Moving Forward in Ontario,** summarizes many of the outcomes of this research study as a set of Principles for *Knowledge Exchange Network* services, and a set of recommendations for next steps, including the following:

> ➢ a consultative process to map ways to more effectively *Share what we have now*;
> ➢ appointment of a cohort of faculty as discipline catalysts to *Identify external resources* and *Plan more dynamic knowledge exchange* for exemplary teaching;
>
> ➢ a set of pilot studies to *Test new collaborations for knowledge-building;* and
>
> ➢ continued efforts to *Explore national and international linkages.*

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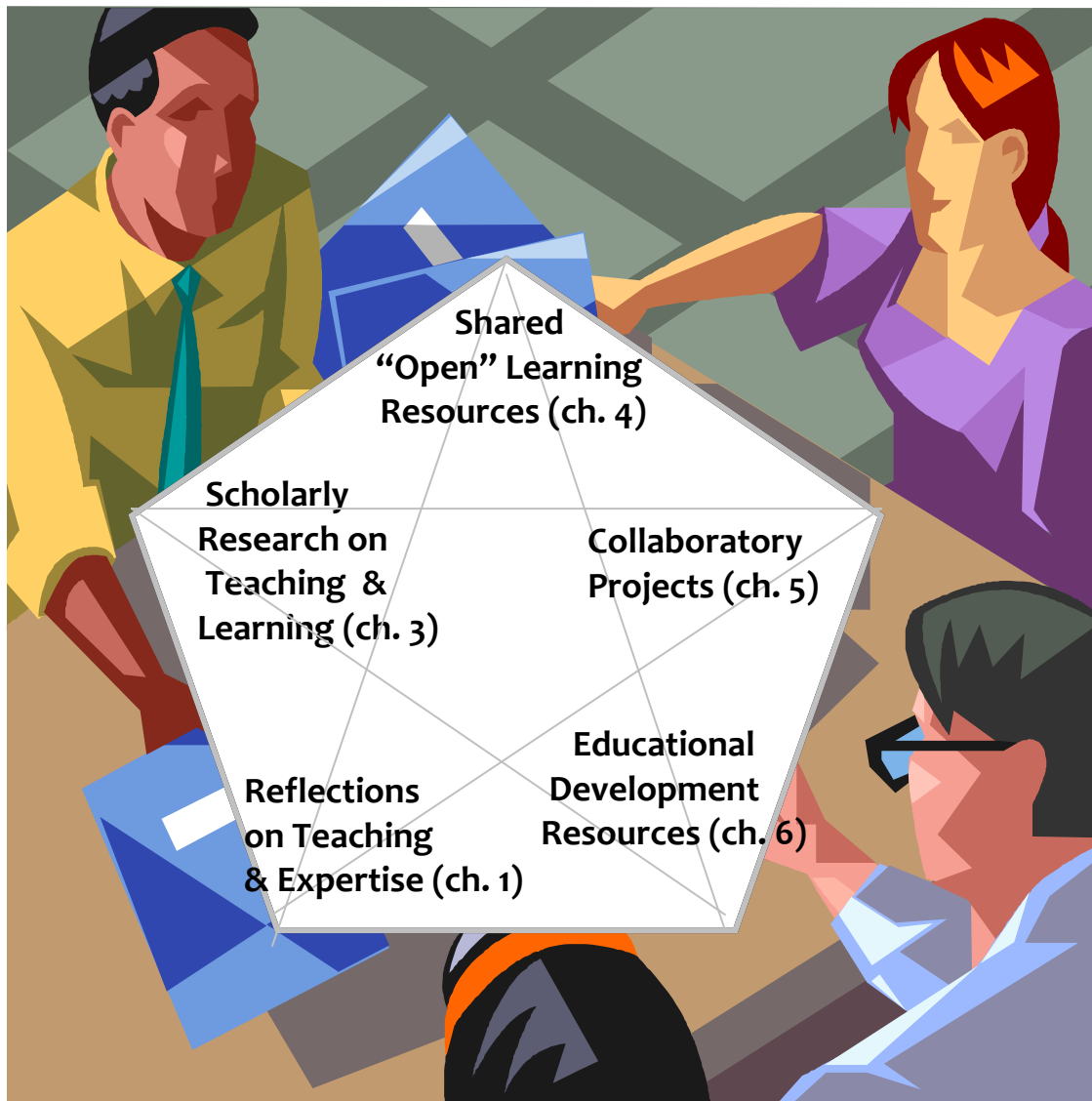
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Research Overview

Post for public consultation: knowledgexchangenetwork.edublogs.org

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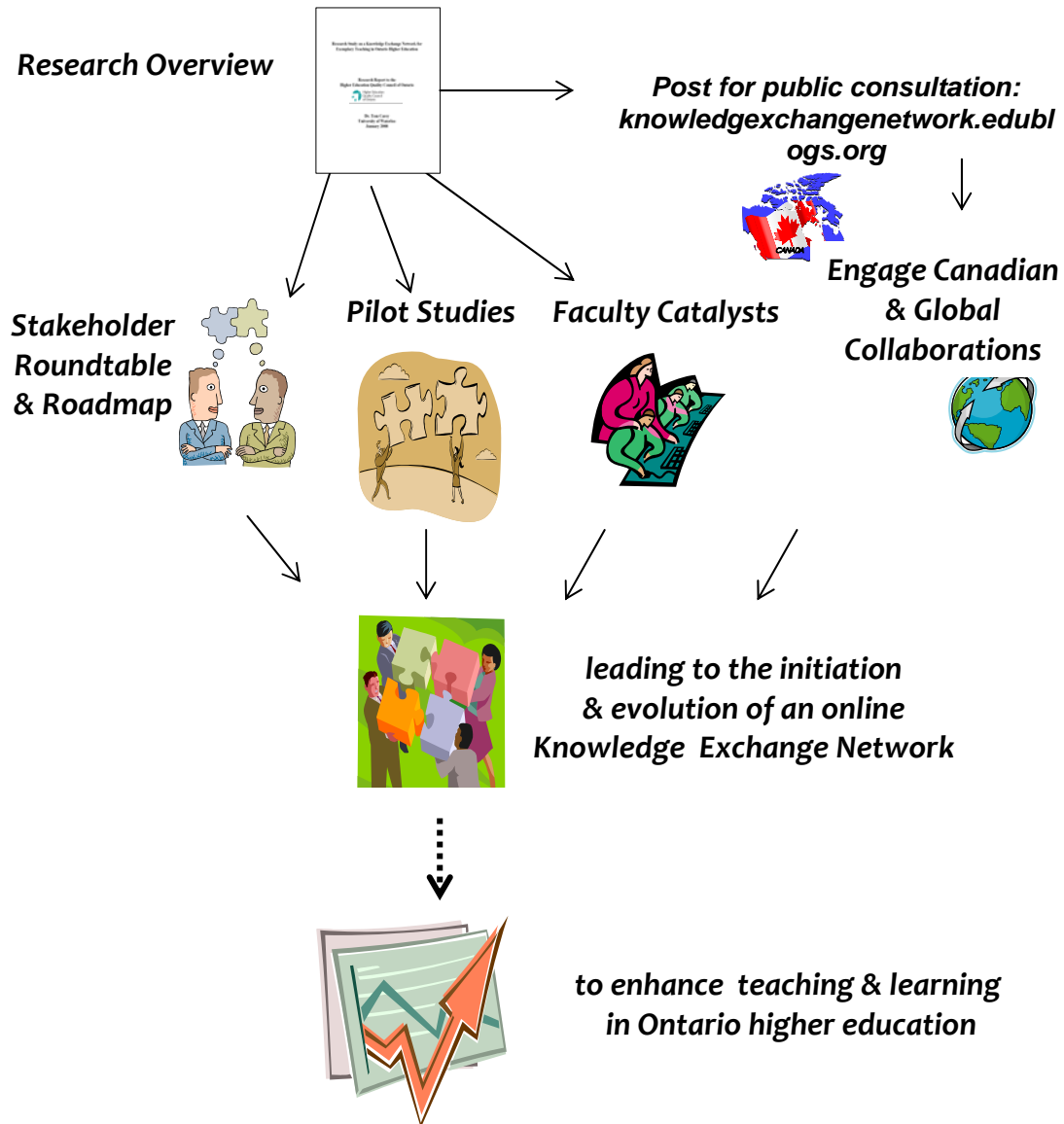
Introduction

The goal of this research study is to investigate how a *Knowledge Exchange Network for Exemplary Teaching* (KNEET) could support the Higher Education Quality Council of Ontario (HEQCO) in its objective to "identify and promote exemplary teaching practices".

Knowledge exchange is a process that has been described as "the push and pull found in the multiple directional movement of data, information, and knowledge between individuals and groups for mutual benefit…The roles of producer and user of knowledge are interchangeable" (Levesque, 2005).

We use the term *Knowledge Exchange Network* for the technical and social infrastructures emerging in Ontario and elsewhere to enable communities of higher education teachers to access, share, extend, and apply online knowledge representations and resources for enhanced teaching and learning*. These evolving tools and support structures use the power of the Internet, including access to federated repositories and Web 2.0 collaboration facilities, to extend the impact of our exemplary teachers, and to engage faculty with world-class knowledge about their students' learning processes and learning outcomes (and are beginning to address how to document and demonstrate these processes and outcomes to provide assurance of learning quality).

A *Knowledge Exchange Network* is one way to support the larger movement toward a *Teaching Commons*, a place for free exchange of knowledge, expertise and wisdom about teaching and learning. As the text box on p. 9 notes, the academic community has traditionally not embraced teaching as community property in the same way as research.

The conclusions of this research study will reinforce the assessment that "the teaching commons is growing in size, diversity, and momentum….(our) immediate challenge is to strengthen and enlarge the commons that is now taking shape, to make teaching…*a subject of community engagement within the academy"* (Huber & Hutchings, 2005).

Relative to the HEQCO objective to 'identify and promote exemplary teaching practices', this research study explored how a *Knowledge Exchange Network* for exemplary teaching can be a catalyst for higher education in Ontario to be a leader in identifying, promoting, and applying exemplary teaching practices. We will demonstrate emerging practices and tools which could enable Ontario communities of teaching practice to engage with one another and with pre-eminent knowledge communities around the world to mobilize, share, and develop world-leading teaching expertise and learning resources. This will involve three complementary faculty roles: a core group with an ongoing engagement in <u>knowledge exchange</u>, a second group of faculty who participate in response to particular collaboration projects for <u>knowledge building</u>,

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* This definition treats the communities as separate from the Network, and restricts the scope of the latter to the online platforms and their support structures. This definition acknowledges that these communities have other ways to potentially engage with each other, in contrast to Platform-Mediated Networks (Eisenmann, 2007) where the network participants rely on the online platform for their interactions.

and a third group who participate occasionally in <u>knowledge mobilization</u> in response to either their individual needs as instructors or to institutional priorities in teaching and learning.

We assume throughout that our intention in Ontario is to measure our teaching and learning against exemplary practice at a global level, not just common practice in our own institutions or within the province. This emphasis on global excellence in mobilizing knowledge for teaching and learning is consistent with our aims to develop an Ontario workforce that will excel in a global knowledge economy, and to support economic and social development in Ontario by mobilizing and developing leading-edge knowledge.

This research report has three main Parts. In Part I, Chapters 2 through 7 explore **How *Knowledge Exchange Networks* Can Support Exemplary Teaching Practices,** by describing the following elements which are merging into a new generation of online *Knowledge Exchange Networks* for exemplary teaching:

> ➢ reflections by individual faculty on their experiences and directions as teachers;

> ➢ scholarly work to document and demonstrate pedagogical content knowledge for teaching in a discipline area;

> ➢ collections of learning resources and associated teaching expertise;

> ➢ collaborative work by project teams addressing teaching issues across institutions;

> ➢ shared resources for developing teaching capability; and

> ➢ resource and community networks supported by provincial, state, and national agencies to enhance teaching practice and the quality of student learning.

These examples illustrate what "could" happen if the success factors in these current models and the future directions in the supporting research are enabled in Ontario.

In Part II of the report, Chapters 8 through 10 present **Analysis and Lessons Learned from Current Models and Related Research,** including chapters on the following:

> ➢ The available studies on existing repositories of shared digital learning resources;

Collaborative research studies of the design and evaluation of learning environments, among cognitive and developmental psychologists and educators, are yielding new knowledge about the nature of learning and teaching as it takes place in a variety of settings.

In addition to these "insights from research", we are discovering ways to learn from the "wisdom of practice" that comes from successful teachers who can share their expertise.

Emerging technologies are leading to the development of many new opportunities to guide and enhance learning that were unimagined even a few years ago.

> *How People Learn: Brain, Mind, Experience, and School,* John D. Bransford, Ann L. Brown, and Rodney R. Cocking, Editors; Committee on Developments in the Science of Learning, National Research Council (U.S.), 1999.

- the importance of communities of teaching practice and supporting services in *Knowledge Exchange Networks*; and

- usage scenarios which can aid our understanding of strategies to foster *Knowledge Exchange Networks* and mobilize knowledge for exemplary teaching.

Finally, Part III of the report addresses **Moving Forward in Ontario,** including summarizing the outcomes of this research study as a set of Principles for Knowledge Exchange Network services, and recommendations for next steps:

- a consultative process to more effectively *Share what we have now*;

- a cohort of expert teachers as catalysts to *Identify external resources* and *Enhance knowledge exchange* in their disciplines;

- a set of pilot studies to *Test new collaborations for knowledge-building;* and

- continued efforts to *Explore national and international partnerships.*

I. How *Knowledge Exchange Networks* Could Support Exemplary Teaching Practices

1. "The Wisdom of Practice": Reports and Reflections on Teaching

The text box on the previous page quoted from the influential report of the National Academy of Sciences in the U.S. on *How People Learn*, intended to bridge between research on teaching and expert practice. Most instructors in higher education have learned about teaching from the "wisdom of practice", both from their own experience and from the expertise of their colleagues. This emphasis on learning from experience and expert practice continues even in structured programs to prepare higher education teachers more thoroughly, such as the one at Oxford University profiled in the text box on this page. Research studies of "How Faculty Learn" confirm the importance of local knowledge exchange within a community of teaching practice, and of local institutional support to identify and promote exemplary teaching practices, and to accelerate their adoption. For example, a study of faculty beginning to use online technologies to support student learning (Armstrong, 2001) came to the following conclusions:

> *While individual faculty members use different strategies and resources to learn, the institutional context plays a key role in facilitating what methods and assistance are used. Their institution (local learning environment) is primarily responsible for providing the resources–assistants (people), indirect or non-human resources and materials–which provide the channels by which faculty members locate, find and use human and non-human resources as sources of information and support. Almost all participants (faculty members) in this study turned to assistants (people) to facilitate their learning. In addition, participants also overwhelmingly preferred to use people as their main resource.*

In addition to their local communities of teaching practice, many faculty members identify strongly with a disciplinary community and learn from exemplary teachers in their discipline – most commonly by reusing or adapting teaching and learning activities accessed through textbooks or other resources. Measuring our teaching against exemplary practice in this larger community can provide more opportunities to identify and promote enhancements to teaching and to the quality of student learning.

A *Knowledge Exchange Network* can leverage the expertise of our exemplary teachers. A

Preparation for Learning and Teaching at Oxford …addresses the needs of graduates who teach, and the Postgraduate Diploma in Learning and Teaching in Higher Education is aimed at experienced teachers who wish to reflect on and develop their skills…All of our seminars are research-informed in the sense that we aim to present research-informed bases for principles and practices adopted in teaching…We encourage participants to examine critically three sources of knowledge about academic practice:

- *personal experience;*
- *discussions with others (peers and more experienced colleagues); and*
- *educational research.*

Developing Academic Practice Program
The Oxford Learning Institute
University of Oxford (U.K.)

number of disciplinary groups and institutional consortia in the U.S. have launched initiatives to systematically describe instances of exemplary teaching and make them publicly available online to be "shared, used, and reviewed by other faculty". Institutional consortia examples include the University of Nebraska's Peer Review of Teaching Project, and the Carnegie Foundation's work with community colleges to provide Windows on Learning. Contributions arise from teachers' reflections on their projects to enhance learning outcomes in their own courses, to be used by other teachers addressing similar learning challenges. The institutional hosts for these resources provide a measure of quality support. However, only a few of these sites show the ongoing dialogue of a *Knowledge Exchange Network*.

For example, a reflection by teachers (and students) at Glendale Community College presents exemplary practice in *Powerful Uses of Technology in Developmental Composition*:

> *The English Division at Glendale Community College has undertaken an in-depth evaluation, revision, and implementation of an advanced electronic pedagogy, called Full E-mersion, for its developmental composition program. In this site, you will find a lesson on paragraph organization that has been successfully used by Glendale faculty member Denise Ezell, along with teaching tips, examples of student work, and tools and materials you can download and use in your own setting.*   by Denise Ezell and Chris Juzwiak

Parallel efforts within the disciplines have a similar scope of focus: an individual topic to be learned by designated students within a particular institutional context. For example, on the *Teach the Earth* portal for Geoscience faculty, a module on *How Large is a Ton of Rock (Thinking About Rock Density)* addresses the following topics:

> *In this Spreadsheets Across the Curriculum activity, students calculate the volume and then edge length of a cube, and the diameter of a sphere, of a*

> *variety of rocks weighing a ton. As part of the problem-solving activity, students build a spreadsheet to do the calculation, figuring out the cell equations as they go. The activity focuses on density and examines how this physical property varies with the kind and percentage of the minerals composing the rock. The rocks are: ice; vein quartz; gabbro; granite; porous arkose. The central quantitative issue is the weighted average. Students also need to apply their knowledge of the volume of spheres and cubes, and of course they get practice with unit conversions…*by Len Vacher, University of South Florida.

The *Teach the Earth* portal has developed a structured method for contributions of exemplary teaching practice that documents the instructional rationale and captures some of the expertise on the instructor. The text box on the next page described this process. An evaluation of this site as part of a National Science Foundation project concluded that around 10% of their target audience of higher education Geoscience teachers in the U.S. annually participated in sharing and mobilizing knowledge for exemplary teaching. This collection of reflections on teaching and guides for faculty to reuse exemplary activities continues to expand; listed in the *Under Development* section are resources on   *Place-Based Learning* by Steven Semken of Arizona

State University and *Teaching Science with the News* by Anne Egger of Stanford University (all with a Geoscience focus).

Many other discipline groups in the U.S. have similar websites, especially in the areas covered by the National Science Foundation. The most extensive effort to engage discipline communities of teaching practice has occurred in the U.K., where the Higher Education Academy (described further in Chapter 5) sponsors 23 discipline-specific communities as well as issue-specific working groups. The following partial list highlights the range of the efforts to identify and promote exemplary teaching practices:

Art, Design & Media; Bioscience; Built Environment; Business, Management, Accountancy; Dance, Drama and Music; Economics; Education; Engineering; English; Geography, Earth & Environmental Sciences; Health Sciences and Practice; History, Classics & Archaeology …

Needs and Opportunities within Ontario: A great deal of similar content is already generated within Ontario – from individual faculty efforts, institutional grants, the collaboration amongst Eastern Region colleges to Celebrate Great Teaching, projects arising from the Leadership in Faculty Teaching work by Ph.D. students to prepare them as teachers, etc. – and is accessible on our college and university websites. There is currently no simple way to discover and access these knowledge representations in the province, or to link to the larger communities of teaching practice elsewhere. Social bookmarking and customized search engines could be applied by Ontario institutions to share the wisdom of our expert practitioners – an approach being used in the Knowledge Finder of the Commonwealth of Learning and in the custom search engine of the Professional and Organizational Development Network in Higher Education (POD) network of teaching and learning centres. We will return to the discussion of Needs and Opportunities in the next chapter, which considers scholarship in teaching and learning and the engagement of a sustaining community of teaching practice and scholarship.

Using a Knowledge Exchange Platform to Gather the Wisdom of Practice

Although identifying existing websites and print resources is a common way to build a collection of materials around a topic, in many cases valuable community expertise is not available in an easily reachable form. A great teaching activity may exist as only a set of handouts in a filing cabinet combined with the time-tested wisdom of the faculty member who uses it. There is often little motivation for individual community members to commit time to building web pages (or writing articles) to share their expertise on topics that fall outside the normal channels of scholarly work.

In an effort to tap into this knowledge, we've developed a process and set of tools for gathering this type of expertise. Educators are solicited to fill out a relatively simple web form that has been carefully structured to tease out the information needed to make that bit of knowledge more easily reused. For instance, we collect educational activities related to petrology, asking not only for a description of the activity but also for the course context in which it's taught, learning goals, assessment, and general teaching tips. Educators can also use the integrated upload tool to provide relevant files (e.g., the Word file they print and hand out to students, the Excel spreadsheet that contains the base data, etc.). An example form through which community members can submit teaching activities can be seen at <http://serc.carleton.edu/1621>. The form is built around the elements we've identified as necessary to enable other educators to adapt and use activities successfully in their own environment…

We can follow this same model to aggregate community knowledge beyond teaching activities. For example, we currently use these tools to build searchable mini-collections of geoscience course syllabi (with associated information about the design of the course) and a registry of geochemical analytic instruments. While the tools themselves don't eliminate all the challenges in bringing together this sort of community expertise, they do … minimize the effort needed on the part of the contributor to add their expertise to a community pool.

from Building Educational Portals atop Digital Libraries, Sean Fox, Cathy Manduca, and Ellen Iverson, D-Lib Magazine, Volume 11 Number 1, January 2005.

2. Insights from Research: the Scholarship of Teaching and Learning

A *Knowledge Exchange Network* for Ontario postsecondary education could promote research-based teaching practices in communities of scholars. The seminal report *Scholarship Reconsidered* (Boyer, 1990) distinguished four complementary areas of scholarship:

> ➢ Scholarship which extends the body of knowledge in a subject through Discovery, e.g., the principles and methods of Economics, History or Physics.

> ➢ Scholarship which extends Application of that body of knowledge (which includes the principles and methods used for Knowledge Mobilization to move research results in the subject area into practice).

> ➢ Scholarship which extends knowledge through Integration of a subject area's knowledge with another body of knowledge, as complementary lenses through which to perceive the world in new ways.

> ➢ Scholarship which extends knowledge about Teaching a body of knowledge and its application. Scholarly work to advance knowledge about teaching within a particular discipline has come to be known as the Scholarship of Teaching and Learning.

*Higher education has long fostered the robust commons created by scientific and scholarly research. This has not been the case with teaching and learning. **Until quite recently**, serious research on the education of college students was the province of relatively small, disconnected communities of scholars reading and contributing to the newsletters, journals, and conferences where pedagogical issues in their fields were aired. Their work has much to offer, but many college and university faculty were not aware of it. For the large majority, conversations about teaching and learning were local…affairs, confined to college and department committees and to circles of close friends.*

from *The Advancement of Learning: Building the Teaching Commons*
Mary Taylor Huber and Pat Hutchings.
San Francisco: Jossey-Bass, 2005. p. 5-6

The Scholarship of Teaching and Learning has become a rapidly emerging area of scholarly work within both universities and colleges, reflecting three key insights. The first is the recognition that most instructors will have much more interest in research insights about teaching and learning that relate directly to their needs and subject areas, compared to more general educational theories. As a research study on faculty using the *Teach the Earth* discipline portal noted (Manduca et al., 2005):

> *"While many faculty have a general knowledge of teaching methods, they are most interested in the application of these methods to the specific topics they teach, and they prefer to learn about teaching methods within such a context."*

The second insight is that there is a natural spectrum in the information required to permit effective knowledge mobilization from one exemplary teacher's experience to other teachers and other contexts (Trigwell et al., 2000). The reflections on teaching described in the previous section would likely be sufficient to communicate effectively about exemplary practice with

another teacher in a similar context, e.g., from a teacher in one Ontario community college to a teacher in another college who deals with similar students and content. As the differences in context increase, the amount of information and the quality of evidence required to communicate effectively also increases. For example, for a faculty member at an Ontario university to adopt an innovative teaching practice based on experience from a university in the U.K. would require more care in determining and documenting the contributing factors to the success of the innovation and more rigour in demonstrating the nature and extent of the success.

A number of scholarly disciplinary journals on teaching and learning are addressing this need for a spectrum of knowledge exchange:

> From first exposure of an innovative new method;

> to design experiments (Brown, 1992) with exploration of effect sizes and causality; and

> to further investigation of its applicability through well-structured, controlled studies.

For example, the *Journal of Chemical Education*, published since 1976, has sections for:

> Instructors' reflections on innovative practices *In the Classroom* and *In the Laboratory* (e.g., Using Tactile Learning Aids for Students with Visual Impairments in a First-Semester Organic Chemistry Course; Interdisciplinary Chemistry Experiment: An Environmentally Benign Extraction of Lycopene); and

> a *Chemical Education Research* section where faculty in the discipline report more rigourous studies (e.g., Investigating Students' Ability To Transfer Ideas Learned from Molecular Animations of the Dissolution Process; How Does Inquiry-Based Instruction Affect Teaching Majors' Views about Teaching and Learning Science?).

Similarly, the *Journal of Economic Education*, published since 1969, has sections for:

> *Content*…contemporary issues, new ideas, and research findings in economics that may influence or can be incorporated into the teaching of economics;

> *Instruction*… innovations in pedagogy, hardware, materials, and methods; and

> *Research*…original theoretical and empirical studies that deal with analysis and evaluation of teaching and learning methods and materials (Becker, 2007).

A recent survey of 20 disciplines analyzes the status of discipline research on teaching and learning and the journals in which it appears (Witman & Richlin, 2007).

In addition to this range of forms for knowledge sharing about

> *How and whether research-based knowledge applies to a given situation is one that is answerable only by those who know the particulars of the situation. When the situation is the classroom, teachers know the most about these particulars.*
>
> (Norris, 2000)

teaching in a subject area, in some instances there is sufficient scholarly research and other evidence to require a knowledge synthesis to bridge from research to practice. Such syntheses have proven to be an effective means to promote and identify exemplary practice in other highly skilled professions, e.g. for evidence-based medicine (Haynes & Haines, 1998). For instance, a literature review comparing particular assessment interventions within the teaching method of problem-based learning in the particular discipline context of medical schools (Nendaz & Tekian, 1999) summarizes the published research on various forms of assessment as evidence of the clinical expertise outcomes that students have developed.

Several discipline associations have begun to create research digests and other resources to bridge research studies to practical guidance for postsecondary teachers. Leading examples include the *Teach the Earth* website for GeoScience teachers with a section on Research on Learning in the Geosciences, the Consortium for the Advancement of Undergraduate Statistics Education guidance on classroom research for statistics educators, and the research digests provided by the Physics Education Resource such as Research-Based Reform of University Physics. Specific projects also generate research digests, such as the U.K. work on learning environments at the program level in History and Engineering.

Needs and Opportunities in Ontario: Ontario institutions have begun to develop an infrastructure to support faculty work as scholars of teaching and learning in their disciplines and in mobilizing this knowledge:

➢ Several Canadian colleges and universities are involved in programs to encourage the Scholarship of Teaching and Learning;

➢ Ontario institutions are developing institutional support for faculty to adopt a research-informed approach to professional development in teaching, e.g., Scholarly Teaching Projects at Queen's University and the Teaching-Based Research Group at the University of Waterloo ;

There are numerous opportunities within Ontario to mobilize a full range of knowledge on exemplary teaching practices in designing learning activities, courses, and curricula – including mobilizing results from other HEQCO research studies on specific instructional approaches, assessment methods, etc. As noted in Chapter 10, the social and technical infrastructure for contribution and access to a Teaching Commons can best be sustained through cultivation of strategic opportunities with multiple institutional sponsors.

> *At present, it is extremely difficult to find appropriate information about effective teaching practices used by others or to share success stories among the higher education community - even within our own disciplines, let alone across discipline boundaries. There must be many university instructors interested in sharing ideas and examples of effective practices and who are keen to learn from the experiences of others, but there is no simple or effective way of doing this at present.*
>
> Carolyn Eyles, Chair of a McMaster faculty group creating an interdisciplinary science program

Participants in consultations for this study mentioned a number of such teaching and learning issues of interest across institutions, such as *Academic Integrity*, *Preparing Students for Blended and Online Learning*, and *Internationalizing the*

Curriculum. Academic leaders also expressed interest in inter-institutional knowledge sharing around Program Quality, including a repository of exemplary practices as demonstrated in college Program Quality Assurance Process Audits, and resources for Research-Informed Program Reviews to strengthen quality processes in universities. The special case of capturing and mobilizing knowledge from collaborative development projects in teaching and learning is addressed in Chapter 5.

Other infrastructure elements already in place or under development for scholarly work can complement the custom search facilities mentioned on p. 9. The Scholar's Portal of the Ontario Council of University Libraries shows what can be achieved by institutional collaboration in this area; recent advances in usability such as Zotero demonstrate how access can be integrated with other work tools. Other collaborations between the Information Sciences and the Learning Sciences have begun to explore how access to community repositories of reusable learning resources and associated teaching expertise can be embedded within course management systems (McLean & Lynch, 2004).

3. Community Repositories of Adaptable/Reusable Learning Resources

High quality online resources for learners can be adapted and reused by other instructors. Repositories to support teachers in sharing, discovering and applying these resources are now being extended with tools for contributors and users to make explicit the underlying pedagogical rationale and issues, and to promote engagement of teaching communities.

A *Knowledge Exchange Network* for Ontario could incorporate community repositories to promote this knowledge exchange. Current leading examples include the following:

➢ Wisconsin Technical College system has collected over 2,000 learning resources designed by its member colleges. The League for Innovation in Community Colleges awarded this repository one of its 2007 Innovation of the Year award. A sample resources is Barriers to Critical Thinking: Psychological and Sociological Pitfalls:

> **Core Skills:** Barriers to Critical Thinking: Psychological and Sociological Pitfalls
> Author: Therese Nemec – Fox Valley Technical College
> Technician: Jay Stulo   Dare 11/8/2007
> Description: Learners examine the psychological and sociological barriers that interfere with clear communication. They select examples of ad hominem fallacy, bandwagon fallacy, emotional appeals, red herrings, irrelevant appeals to authority, suggestibility and conformity, "poisoning the well', and "shoehorning." In an interactive exercise, learners identify ways to overcome these barriers.

➢ the Connexions repository hosted by Rice University promotes adaptation of the 5,000 contributed resources by other teachers and organizational partnerships for knowledge exchange. For example, a recent announcement notes that "the Institute of Electrical and Electronic Engineering (IEEE) – the world's largest professional society – is partnering with Connexions on a major initiative to develop a critical mass of signal processing educational modules and courses that will be available for free access by anyone, anywhere, at any time. The materials will pass through a careful Society review for quality and content that will earn them the imprimatur of the IEEE brand for quality. Eventually the materials will be available not just in English but also in a number of languages, including Spanish and Chinese".

➢ the Maricopa Community Colleges Learning Exchange (MLX) contains 1,600 resources contributed by instructors, and tools to realize the larger vision that "the key to MLX is it being a place for exchange of ideas". For example, MLX has a set of digital stories about reuse of resources by other instructors, such as the following:

> *In her interview, Patricia describes how she uses parts of some of the larger MLX English 102 activities created by **Miguel Fernandez** (Phoenix College) as well as a number of the PowerPoint and related activities added to the MLX by **Alisa***

> **Cooper** *(South Mountain Community College). She shares too how she found useful materials from other disciplines (e.g. Biology, Geology).*

➢ the MERLOT network of 15 discipline communities has collected 16,000 reusable resources with teacher contributions of peer reviews, learning activities, comments on usage, and personal collections. The text box on the next page explains how the discipline communities engage knowledge exchange to identify, promote, and share exemplary teaching practices and learning resources.

MERLOT has been a leader in integrating teaching expertise and exemplary resources in its repository within an open education strategy.   Current methods for contributing knowledge include:

- *Member Comments are personal reflections on the value of the MERLOT resource. About 140 new comments are being added to MERLOT per month. In 2007, the MERLOT collection contained about 5,000 Member Comments on about 2,500 materials, with about half the people writing comments being students.*
- *Personal Collections are individualized collections of MERLOT resources that are created and annotated by members as organizational aids (e.g. resources for optional student use in a particular course). About 170 personal collections are being added to MERLOT per month. In 2007, the MERLOT collection contained about 8,800 Personal Collections created by about 4,800 members, with about ½ created by faculty and ¼ created by students.*
- *Learning Assignments are student tasks and accompanying lesson plans and important pedagogical context, including the learning objectives, pre-requisite skills and knowledge for the assignment, and estimated time to complete the task. About 15 assignments per month are being added to MERLOT. In 2007, the MERLOT collection contained about 1,100 assignments on about 900 materials, with about 2/3 being written by faculty and about 1/3 written by students and student teachers.*
- *Peer Reviews are structured evaluations of the MERLOT resources conducted by at least 2 trained experts in the discipline. The evaluations provide a formatted report on the quality of content, pedagogical effectiveness, and usability of the resource. In 2007, the MERLOT collection contained about 2,300 peer reviews produced by 15 editorial boards at a rate of about 25 per month.*

from T.T. Carey and G.L. Hanley, Extending The Impact Of Open Educational Resources: Lessons Learned From MERLOT, in Opening Up Education: The Collective Advancement of Education through Open Technology, Open Content, and Open Knowledge**.** Edited by Toru Iiyoshi and M. S. Vijay Kumar, MIT Press, April 2008.

Resources in these community repositories are reused more effectively when they are linked to pedagogical content knowledge. For example, understanding the teaching context for which resources were designed can help faculty to select resources which will be suitable for their students. A recent study in Physics demonstrated the need to rethink instructional designs when resources designed for students in a highly selective program were reused with students having different learning styles and needs (Loverude, 2003).

Recent repository developments permit authors to link their resources with supporting knowledge to explain the contexts for which they created these resources and some of the underlying pedagogy. For example, a resource like the History Research Project for teaching critical thinking in History courses can be linked to the author's Reflections about context and use, to a Research Digest about teaching critical thinking in History courses, and to sample student work produced with the resource.

Another recent development is the growing trend to provide federated search facilities across multiple repositories, similar to the access to research resources through the Scholar's Portal mentioned in the previous chapter. This is occurring in part by informal collaborations across national boundaries, such as the Global Learning Objects Brokered Exchange (GLOBE) network which brings together resources from the U.S., Europe, Australia, Japan, and Canada. There are also efforts underway to establish international conventions to more easily implement shared repository searches, such as the Learning Object Discovery and Exchange work of the IMS Global Learning Consortium.

Needs and Opportunities in Ontario: Individual teachers in Ontario postsecondary education have previously shared resources they have developed through their own websites and institutional repositories. In addition, a prototype resource repository, the Cooperative Learning Object Exchange (CLOE), was developed with grant support from agencies of the government of Canada as a research and innovation project.

The CLOE partners –eight Ontario community colleges, 18 Ontario universities, and two universities from other provinces – successfully demonstrated two innovations: the increase in reusability of shared resources resulting from cooperative design, and the value of documenting reuse through case stories of knowledge exchange between instructors. Although the CLOE repository remains available as a prototype, the national agencies previously engaged in supporting e-learning innovations no longer exist and no further development projects are underway. As outlined in the next chapter, collaborative projects involving Ontario instructors continue to generate resources to be exchanged, adapted, and reused – and these collaborations have independently identified the need for a knowledge exchange infrastructure to disseminate and extend their work.

Some other provinces are moving forward with repositories of learning resources to support resource sharing and knowledge exchange in postsecondary education:

> in British Columbia, the Shareable Online Learning Resources (SOL*R) community site is "a service provided by BCcampus to educators in British Columbia that aims to facilitate the sharing, discovery, reuse, and remixing of postsecondary online learning content".

> In Quebec, repositories to support learning and teaching are under development to serve the institutions in the Université de Québec system (REA.UQ). The goal is to provide both a repository and support for a knowledge exchange:

> > *"Encourager une «culture» des communautés de pratique qui partagent une même philosophie… Favoriser le modèle «Bottom-up» auprès des communautés d'éducateurs à l'aide d'incitatifs"* (Anderson 2006)

> RAFAEL is being developed at Université de Québec à Montréal with participation from Université de Moncton, Université d'Ottawa and others. The goal of RAFAEL is to integrate access to Canadian repositories offering learning resources in French, including a large component for postsecondary, with a target of 30,000 resources.

There are also efforts by individual discipline groups, such as the [French Learning Object Repository for Education](#) (FLORE) hosted at the University of Victoria. "FLORE offre un ensemble de ressources électroniques pour l'enseignement et l'acquisition du français." (Caws, Friesen & Beaudoin, 2006). Access to FLORE will also be available from the RAFAEL federated service.

On the other hand, Alberta recently decommissioned its Campus Alberta Repository of Educational Resources (CAREO) (Norman, 2007). Lessons learned from the demise of CAREO and the limited use of some other repositories are explored in Chapters 8 and 10.

4. Collaboration Facilities for Province-wide Collaborative Projects

The examples in the previous chapters – from reflections of individual teachers to work within a community of scholars to exchange of learning resources and affiliated pedagogical content knowledge – follow a sequence of increasing emphasis on community activity for collaborative knowledge building. As we noted in Chapter 4, the work of the CLOE in Ontario illustrated how reusability and adaptability of learning resources can be enhanced by earlier collaboration to specify and design the resources with the needs of more than one institution clearly set out.

It is a natural step to consider other projects dealing with teaching and learning issues across multiple institutions. The fit with the focus of this research study is two-fold:

> When the project activities distributed across institutions are supported by online collaboration facilities, there can be a built-in capture of pedagogical content knowledge in the discussions and deliberations of the project team; and

> the outcomes from the projects are intended for use across multiple institutions, usually extending beyond the project partners. These projects have identified a need for repository facilities for access, updates, knowledge sharing, etc.

The needs of collaborative projects in teaching and learning can thus strengthen the argument for repository facilities as part of a *Knowledge Exchange Network*, and the opportunity to integrate those facilities with project support for knowledge building can generate more value from the Network platform.

For example, in the MERLOT network in the U.S. a set of workforce development projects is using extensions to the repository platform to promote collaboration in creating curriculum and learning resources to address critical gaps in the workforce within partner states. The MERLOT Fire Safety community, for instance, involves institutions in five state systems of postsecondary education, working collaboratively to accelerate program development and implementation in this are of workforce shortage. Within the California State University system, an existing "teaching commons" platform from the Transforming Course Design initiative is being extended with collaboration facilities to support joint projects in critical curriculum areas, with 15 institutions as partners. In both cases, the goal is to create a set of high quality learning activities and resources from which individual institutions can select the appropriate products to meet their individual needs (i.e., not a one-size-fits-all "canonical course").

Needs and Opportunities in Ontario: Two projects across Ontario institutions, one ongoing and one proposed, are described on the next two pages to illustrate the need for a repository facility – and the opportunity to augment repository services with support for knowledge exchange in the project and later as results are reused, adapted, and assessed:

> The Canadian Interprofessional Health Collaborative (CIHC) projects involve the Council of Ontario Universities, five provincial universities, and one community college; and

➢ the proposed Occupation Specific Language Training (OSLT) program involving Colleges Ontario and several community colleges.

There are other examples in Ontario of project collaborations which could benefit from *Knowledge Exchange Network* facilities to support project activities as well as subsequent dissemination of the resources created. For example, the Institute for the Advancement of Teaching and Learning recently completed a project on Integrating New Immigrant University Professors, and several Ontario universities are now investigating a joint project to create shared resources on Academic Integrity.

Canadian Interprofessional Health Collaborative

The CIHC "identifies and shares best practices and research in interprofessional education and collaborative practice (IECPCP)" in the health professions, with funding support from Health Canada (CIHC, 2007). The Ontario-led projects include participants from the Council of Ontario Universities, Centennial College, the University of Ottawa, Queen's University, McMaster University, the University of Toronto, and the University of Western Ontario.

In the area of Curricula, "as the CIHC identifies the best approaches to achieving IECPCP Canada-wide, subsequent changes to health professions curricula (pre and post-licensure) are necessary…the CIHC Curriculum committee…documents and disseminates the conceptual and program frameworks that are being used across the country related to the…curriculum and its implementation".

In pursuing these goals, the CIHC commissioned work on a CIHC Repository Needs Assessment which reached the following conclusions in April 2007:

> *"The use of digital media for research, development and knowledge transfer is increasing, particularly with respect to research projects that produce information and knowledge transfer activities across multiple stakeholder domains. Funded projects with specified end-dates need to ensure the information and knowledge produced is made useful and useable to relevant communities of practice…The Health Canada Interprofessional Education for Collaborative Patient Centred Practice (IECPCP) projects, CIHC included, have the additional mandate of producing curricular materials. This raises other **knowledge transfer issues that are best met with the use of digital repositories** for the storage and retrieval of digital learning materials."*

The Repository Needs Assessment also identified a requirement to go beyond a repository for storage and access of learning resources, and to incorporate facilities for an ongoing community knowledge exchange:

> *"The CIHC Dissemination Strategy identifies the need to facilitate information exchange and knowledge transfer, two distinct activities that are nonetheless closely linked. Information exchange simply refers to the ability to get information (research results, for example) published or otherwise broadly disseminated or*

*put into practice. **Knowledge exchange is the ability to continually use and adapt this information for mutual learning within communities of practice or communities of interest**. A key theme emergent from the surveys, and correlated with data from other IECPCP project initiatives, is the ability to facilitate this knowledge exchange, particularly around the use and dissemination of information and other media."*

While identifying the need for "the development of federated repository search capabilities", the Repository Needs Assessment participants were not able to identify an existing *Knowledge Exchange Network* infrastructure in Canada which could be employed to meet these needs, and therefore carried out some preliminary analysis of the requirements for implementing their own platform.

Occupation Specific Language Training

Citizenship and Immigration Canada (CIC) recently invited:

> *"proposals to deliver occupation specific language training (OSLT) in community colleges as a pilot program and/or to develop curriculum guidelines for such training... Collaboration among community colleges is encouraged…Cooperating on a joint proposal allows colleges to extend their networks and learn from one another. Two or more colleges may be able to take on a larger project than a single organization could alone."*

In response to this request-for-proposal, a number of Ontario colleges are working cooperatively to submit a collaborative proposal in February 2008.

In work prior to the call for proposals, Citizenship and Immigration Canada funded Colleges Ontario to research and report on existing occupation specific training in community colleges and identify gaps and opportunities. This project concluded in November 2007 with a report entitled *Language Skills for the Workplace*: *Developing a Framework for College Delivery of Occupation-specific Language Training in Ontario.* The section addressing *Integrating Web-based Application for Enhancing College Collaboration* reports the following:

> *"Colleges identified the need to identify, organize and make available OSLT curriculum and resource materials in an easy-to-access format. The need was articulated for:*
>
> - *shared access to any material related to occupation-specific language training;*
> - *web-based, easily accessible storage of curriculum and learning materials…;*
> - *an easy way to search for and share information and materials; and*
> - *a 'place to go' to gather information on OSLT initiatives undertaken by Ontario colleges…*

*Colleges suggested using **web-based technology to develop a digital repository**…it would offer colleges an opportunity to share different instructional applications… colleges indicated interest in investigating the feasibility of a digital repository.*

*Colleges expressed openness about collaborating with other colleges, but raised the issue that there is currently no mechanism in place for sharing curriculum or gauging the effectiveness of curriculum design and delivery…Colleges expressed the belief that **a mechanism for communicating and coordinating OSLT initiatives is essential** in developing a sustainable, cost-effective approach to occupation-specific language training across Ontario."*

An appendix to the Colleges Ontario report provides additional detail about digital repository requirements for the proposed project. As in the CIHC study, the lack of an existing platform led the collaborating colleges to conclude that they would need to invest effort in a supporting facility of their own. The need for facilities to support collaborations during the project has also been noted by members of the project team, and the timing of the project could make it ideal for a pilot study as described in Chapter 8.

5. Shared Resources for Faculty and Professional Development

Shared effort for faculty and professional development is a related area which could be integrated with a *Knowledge Exchange Network*. Initiatives of this type are more common in postsecondary systems in the U.S. For example the University of Wisconsin system Office of Professional and Instructional Development sponsors initiatives such as the Lesson Study Project, which "trains and supports college instructors to engage in lesson study, a process in which small groups of instructors collectively examine their teaching and student learning by designing, teaching, observing and refining individual class lessons". The program provides a gallery of past projects, online guides, and a weblog to track current projects across the state. As discussed in the next chapter, there are also fledgling efforts in other states for explicit encouragement of wider community engagement within a region and discipline (e.g., Teaching Business in the California State University, Expository Reading and Writing Community).

Ontario institutions are already engaged in a variety of collaborations for faculty and professional development programs:

> The professional group of educational developers in Ontario meets regularly for knowledge exchange and to plan joint initiatives, such as the shared workshop series on *Curriculum Development and Undergraduate Degree Level Expectations*.

> Community college participants in consultations for this research study mentioned the In-Service Teacher Training Certificate Program offered through St. Clair College as a collaboration in professional development.

> Ontario institutions also collaborate on faculty development via the Institute for the Advancement of Teaching in Higher Education, including the facultydevelopment.ca website and the online course *Introduction to teaching in higher education*.

Perhaps the biggest obstacle we face is the notion that teaching ability is somehow implanted at birth and that there is little we can do to change whether we have it or not… Part of being a good teacher (not all) is knowing that you always have something new to learn…to learn from the best teachers we must recognize that we can learn – and that we will still have failures. We will not reach all students equally, but there is something to learn about each one of them and about human learning in general.

Perhaps the second biggest obstacle is the simplistic notion that good teaching is just a matter of technique. People who entertain that idea may have expected this book to provide them with a few easy tricks that they could apply in their own classrooms. Such ideas make enormous sense if you have a transmission model, but it makes no sense if you conceive of teaching as creating good learning environments.

The best teaching is often both an intellectual creation and a performing art…we must struggle with the meaning of learning within our disciplines and how best to cultivate and recognize it…If we are to benefit from the insights and practices of outstanding teachers, we must go beyond…expecting right answers – tricks of the trade – that we can employ blindly.

What the Best College Teachers Do, Ken Bain, Harvard University Press, 2004. pp. 174-175

> The six medical schools in Ontario have established the [Ontario Medical Education Network](#) (OMEN), based in part on past collaborations which demonstrated that "cooperation throughout the Province of Ontario provided a synergy of scholarly work in education that was value added to the work done at individual institutions." Of particular interest regarding shared faculty development is the online offering of [Ontario Medical Education Rounds](#) (through a platform from the [Ontario TeleMedicine Network](#)). These provide collaborative professional development opportunities for medical educators, including topics such as Community Engaged Learning, Life-Long Learning in the Health Professions, and Evidence-Based Education.

> Several Ontario institutions have expressed interest in participating in the [ELIXR](#) program sponsored by the U.S. Department of Education, creating virtual classroom visits and digital case stories to accelerate adoption of exemplary teaching practices. The text box at the bottom of this page describes one usage scenario for these resources: preparing new faculty to address student needs. As another area of shared need, several community college participants in consultations for this research study mentioned capability development for part-time instructors in effective teaching.

Needs and Opportunities in Ontario: These examples illustrate some of the needs for collaboration in faculty and professional development; additional examples appear in the discussion of strategic collaboration opportunities in Chapter 10. One conclusion of this research study is that engaging faculty and professional development leaders presents a potentially valuable priority for pilot studies of a Knowledge Exchange Network, particularly in areas such as programs for new faculty learning to teach:

> As programs for faculty to enhance their teaching capabilities engage faculty as learners in resources from a *Knowledge Exchange Network*, it will be easier for them to visualize their students benefiting from such resources in their subject areas; and

> as leaders in the faculty and professional development programs – both professional staff and other faculty – demonstrate the value of collegial knowledge exchange and mobilization around teaching and learning, it will be easier for faculty participants to visualize themselves engaging with colleagues to enhance their expertise in teaching and to share, re-use, adapt and evaluate exemplary learning activities and resources.

Usage Scenario for ELIXR Collaborations on Faculty and Professional Development

For example, one of the first opportunities and challenge campus leaders have to disseminate exemplary teaching practices across their institutions is the induction of new faculty into the institution. On one hand, the institutional context of strategic priorities and the limitations on a center's resources require a typical "new faculty orientation" to focus on specific campus-wide themes, which may emphasize a particular approach such as Just-In-Time Teaching, a particular need such as retention and success for special needs or at risk groups, or a particular aspect of pedagogical knowledge such as how to detect and debug student misconceptions.

On the other hand, as a recent study in the U.K. has noted, when considering their approaches to teaching and learning most of our faculty may "primarily seek and respect the advice and guidance given by colleagues in their own discipline" or at best are "broadly tolerant of a generic approach but need to be provided with 'stepping stones' to link this with their disciplinary context" (HEA 2006). The challenge for faculty development is to provide discipline-based examples of exemplary teaching practices and innovations, in ways that build faculty identity as members of both institutional and disciplinary communities of teachers.

We believe the time is right for collaboration – across campuses, systems and disciplines – to develop, share and apply discipline-oriented resources which illustrate exemplary teaching practices and which also support faculty in using those practices to enhance student learning.

-excerpted from the ELIXR Project Narrative 2006

6. *Knowledge Exchange Networks* in Other Jurisdictions

An Ontario *Knowledge Exchange Network* for exemplary teaching needs linkages with other jurisdictions in order to achieve a critical mass of knowledge representations and resources. This is an instance of 'The Long Tail' effect, in which Internet facilities provide an effective economic model to address the needs of very specialized audiences (Brynjolfsson et al., 2006). In our context, providing access to resources and communities outside Ontario offers more opportunity for faculty to identify exemplary practice and share knowledge about teaching and learning related to particular combinations of topic, student characteristics, and institutional curriculum context. On the other hand, usage will be limited if faculty are unsuccessful in locating resources and knowledge exchange opportunities relevant to their teaching interests. The rest of this chapter will outline some of the **Opportunities for Ontario** to collaborate with initiatives in other jurisdictions.

Within Canada, a number of other repositories of learning resources have already been described in Chapter 4. Federated search across such repositories has already been implemented in several ways, and Canada has provided leadership in some of these activities through research consortia in the Networks of Centres of Excellence and the Social Sciences and Humanities Research Council (SSHRC) Strategic Networks programs. However, some Canadian repositories have restrictions on access which will require bilateral agreements to enable use in Ontario.

In the context of the larger vision of an integrated *Knowledge Exchange Network*, there are also some opportunities for collaboration within Canada. For example, BCcampus has a stream within its Online Program Development Fund to engage leaders in faculty and professional development in collaborative development and knowledge exchange. Some of the common interests identified in British Columbia, such as Internationalizing the Curriculum, are also regarded as of strategic importance by many Ontario institutions.

As outlined in the previous sections, access to many static resources elsewhere in North America is unrestricted. The exceptions are state-sponsored initiatives which restrict access to educators within the state. However, almost all facilities offering ongoing knowledge exchange restrict some participation in the communities either to the sponsoring jurisdiction or to member institutions, including multi-discipline portals with significant support for developing leadership communities (e.g., National Science Digital Library, discussed further in Chapter 9) and emerging efforts in explicit encouragement of wider community engagement within a region and discipline (e.g., Teaching Business in the California State University). We should therefore consider the federated search of these sites as outlined above as just a first step in linking Ontario postsecondary teachers into the wider world of exemplary teaching practices.

Many developments outside North America have similar restrictions. The largest investments have come from the Higher Education Funding Council in the U.K., where the Higher Education Academy sponsors 24 discipline-specific communities and 81 issue-specific working communities. The Council also helps to fund the Joint Information Systems Committee (JISC) which provides the technical infrastructure for interconnecting academic institutions, including

the JORUM national repository of shared learning and research resources. A strategic partnership between the Academy and JISC has been formed to attempt to integrate the teaching community development efforts with the repository projects. However, recent analysis (Charlesworth et al., 2007) has suggested that there may be a fundamental disconnect between the legitimate but orthogonal priorities with which the two organizations are approaching repository and Knowledge Exchange initiatives: the JORUM approach favours very strong technical standards and restrictions on contribution to trained staff and the Academy approach favours a dynamic community environment with a low threshold for participation. Access to JORUM resources is restricted to U.K. academic staff; access to Higher Education Academy sites is public but access to many activities is restricted to U.K. academic staff.

From a purely technical point of view, a more promising example for Ontario may be the Learning Objects Repository Network (LOREnet) system in the Netherlands, which links together repositories across the country, mostly at the institutional level, for teaching and learning resources. LOREnet is currently focused only on the domains of health care, justice and economics. The project is an initiative of the SURF Foundation, which also operates the national high speed network for education and research much like the Optical Regional Advanced Network of Ontario (ORANO), and has similar interests in the larger cyber-infrastructure in these areas. SURF has been able to leverage the assets of a small national population base, about a third larger than Ontario, through partnerships such as the joint Repository project of the Knowledge Exchange partnership with similar organizations in the U.K., Denmark, and Germany.

Another emergent model, which has attempted to integrate lessons learned across many of the initiatives listed in this report, is the Carrick Exchange under development by the national Carrick Institute for Learning and Teaching in Australia. While the Exchange is an outgrowth of efforts to share and re-use learning resources, the priorities have now been reordered to emphasize "connecting people with people, providing opportunities to share knowledge and know-how and to contribute to the Exchange knowledge store". In particular, the Carrick Exchange aims to provide the following:

  ➢ Access to quality learning materials and resources;

  ➢ information about new technologies and ideas that impact on teaching practice and student learning;

  ➢ opportunities for academic and support staff to network with others, comment on and exchange ideas; and

  ➢ a means for academics to participate in discussions, debates and dialogue about teaching (Philip et al., 2007).

Prototypes for the Carrick Exchange have been developed and hosted by a parallel agency, Education.au, which has expertise in information and communications technologies. The Carrick Exchange plan is the first knowledge exchange model to fully engage use of Web 2.0 facilities for collaboration, for example social bookmarking:

An item bookmarked by multiple users in the Exchange provides a way for one user to see who else has taken the trouble to bookmark the item – immediately there is a shared bond between hitherto unknown users – the Exchange site enables and facilitates this link – and then allows one user to view the other user's profile including all their tags – thus allowing contact and discussion if required (Ide, 2007).

II. Analysis and Lessons Learned from Current Models and Related Research

The previous chapters described the current elements which are merging into online *Knowledge Exchange Network* for exemplary teaching:

> reflections by individual faculty on their experiences and directions as teachers;

> scholarly work to document and demonstrate pedagogical content knowledge for teaching in a discipline area;

> collections of learning resources and associated teaching expertise;

> collaborative work by project teams addressing teaching issues across institutions;

> shared resources for developing teaching capability; and

> resource and community networks supported by provincial, state, and national agencies to enhance teaching practice and the quality of student learning.

These examples illustrate what "could" happen if the success factors in these current models are enabled in Ontario and if the directions indicated by the supporting research studies can be made effective.

This section of the report addresses an analysis of the conditions necessary to move from what "could" happen to what "would" happen. What critical success factors and vital elements have been identified, and how we can move forward toward achieving them? Chapter 8 briefly surveys and interprets the available studies on the most frequent form of the current generation of such systems, repositories of shared digital learning resources. Chapter 9 examines the importance of communities of teaching practice, which are increasingly recognized as critical elements of any a next generation of *Knowledge Exchange Networks*. Chapter 10 examines three conceptual models which can aid our understanding of strategies to foster *Knowledge Exchange Networks* and their use to mobilize knowledge for exemplary teaching. Chapter 11 summarizes many of the outcomes of this research study as a set of Principles to be applied in planning for a new generation of integrated *Knowledge Exchange Network* services. Chapter 12 provides three recommendations for next steps, including a more formal consultative process to map out ways to more effectively *Share what we have now*, a set of pilot studies to *Test new collaborations for knowledge-building,* and continued efforts to *Explore national and international linkages.*

7. Studies on Repositories of Shared Digital Learning Resources

The most successful of current generation discipline-oriented online *Knowledge Exchange Networks* engage around 10% of their target audience of higher education teachers annually in sharing and mobilizing knowledge for exemplary teaching (McMartin et al., 2007). Replicating this success in Ontario would translate into 4,000 users (and a highly active membership of 400 catalysts), who could potentially serve as leaders for further dissemination within their local institutional communities of teaching practice. On the other hand, many systems have been successful in knowledge sharing and knowledge development only within much smaller proportions of the target communities. Moreover, few of the current generation of Knowledge Exchange systems have integrated multiple elements from those listed above and described in Chapters 2-7.

In this chapter we summarize the data from analyses of the most frequent form of the current generation of such systems, repositories of shared digital learning resources, in terms of what is known about critical factors promoting successful engagement of faculty. This data is limited in its applicability by a focus on the framing in which these current generation systems were conceived, namely from a digital library perspective. However, several of the results do point the way toward a next generation perspective around *Knowledge Exchange Networks*. In any case, the challenges outlined in these studies provide a checklist against which to evaluate plans for a more comprehensive knowledge sharing framework.

The major studies used as resources are the following:

a) a study of humanities and social science faculty in California "research universities, liberal arts colleges and community colleges" and their attitudes about use and nonuse of digital resources in teaching undergraduates (Harley, 2007);

b) a study of faculty across disciplines at a range of U.S. institutions, split in approximately even proportions across community colleges, undergraduate, Master's and Doctoral categories (McMartin et al., 2007; McMartin et al., 2008);

c) a study of multiple repository projects in the U.K. funded by the Joint Information Systems Committee (Charlesworth et al., 2007); and

d) a "first person" analysis of the success of the MERLOT Network in sustaining institutional support (Carey & Hanley, 2008).

a) The study of humanities and social science faculty set out to "map the universe of digital resources available to undergraduate educators and to examine how understanding use, users, and nonusers might benefit the integration of these resources into scholarly environments". The conclusions were based on two surveys, one using paper and online forms with 830 survey responses and one online with 450 responses, and follow up discussions with 31 individual faculty.

Unfortunately, the surveys appear to have generated answers that were teacher-centred rather than learner-centred. The responses from the follow up discussion groups indicates that the questions were interpreted as asking about digital resources used by teachers in classroom presentations, and not about learning resources used by students. Accordingly the data about obstacles to faculty use of digital resources does not provide much by way of analysis about the identification and promotion of exemplary teaching practices, although some of the conclusions reached by the investigators are no doubt more widely applicable (e.g., about the limitations of "usability studies which…tell us only about relatively enthusiastic users of a particular...tool or content, but nothing about whether that...may be valued or usable by a wider potential audience operating in varied and complex educational contexts" p. 20).

b) As with the Harley study, the focus of the McMartin et al. (2008) study on digital resources limits the applicability of the results, which included survey data from 4,600 respondents across the U.S. The following two results stand out as of interest:

> *"Respondents repeatedly reported that Google was their first choice for finding information", suggesting that "digital libraries should seek to leverage search tools to bring users in" (p. 14).*

> *"In terms of barriers to use of educational digital libraries and online resources, a large majority of our respondents stated that lack of time was a barrier to adoption. The results from our focus groups contradicted this finding in the sense that faculty reported a willingness to spend the time necessary to find the 'right' materials. It also contradicts responses from the survey where a similar number of respondents noted that they used digital resources to themselves time. The results point the complexity of naming 'time' as a barrier. The danger of including a question that asks if time is a barrier is that it fails to force the user to reflect on the ultimate barriers that lack of time reflects. We suggest that is it not really lack of time…but rather an issue of priorities. For example, when people say that they do not have time to perform a task, it may be a polite way of saying it is not as high a priority as the other tasks that they have to do"* (p. 14).

c) The study of U.K. projects funded by JISC (Charlesworth et al., 2007) concluded that the projects had achieved relatively little of the "large-scale sharing which is needed to improve the quality and cost-effectiveness of teaching within and between institutions".

The recommendations to move toward more effective and large scale sharing of resources support the conclusions of the studies above, with the additional suggestion to extend services for knowledge sharing through community and collaborations services:

> *To make a repository infrastructure work, in our opinion, the repositories would have to take a leap towards being more useful, more popular and more usable. They would need:*

- *To match in organizational structure what people want, and this seems to be a visible subject-community-based organization (whatever the underlying hosting organization is);*
- *efficient, open, comprehensive search and retrieve facilities;*
- *to link effectively with networked community/Web 2.0 services, to enable coherent services, transactions and workflow between them;*
- *the ability for users to easily rate and review resources providing both assessment and reassurance for human users and metadata for search procedures; and*
- *the ability for users to download, add and amend and re-upload, providing a development path and incentives for the original author to share* (Charlesworth et al., 2007, p. 33).

Of more interest for our focus on *Knowledge Exchange Network* is the recommendation that future projects be focused more effectively on areas with a well-defined problem in search of a solution:

> *From the evidence we have seen, we believe that sector resources would best be concentrated on sharing that involves institutions or discipline communities which have a common 'delivery endeavour'…where sharing is **part of the solution to an immediate problem that the institutions, or discipline community, want to solve*** (Charlesworth et al., 2007, p. 28, emphasis added).

We also should note in conjunction with this study that there are mixed views on the importance of rights to use and intellectual property. While one study concluded that this is not an important issue, given a context of clear ownership and a shared sense of "educational fair use" (Fox et al., 2005), potential users in the U.K. study seemed to rate this issue as a more important obstacle (Charlesworth et al., 2007).

d) The final study we report on here was a subjective analysis by leaders in the MERLOT Network about the critical success factors in the initial seven years of the institutional partnership (2000-2007). The focus was on how to sustain successful programs past the one-time external support which was pivotal to launching a critical mass of these initiatives to identify, share, re-use and evaluate exemplary learning resources. As noted in the Charlesworth et al. study (2007), a related ongoing challenge is the development of institutional plans and support for the reuse and adaptation of these resources. Any long-term value proposition for a *Knowledge Exchange Network* derives from the benefits of the knowledge exchange and mobilization as reflected in benefits related to institutional goals:

> *In this context, the way the MERLOT community has sustained its operations over the last seven years may be instructive for other…initiatives. The costs of operating the website infrastructure and of the processes that support it are underwritten by MERLOT's sponsor academic institutions. The sponsoring institutions – currently 16 state or regional systems and 7 individual universities and colleges – invest in supporting operations for the public website, and also provide faculty time to serve as members of the 15 MERLOT discipline Editorial*

Boards to provide oversight, management and quality control of the Teaching Commons content. A critical investment they make is supporting their leadership role in the MERLOT shared governance process. Each academic sponsor academic institution commits to support a MERLOT Project Director that participates in MERLOT's yearly cycle of strategic and operational planning processes and is the steward of MERLOT services in their own institution. It is through the Project Directors that MERLOT can align its services to the needs of the institution's initiatives.

*The key to this continued engagement of sponsor academic institutions in MERLOT over the last seven years is **to reduce the costs and risks of their own strategic initiatives as well as increase their impact through the systematic exchange, reuse and adaptation of resources, services, and tools provided through MERLOT**. Our sponsor academic institutions contribute financial support to MERLOT because that involvement augments and accelerates their own initiatives. They contribute faculty time to the MERLOT Teaching Commons for the representation and application of open pedagogical content knowledge because it supports their institutional plans.*

This analysis suggested that the MERLOT Network succeeded by aligning its activities with the priorities of its particular sponsoring institutions, including the following:

➢ Accelerated Development of Quality Online and/or Hybrid Courses

➢ Course Redesign/Academic Transformation

➢ Enhancing Faculty Development in Technology to Support Teaching

➢ Enabling Success of Adjunct Faculty (from Serving Your Institution's Initiatives With MERLOT Services)

We address in Chapter 10 some of the institutional goals in Ontario which might be effectively addressed through a next generation *Knowledge Exchange Network*.

8. Emerging Directions: Engaging Communities in Knowledge Exchange Networks

A key lesson learned from the studies of existing models is the importance of developing and support communities of teaching practice. In this chapter we briefly review this valuable concept and some of its implications for *Knowledge Exchange Networks*.

Much recent attention has been paid to the notion of a *community of practice*, a concept which focuses on the process of social learning that occurs when people who have a common interest in some subject or problem collaborate over an extended period to share ideas and solutions and to establish professional identity and norms for practice (Wenger, 1998). As noted above in Chapter 2, communities of teaching practice in post-secondary education are frequently limited in scope: the norms for practice may be influenced more by local conditions within an institution than by the larger group of teachers engaged with similar subject matter. One of the goals of a *Knowledge Exchange Network* is to engage our faculty with exemplary practice in global teaching communities in their disciplines – measuring our teaching against this benchmark can provide more opportunities to identify and promote enhancements to teaching and to the quality of student learning.

It is helpful in our analysis to consider other types of communities with smaller scope and impact as the initial targets of our work. A *community of interest* is a group of people who share a common interest or passion, whereas a *community of purpose* is a group of people who are going through the same process or are trying to achieve a similar objective (Schummer, 2003). As the next section illustrates, a well-designed resource exchange and affiliated processes can enable a community of interest in a particular teaching area to become a community of purpose around improving teaching through the resource exchange. As noted in Chapter 10, we can also design facilities to support project teams as short-term communities of purpose, as well as particular subtype communities of purpose which are characteristic of higher education, such as *communities of inquiry* (Garrison & Anderson, 2003*)* and staff/faculty *learning communities* (Vaughan, 2004).

Our analysis is focused here on the communities of users; other groups, such as the "curators" who provide management and support, may not share the users' perspectives. For example, a study of three digital repositories in the U.K. observed that "curators are concerned with the long-term goals of the repository, while users tend to consider short term outcomes" *(*Margaryan & Littlejohn, 2007). These complementary (and sometimes conflicting) viewpoints were noted in Chapter 7 with regard to the partnership challenge for two U.K. agencies reflecting these perspectives.

A number of recent studies have demonstrated the critical importance of conceptualizing the focus of a *Knowledge Exchange Networks* in terms of communities of users rather than individuals. Since none of the emerging multi-faceted *Knowledge Exchange Networks* has been in use for a sufficient period to provide data, these studies looked at only at learning resources repositories:

- A [study in the U.K](#). examined the experience of several different repositories, with the aim of "identifying and analyzing the factors that influence practical uptake and implementation of repositories, with a focus on social and cultural issues".

- Plans being developed for the next generation of the National Science Digital Library (NSDL) in the U.S. reflect the results of investigations of usage and the progression from users to contributors of resources (Lagoze et al., 2006; see also Marshall & Bly, 2004 for an example of earlier work on the same theme). The conclusions from these studies have led to a focus on **Creating Collaborative Spaces** for knowledge exchange in the next generation of the NSDL, a significant shift from the initial phases of the initiative:

  *"NSDL is already a highly useful library of almost two million vetted science resources, but until now it has followed the traditional library model of search and discovery of resources. To find out about a resource, users must either consult the brief information in the catalog, or else examine the resource itself. Over the past five years of operation, we have heard a strong and consistent message from our community: "**I don't just want a list of resources; I want to understand how to use them**."*

The text box on this page lists some of the major recommendations of the U.K. study, all of which need to be incorporated into thinking about an Ontario *Knowledge Exchange Network.* Similarly, the text box on the next page presents excerpts from the latest plans for the NSDL, reflecting a similar focus on emerging Internet facilities to support communities of teaching practice in knowledge development, exchange and mobilization. In the next chapter we will use a collaboration framework for distributed scientific research communities to illustrate how different community needs can be addressed.

Recommendations related to integration of user needs
Knowledge Exchange Networks should be based firmly on the needs and context of the end user communities that the Knowledge Exchange Networks aim to serve. Impact and added value of using Knowledge Exchange Networks must be demonstrated to users. Examples of successful use of Knowledge Exchange Networks should be collected and made available to users.

Recommendations related to new functions that Knowledge Exchange Networks could serve
Knowledge Exchange Networks could play a useful role in supporting collaboration on development of resources (among expert resource developers as well as individual users) rather than only being used to store completed resources. Knowledge Exchange Networks should be web 2.0-enabled.

Recommendations related to alignment of Knowledge Exchange Networks with existing systems, tools and strategies
Product innovation should involve process innovation, and integration of Knowledge Exchange Networks with existing tools and systems used in the communities.
Knowledge Exchange Networks should be linked to organisational strategy and objectives…

Recommendations related to vision for funding and integration …
[focus on] Pedagogy pull vs. technology push.
Funding initiatives should target developments with a pedagogic vision rather than technology driven developments.
Integrate Knowledge Exchange Networks with other… initiatives.

Conclusions from the **Community Dimensions of Learning Object Repositories** (CD-LOR) project excerpts from (*Margaryan et al., 2007*), with the substitution of "*Knowledge Exchange Networks*" for "*Learning Object Repositories*"

Leveraging Collaborative Networks: Excerpts from the [2006 NSDL Annual Report](#)

Founded by the National Science Foundation in 2000 as its online library of exemplary resources for science, technology, engineering, and mathematics education...the [National Science Digital Library](#) offers an organized point of access to a wealth of online educational resources.

NSDL Pathways partners are aggregators of resources and user services for their communities. They are portal sites supporting resource discovery for broad categories of users...in partnership with organizations and institutions that have a history and expertise in serving...target audiences...

Applied Math and Science Education Repository (AMSER) *[Example Pathway]*
AMSER is an applied mathematics and science education portal of resource collections and integrated services designed specifically for use by faculty, staff, and students of community and technical colleges...AMSER's goals include the creation of professional development that promotes adjunct faculty skills in the application and use of digital resources...

Materials Digital Library Pathway (MatDL) *[Example Pathway]*
The MatDL Pathway provides content and services needed across the materials science (MS) community, particularly directed to undergraduate and graduate students, educators, and researchers. MatDL is building an information infrastructure to support MS education, research, and interactions between the two...MatForge is a collaborative code workspace for open access development of modeling and simulation software. MatDL has also established a Teaching Archive for collaborative development of core undergraduate MS teaching materials, and created services and content for virtual labs in large undergraduate introductory science courses...

Creating Collaborative Spaces
*NSDL is already a highly useful library of almost two million vetted science resources, but until now it has followed the traditional library model of search and discovery of resources. To find out about a resource, users must either consult the brief information in the catalog, or else examine the resource itself. Over the past five years of operation, we have heard a strong and consistent message from our community: "**I don't just want a list of resources; I want to understand how to use them**." Context for a resource—... how it relates to other resources; how other teachers have incorporated it into a lesson plan; and what teachers, scientists and librarians have to say about it—are all critical to allowing NSDL users to make effective use of the library...*

The second major release of the NSDL technical infrastructure, NSDL 2.0, supports creating this web of context around the resources in the library. Users will be able to discover resources by their context... [and] to explore the context around a resource: reviews, teaching tips, related resources that were used in the same lesson plan, and much more. There are two critical features of NSDL 2.0: it will easily represent the web of related information around and among library resources, and it will make it very easy for qualified library users to add new context and content to the library.

*Often referred to as Web 2.0, many features in today's technology landscape are characterized by high user participation in content creation combined with deeper and broader access to related information. NSDL 2.0's architecture and library services enable NSDL to build on social networking tools and participatory services such as bookmarking and tagging, wikis, blogs, podcasts, and RSS feeds. By allowing these tools to specifically reference, discuss, and organize library resources... qualified NSDL users will be able to quickly and easily embed these resources in a web of context. **The integration of these social networking tools into the fabric of the library brings another major benefit. It will be easy for communities of interest to form around subsets of resources in the library and collaborate on enhancing library resources as well as context.** This is already beginning to happen with NSDL blogs and wikis, even as NSDL works to fully integrate these tools.*

9. Usage Scenarios for a Knowledge Exchange Network

This chapter provides usage scenarios illustrating how a *Knowledge Exchange Network* would foster the identification and application of exemplary teaching practices. These scenarios return to the goals articulated in Chapter 1 around a core group of faculty with an ongoing engagement in the <u>knowledge exchange</u>, a second group of faculty who participate frequently during the course of collaboration projects for <u>knowledge building</u>, and a third group of faculty who participate periodically in <u>knowledge mobilization</u> in response to either their individual needs as instructors or to institutional priorities in teaching and learning. This chapter concludes with a discussion of ways a *Knowledge Exchange Network* provides value to the institutional leaders in colleges and universities, whose priorities in teaching and learning are advanced by these faculty activities.

Passion-Driven: Who Will Engage in Ongoing Knowledge Exchange?

The conceptual model we employ to analyze the composition of a core *Knowledge Exchange Network* community was developed by Carolyn Kreber (2002). Kreber makes the important distinction between "excellent teachers" and "expert teachers"[*]:

> ***Excellence in teaching*** *is usually identified on the basis of a judgment made about performance…it is deemed far more pertinent that the performance was perceived as successful or effective by those who had the experience (i.e., present and former students, peers, and the instructors themselves)…Awards for teaching excellence, for example, are ordinarily not adjudicated on the basis of how much someone knows about teaching… Over time, most faculty develop a repertoire of approaches and strategies that tend to work well. Nonetheless, some teachers continue to engage in reflective thinking about what works and what does not and ask themselves why it worked or did not work.*
>
> *The expertise literature (Bereiter & Scardamalia, 1993) suggests that faculty who continuously engage in self-regulating their learning about teaching develop into* ***expert teachers***…*The difference is that…people pursuing "expert careers" continually reinvest their mental resources…which, in turn, leads them to develop more sophisticated skills and knowledge…experts continuously seek out new opportunities to further their understanding of problems. It is precisely by identifying, analyzing, and solving problems that experts, over time, develop problem solving strategies that are even more effective. This desire to be even more effective underlies the motivation of experts.*

This division between excellent teachers and expert teachers is of course somewhat simplistic – for example, some teachers pursue this role as experts only in certain areas of their teaching.

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[*] Kreber makes the further distinction of scholars of teaching, who are experts advancing the body of knowledge about teaching in their disciplines. We do not pursue this distinction, since our focus is more on advancing practice. We can also make a useful distinction between *excellent teachers,* whose performance exceeds that of their peers, and *exemplary teachers,* whose teaching processes can be disseminated so that their performance can be replicated by others who follow those processes as a model for effective teaching.

The commitment to continuously enhance their understanding of teaching and their capability to engage learners is a reflection of the faculty members' underlying passions in their subject area. For our purposes, the distinction is important in understanding that it is expert teachers who can be expected to engage as the core community who will contribute to and sustain a *Knowledge Exchange Network.* They are the discipline community members who contribute to the MERLOT [Editorial Boards](#) as Peer Reviewers of learning resources, to the NSDL Pathways programs such as the [MatDL Teaching Archive](#), share their teaching methods with others through the [Teach the Earth](#) portal, and oversee governance of Higher Education Academy [Psychology](#) subject centre in the U.K. These faculty members find the interactions within these communities of purpose are intrinsically rewarding as sources and inspiration for additional expertise.

While the passion of expert teachers is a necessary precondition for an effective community to sustain an ongoing knowledge exchange amongst teachers, it may not prove sufficient to generate significant institutional value. The passion of these expert teachers does not always translate well into extrinsic benefit to their colleagues and to their institutions. When these enthusiasts become the prime source of input on further development of learning resource repositories and the directions of scholarship in teaching and learning, the needs of the majority of faculty may not be addressed and the expected scaling up of knowledge exchange does not occur. A sustainable *Knowledge Exchange Network* must incorporate knowledge mobilization which supports other faculty whose involvement occurs in the context of particular projects, problems, or institutional priorities.

Project-Driven: Scenarios for Collaborative Knowledge Building Projects
The second set of usage scenarios to be considered was illustrated in Chapter 6 with examples of collaborative projects across institutions which need an infrastructure to support their development activities and to disseminate the products and insights from their work. Both the CIHC and the OSLT program had explicitly identified the need for a repository for sharing and maintaining the teaching and learning resources being produced; left implicit was the opportunity for a collaboration platform to facilitate distributed project operations and representation of the teaching knowledge the project teams identified, applied, or developed.

These collaborative projects are supported by funding external to the Ontario postsecondary system and consequently are of at most tactical importance for our colleges and universities. A *Knowledge Exchange Network* can also support collaborations around strategic themes. For example, if several Ontario universities sought to strengthen the process of program review to promote the practice of [Research-led Teaching](#) (Brew, 2001), a collaborative knowledge exchange around exemplary processes and "lessons learned" would also produce artifacts to share that knowledge more widely: guidelines, case studies, etc. These resources, and the knowledge network underlying them, would be of significant value to other provincial institutions which choose to emulate these leaders. We return to consideration of these collaborations in the last section of this chapter.

Priority-Driven: Scenarios for Periodic Use to Address Academic Priorities
We can envision the following scenarios as creating significant extrinsic incentives for investment in instructional change by faculty who are only periodic users of the *Knowledge Exchange Network*, in particular those who do not fit Kreber's definition of expert teachers with

continuing engagement in "self-regulated learning about teaching and continuing development of improved effectiveness". These scenarios involve periodic departmental* initiatives to enhance teaching and learning, beyond the individual commitments described above for expert teachers:

> A department aims to enhance learning outcomes in specific course topics. The extrinsic impetus for this may often involve dissatisfaction at the institutional level, e.g., the identification of a need for more nursing graduates may lead to an institutional initiative to improve retention of nursing students who are admitted with weak prerequisite skills in mathematics or chemistry. Another extrinsic impetus could be feedback from employers or other instructors about student difficulties in transferring classroom knowledge into application in practice.

  Some other design scenarios for *Knowledge Exchange Networks* focus on such problem-driven use to address specific instructional challenges outside of this context of extrinsic motivation (e.g., Education.au, 2006). The survey data in Chapter 8 and the limited use of some learning resource repositories suggest that a 'business case' should not be based on extensive use by time-pressured instructors with only intrinsic motivation – at least until a critical mass of resources and expertise is available to users and access is integrated into work tools.

> An instructor is developing learning activities and resources to address a new departmental outcome within a course. The impetus here could be self-directed if the instructor was a supporter or an advocate of curriculum change to introduce new disciplinary outcomes. It could also be an extrinsic strategic program within the institution, e.g., addressing Degree Level Expectations in a more thorough way.

  As an example, the Ohio State University has introduced a graduation requirement that students be able to demonstrate skills in written, oral, and *visual* expression. Course revisions are now underway to insure this additional outcome is achieved by all students (Metros & Woolsey, 2006). As another example, a group of U.S. institutions is exploring *Innovation Literacy* as an across-the-curriculum learning outcomes for student success in a global knowledge economy (TRIBE, 2007).

> A department seeks to address the needs of a new student cohort. A number of predictions have been made about the differing learning needs of 'millennials', 'digital natives' and the like. The most immediate impact noticed by departments seems to be in the area of *Academic Integrity*, where many institutions are feeling they need to respond to changing student attitudes and perceptions. Other institutional initiatives might target particular underserved demographic groups for whom retention had been identified as an issue (Nelson, 1996).

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* the scenarios apply equally to other academic units: School, College, etc.

- a department may be seeking to reduce instructional costs or respond to other external constraints. Several public university systems in the U.S. have provided seed grants to enable institutions to engage in Course Redesign with the goal of simultaneously enhancing student learning outcomes while lowering per student costs for instruction (e.g., California, North Carolina, Arizona, Maryland, along with individual institutions like Ohio State). These initiatives are invitational so departmental and faculty involvement is self-directed; identifying and promoting successful Course Redesign practices to meet these goals in a similar institutional or disciplinary context is vital for successful adoption of these approaches.

In each of these scenarios, faculty involved in identifying and applying exemplary practices for these instructional changes will want to access discipline exemplars. A Knowledge Exchange Network to access a broad range of resources within and outside of Ontario could provide access to tools, information and knowledge in these areas. Several of the scenarios above had links to suitable resources; here are two expanded scenarios to illustrate access to pedagogical content knowledge to support identifying and mobilizing exemplary teaching practices:

- A Google Search on "chemistry, nursing, teaching" turns up a couple of thousand hits on curricula with a chemistry course for nursing students, but no guidance on the pedagogy involved. A Scholars Portal search turns up an article from 2005 on *Teaching nursing and engineering students chemistry: New activity-based approach, same challenges* and one from 2000 on *Predictors of nursing students' performance in a one-semester organic and biochemistry course* and one from 1995 on *A Collaborative Approach by Nursing and Science Faculty to Improve the Success of Nursing Students in Chemistry.* Of even more value would be some record of others in Ontario or elsewhere actively interested in this area.

- A Google Search on "academic integrity" and "economics" yields a multitude of economics course syllabi with statements of expectations about Academic Integrity, but does not reveal the section on Plagiarism in the Handbook for Economics Educators of the U.K. Higher Education Academy Subject Centre in Economics. A bilateral agreement with the Academy could potentially provide federated search on the resources of the subject centres sponsored by the Academy.

Institutional Value from Identifying and Promoting Exemplary Teaching Practices
The example of the MERLOT Network was presented in Chapter 8 as an instance of alignment over a period of time between the goals of institutional sponsors and the activities of networks for their faculty communities. This alignment was critical in generating ongoing support. In the case of a *Knowledge Exchange Network* to support exemplary teaching in Ontario postsecondary education, support from colleges and universities could come in several forms:

- effort by faculty/professional development units to link in their resources, promote and support faculty use and contribution, and potentially contribute their own time to collaborative development with other teaching and learning centres;
- time of leading teachers as catalysts for knowledge exchange in their disciplines;

> ➢ Setting expectations for institutionally sponsored projects to use and contribute to the *Knowledge Exchange Network* as a means to promote exemplary teaching practices;
> ➢ Supporting resource commitment for the *Knowledge Exchange Network* in the plans of provincial agencies (HEQCO, Ministry of Training, Colleges and Universities (MTCU), ORANO…);
> ➢ Setting expectations for collaboration in high priority areas where there are common interests across institutions in identifying and promoting exemplary teaching practice

This last point seems to be critical in order for a *Knowledge Exchange Network* to thrive: deliver, and demonstrate value in supporting high priority institutional goals. Sustaining the necessary social and technology infrastructure to support scaleable knowledge mobilization requires institutional commitments beyond the personal passion of expert teachers and occasional use by short-term project teams[*]. The value proposition for a *Knowledge Exchange Network* has to include a tangible return on investment at the institutional level, to demonstrate that a modest commitment of time and effort in supporting the social and technology infrastructure for knowledge exchange increases the productivity and impact of institutional efforts of strategic importance.

Several potential high priority areas for identifying and promoting exemplary practices were suggested in consultations with Vice-Presidents Academic and Chief Learning Officers in Ontario. Some have been incorporated in the usage scenarios listed above for Collaborative Projects and Periodic Use; additional areas mentioned for collaborations include sharing exemplary practice in outcomes-driven program design and developing teaching capability with new faculty and part-time instructors. The importance of identifying and addressing common strategic priorities is reflected in the Principles for a *Knowledge Exchange Network* that follow in Chapter 11 and the Recommendations to HEQCO for next steps in Chapter 12.

Other Potential Ontario Partners

Our focus in this report has been on the value of a *Knowledge Exchange Network* relative to the goals and priorities of HEQCO and of Ontario colleges and universities. There are also other provincial and national organizations with complementary interests. For example, one of the informal consultations informing this report was with the ORANO. While ORANO is best known in the postsecondary community as provider of a robust network infrastructure through the Ontario Research and Innovation Optical Network (ORION), the organizational vision is to support a larger *cyberinfrastructure* including "facilitating the deployment of user-centric services and web 2.0 applications over the ORION network" (ORANO, 2007). ORANO's new Partnerships and Strategic Alliances Group could become involved in further discussions about the development and hosting of a *Knowledge Exchange Network* technology infrastructure.

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[*] the alternative for sustainability seems to be a source of far-sighted sponsorship to sustain momentum until a critical mass of resources and users can accumulate, e.g., the Higher Education Funding Council in the U.K. or U.S. foundations like Carnegie or Hewlett. Neither appears to be a likely model for Ontario.

III. Moving Forward in Ontario

10. Principles for a *Knowledge Exchange Network* for Exemplary Teaching

The analysis produced a number of conclusions for a strategic approach to a HEQCO *Knowledge Exchange Network* for exemplary teaching, including the following:

i) Focus on a community-oriented paradigm as outlined in Chapter 9.

ii) Focus on network facilities which transparently integrate content and activities based at participating institutions, those based at the regional and provincial levels, and content and activities based outside Ontario.

iii) Provide clear Return on Investment (ROI) for individuals – users, contributors, catalysts – project groups, supporting institutional units, and institutional/provincial strategic priorities. At the institutional level, this will mean demonstrating ROI on institutional goals such as those outlined in Chapter 10.

iv) At the provincial level, emphasize global excellence, in line with our goals for mobilizing, sharing, and developing world-leading knowledge in all scholarly areas:

> *Higher education in Ontario will be a leader in identifying, promoting and applying exemplary teaching practices. The Knowledge Exchange Network will be a catalyst for this goal by enabling Ontario communities of teaching practice to engage with one another and with pre-eminent knowledge communities around the world to mobilize, share, and develop world-leading teaching expertise and resources.*

v) At the institutional level, institutions who choose to participate in the HEQCO *Knowledge Exchange Network* – individually or as consortia around issues or regions – may need to translate this provincial goal into concrete objectives and measures which align with their institutional priorities and resources. Ideally, this will also align with emerging process-oriented views of quality assurance and support. For example:

> *The teaching activities of N% of our faculty and X% of our programs are systematically informed by, aligned with and contributing to world-leading knowledge and resources for exemplary teaching, consistent with our context.*

vi) Begin to use the power of Web 2.0 collaborations to capture dynamic community knowledge. For example, Appendix A illustrates how a prototype collaborative webspace (a "wiki") could be used to generate and maintain a synthesis of different forms of knowledge about a specific teaching issue.

vi) Establish bilateral partnerships with world-leading knowledge exchanges elsewhere, to share technical platforms, knowledge content and insights, and to integrate access to social networks and community activities as appropriate.

11. Recommended Next Steps for HEQCO

Given the emergent status of many developments related to a HEQCO *Knowledge Exchange Network*, we recommend four coordinated next steps to occur in 2008:

- ***Plan to share what we have now***: Use this report to invite comment and consultation, including participation a Working Group of potential institutional and other contributors, to collaboratively map out loosely-coupled infrastructures for knowledge exchange through <u>discovery and access</u> to <u>existing</u> institutional products and activities.

The potential participants to be represented in the Working Group would include many of the Ontario organizations indicated above as stakeholders:

- Colleges Ontario
  - Committee of Heads, Libraries and Learning Resources
  - Coordinating Committee of Vice-Presidents, Academic
  - Educational Technology Coordinating Committee/Chief Information Officers (CIO) Council

- Cooperative Learning Object Exchange (CLOE) of Ontario Steering Committee

- Council of Ontario Universities (COU)
  - Association of Computing Services Directors (ACD)
  - Ontario Council of Academic Vice-Presidents (OCAV)
  - Ontario Council of University Libraries (OCUL)

- Educational Developers Network of Ontario

- Institute for the Advancement of Teaching in Higher Education

- Optical Regional Advanced Network of Ontario (ORANO)

- Society for Teaching and Learning in Higher Education (STLHE)

Other potential contributors could be representatives of the collaborative projects listed in Chapter 5, or participants representing particular discipline groups such as Heads of Health Sciences and Heads of Languages from Colleges Ontario.

- **Invite participation from faculty as discipline catalysts:** Request nominations of catalyst faculty who can engage their discipline colleagues in <u>identifying external sources of exemplary practices and research insights</u> which can be linked as resources into an Ontario Knowledge Exchange Network. The cohort of catalyst faculty will also serve as a <u>planning group for more dynamic knowledge exchange</u> amongst expert teachers in the province. These nominations will come from institutions and the work will be supported by HEQCO grants to release faculty time for this role.

Some institutions may be able to offer matching support: a number of Ontario institutions have appointed faculty fellows to their teaching and learning centres, and some institutions have already established support programs for exemplary teachers to disseminate and extend their expertise (e.g., Queen's University, University of Ottawa). However, matching institutional support should not be a condition of selection – the key priority will be a personal record as a catalyst for exemplary teaching and support for the nomination from discipline colleagues and collaborating institutions.

- **Test new collaborations for knowledge-building:** Commission a set of pilot studies to model inter-institutional <u>contribution and development</u> of knowledge and resources for exemplary teaching. Emphasize projects addressing both HEQCO goals and strategic priorities across multiple institutions. Partner outside Ontario to use leading-edge technical infrastructures as a base, and supplement with additional personnel support to projects in order to simulate the benefits and costs of a working Knowledge Exchange Network.

- **Explore national and international linkages:** the two activities above focus on mustering Ontario resources to address Ontario priorities. In their plans, those activities will take into account our goals for global excellence and the resulting need for knowledge exchange with expert communities and infrastructure advances across Canada, North America, and other world leaders. Several ongoing informal linkages will continue; exploring more formal linkages should commence in September 08, following the Task Force activities and launch of the pilot studies.

Looking ahead

At the level of individual institutions, the interface to a *Knowledge Exchange Network* might be integrated into the faculty workplace through a course management system, a library portal, a custom browser toolbar or some other means. We can expect multiple interfaces to be developed to meet the needs of different institutions and faculty, and the role of a collaborative *Knowledge Exchange Network* program would be to share effort in such developments – but not to limit how any institution will provide its interface.

At the Platform level, a collaborative *Knowledge Exchange Network* program in Ontario would map out mechanisms to link together resources and services as the needs and the tools evolve. While there could be multiple customizations and extensions to this technology infrastructure, there is a common core whose development could be shared to insure ready access for institutional interfaces on the one hand and powerful facilities for teaching communities to identify, share, develop, adapt, evaluate, and refine exemplary teaching practices and resources.

Much of the institutional interface and technology platform work can be reused, adapted, and collaboratively developed with other partners in Canada and internationally. The most important work to enable a Knowledge Exchange Network for Exemplary Teaching remains as a challenge for collaboration within the province: the systematic engagement of our teachers in

knowledge exchange activities (such as those outlined in Chapter 10), the evaluation of benefits and costs from these activities, and establishing a continuing expectation that our teachers will mobilize, share, and develop world-leading teaching expertise and resources. One flagship application of a Knowledge Exchange Network will be for the groups collaborating on its development to use the emerging facilities and services in knowledge exchange themselves, to insure that the process of creating the Knowledge Exchange Network also demonstrates the mobilization, sharing, and development of world-leading expertise and resources for knowledge exchange.

For more information on recommended next steps for HEQCO, refer to Addendum to the KNEET Report on p. 55.

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Dr. Thomas Carey is a Professor of Management Sciences in the Faculty of Engineering at the University of Waterloo and a Visiting Senior Scholar in the Chancellor's Office of the California State University. In addition to his work on this research study of a Knowledge Exchange for Exemplary Teaching for the Higher Education Quality Council of Ontario, Dr. Carey is also Program Leader of the *ELIXR* research and innovation program funded by the U.S. Dept of Education's Fund for the Improvement of Post-Secondary Education, and Lead Catalyst for the *Transforming Course Design* initiative in the California State University.

At Waterloo, Dr. Carey's most recent campus position was as Associate Vice-President - Learning Resources & Innovation, where his mandate focused on enhancing learning through innovations in teaching and technology. He also has served as Chief Learning Officer of the MERLOT network in the United States and founding Director of the Cooperative Learning Object Exchange in Ontario. Dr. Carey has ongoing roles in several higher education collaborations and advisory groups, including serving as a Senior Associate of the TLT Group in Washington D.C., a member of the Adobe Higher Education Advisory Board, and a member of the External Experts Advisory Group for the Carrick Exchange project in Australia.

Dr. Carey was one of the founders of Human-Computer Interaction as an academic discipline in Canada. He was also co-leader of the Workplace Research theme in Canada's national Network of Centres of Excellence in TeleLearning, where he led research projects in workplace learning with government, not-for-profit and corporate organizations including IBM Canada and Nortel Networks.

Before returning as a faculty member to Waterloo - where he received a Ph.D. degree in Computer Science - Dr. Carey had management and faculty responsibilities in other Canadian universities as Executive Director of Graduate Programs and Co-Director of Teaching Support Services. He has advised numerous higher education institutions and government agencies on learning and teaching strategy, and has received awards for his pioneering contributions to curriculum development, for research papers and for corporate-university partnership.

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List of Links

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  http://www.causeweb.org/research/

comPADRE
- RESEARCH-BASED REFORM OF UNIVERSITY PHYSICS
  http://www.compadre.org/per/per_reviews/

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  http://www.tla.ed.ac.uk/etl/docs/HistoryDigest.pdf
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Appendix A: A Knowledge Synthesis for Teaching Cash Flow Statements to Business Students
[excerpts from a Research Digest used in the California State University Transforming Course Design
program]

Challenges
The Cash Flow Statement is challenging for students because of its particular tradeoff between the
conceptual logic of financial logic and the operational requirements of generating and managing cash
flow.

> *"The Statement of Cash Flow is one of the more difficult concepts to teach in an*
> *Introductory Financial Accounting course. Students often find the underlying concepts*
> *confusing, particularly after using accrual accounting techniques for several weeks to*
> *prepare balance sheet and income statement information. This module helps students to*
> *understand the type of information communicated by the Statement of Cash Flow."*
> > Annand, D. Learning How to Prepare a Statement of Cash Flow
> > Using Computer-Based Instruction, Proceedings EDMEDIA 1997.

> *"Students appear to instinctively understand the meaning and importance of both income*
> *statements and balance sheets….compared to seeing the value of creating a cash flow*
> *statement…cash groups in general appear to resent the existence of a third major*
> *document…"*
> > Bessner, B. The Accounting Educator, XIV (2), 10-11. p. 10

Contexts
Resources for teaching about the Cash Flow Statement are typically designed for students in Accounting
programs, and likely for many other students who perceive Accounting as critical to their goals. Some
reflections on teaching Cash Flow suggest that a more applied approach will be more effective for
students in business entrepreneurship programs rather than accounting programs. The challenge for
these students is to connect the concept of cash flows with its practical value in the proactive context of
business planning, not just as a post-hoc analysis.

> *"For example, I want my current students to know how to take a set of facts and create*
> *projected cash flows for a new business. I want them to be able to tell whether that*
> *business is viable and suggest ways to remedy problems….if projections show a*
> *negative cash balance at any point, it generally means that they are undercapitalized. I*
> *could tell them that, but it seems to sink in better when they look at the cash balance and*
> *realize they would be bouncing checks. Rather than give them a list of rules, I get them*
> *to understand that tracking the flow of cash in a new venture allows them to do*
> *something very practical and down to earth: not bounce checks".*
> > Noel, T.W. Lessons from the Learning Classroom,
> > Journal of Management Education, 28(2), April 2004 188-206, p. 204

Outcomes
Each course in a curriculum is traditionally regarded as contributing to two levels of student capability:
those focused on the concepts and capabilities of the course content and those focused more generally
on Degree Level Expectations. Some past studies have investigated the ways in which studying cash flow
can make a contribution to these larger curriculum goals.

Deep versus Surface Learning
- *"When teaching accounting to undergraduate students…there is the challenge of*
  'instrumentality' as students are motivated to study accounting…for vocational
  reasons linked to future extrinsic reward.
- *Another challenge, possibly linked to instrumentality, is an approach to*
  learning…where surface learning is favoured over deep learning.
- *Finally, students of accounting often lack concrete experience to enhance*

Previous Studies on Engaging Learners with Cash Flow Statements (continued)

> *their learning, possibly causing them to adopt learning style preferences favouring abstract conceptualization.*
> ▪ *Students adopting such learning style preferences can often perform well in methods of assessment favouring theoretical aspects of accounting.*
> > Marriott, N. Using computerized business simulations and spreadsheet models in accounting education: a case study, Accounting Education, 13(Supplement 1), Dec. 2004 55-70 Abstract

Generic Problem-Solving Capabilities

> *"I teach the students how the fact that I am relating was discovered or the principle I am teaching was formulated. I want my students to understand where the facts and rules we teach come from and also be capable of reasoning through and distilling down the vast array of concrete experiences they will have to formulate new rules and new insights…If they forget the specific rules, they can regenerate them. I hope they have not only learned how to generate financial statements but also a little and how to teach themselves….To teach this way, I have to provide more support … [students will not] know how to be self-reflective in this way without a lot of coaching and support [Kolb, Ruben & Mcintyre, 1984]. Because most students seem to have trouble taking experience and developing useful principles from it, I have to guide them through that process"*
> > Noel, op. cit., p. 205

Resources for Teaching Cash Flow Statements

Cash Flow Statement Tutorial: A comprehensive introduction, which can best be used once students have absorbed the rationale for understanding cash flow statements. There are six sections: an introduction, a review of accrual accounting concepts and their effects on the balance sheet working capital accounts and related income statement accounts, three separate modules on how to calculate cash flow from operations, investing, and financing activities respectively, and a final section on interpreting the finished CFS. For a shorter module focused solely on the operating activity of a Cash Flow Statement, consider a tutorial such as **Operating Cash Flow.**

Guide to Financial Statements: This module contains a good guide to Cash Flow Statements, bundled in with others on income statements and balance sheets.

Cash Flow Calculator: This tool helps students to manage the details of calculations and to visualize the impacts of changing values. The introduction is written with Management students in mind, e.g., *Having adequate cash flow is essential to keep your business running. If you run out of available cash, you run the risk of not being able to meet your current obligations such as your payroll, accounts payable and loan payments. Use this calculator to help you determine the cash flow generated by your business.*

For students for whom additional motivation is required as to the value of Cash Flow Statements, there is evidence that embedding the use of cash flow statements in a larger motivating business simulation can be helpful.

> *The simulation provided the students with the concrete experience of the reality of severe capital rationing and the increased tendency for new businesses to fail because of cash flow difficulties. Five of the 18 students specifically referred to the lessons of cash flow management which they had encountered in the simulation:*
> *"The business simulation…gave us a good lesson…on the actual conduct of a small business and we learned about the importance of cash flow as the 'lifeblood' of the small firms [student K.]…"*
> > Marriott, N., op. cit, p. 65

Appendix B: Applying a collaboratory taxonomy for scientific research to a *Knowledge Exchange Network* for Exemplary Teaching

The discussion of different target user groups in Chapter 10 was derived in part from a similar analysis in a different academic work domain: an analysis of distributed scientific collaborations in the U.S., so-called "collaboratories" (Bly, 1998), shown in the table below.

Collaboratory types by resource and activity (Bos et al, 2007).

	Tools (instruments)	Information (data)	Knowledge
Aggregating across distance (loose coupling, often asynchronously)	Shared Instrument	Community Data System	Virtual Learning Community, Virtual Community of Practice
Co-creating across distance (requires tighter coupling, often synchronously)	Infrastructure	Open Community Contribution System	Distributed Projects Distributed Research Centers

The horizontal axis "differentiates based on the type of resource to be shared": a scientific instrument such as a telescope, an information resource such as a shared database, or a knowledge base which might provide access to both implicit and explicit knowledge. The vertical axis differentiates by the type of collaborative, from aggregating existing tools, data or knowledge in the top row to jointly creating new tools, information or knowledge in the lower row.

This informal taxonomy illustrates the need for different technical and social infrastructures to support the differing needs across the table. As the researchers concluded:

"In general, the collaborations become more difficult to manage and sustain from the top left of this table to the bottom right….A question that arose early on in the project was, 'What technology should be recommended for collaboratories?' However, the nature of the projects that were being generalized across was so diverse as to make the question specious. The technology needs of a Shared Instrument Collaboratory are very different from those of a Virtual Community of Practice, for example."

If we summarize our analysis of opportunities for a Knowledge Exchange Network for Exemplary Teaching using this framework, the space of possibilities and examples might look like this:

	Tools	Static products to represent pedagogical information	Dynamic (community-maintained, Web 2.0) knowledge resources
Aggregating across distance	Resource repository (learning resources, instructional design and assessment tools)	Teacher reflections, scholarship of teaching and learning	Dynamic knowledge syntheses (Appendix A), expert network
Co-creating across distance	Cooperative design of resources (e.g., CLOE)	Project teams, shared faculty development	Collaborations on strategic priorities

Adapted from (Carey 2007)

Addendum to the KNEET Report

The KNEET Report was posted on the Internet in Spring 2008 for comment by interested members of the higher education community. A number of suggested revisions have been incorporated in the report and subsequent planning in response to thoughtful comments, whether provided in the online environment or in direct communication. Some additional research domains of interest have also been identified; this addendum provides a brief summary of these knowledge areas for potential future research.

The Addendum concludes with an overview of follow up activities by HEQCO and an online reference point for tracking these developments.

Additional Research Resources Applicable to Knowledge Exchange Networks for Exemplary Teaching

1. Several resources pursue the theme of different levels of community engagement, and the need to target these groups with different facilities. Among the most interesting are the **Four Levels of Community Engagement** proposed in a Gartner Group study of online (commercial) communities[1], and the Collaborative Knowledge Networks concepts developed at the MIT Center for Collective Intelligence[2] and presented in books and websites such as Swarm Creativity[3].

The Gartner Group study of commercial online communities identifies **Four Levels of Community Engagement**. These insights mirror the different community types described in the KNEET report, and point toward different facilities to engage and support each level:

- Up to 3% of individuals will be **creators**, providing original content and can be advocates that promote your product and services.
- Between 3-10% of individuals will be **contributors**, essentially followers, who add to the conversation, but don't initiate it. They can recommend products and services as customers move through a buying process, looking for purchasing advice.
- Between 10-20% of individuals will be **opportunists**, who can further contributions regarding purchasing decisions. Opportunists can "add value" to a conversation that's taking place, while walking through a considered purchase.
- Approximately 80% of individuals will be **lurkers** (and all users start as such), essentially spectators, who reap the rewards of online community input, but only absorb what is

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[1] Gartner Group, How to Determine Levels of Engagement for Generation Virtual. Research Report, June 2008.
http://www.gartner.com/it/page.jsp?id=721008
[summarized in Via ScLoHo's Collective Wisdom blog, August 9, 2008
http://sclohonet.blogspot.com/2008/08/generation-v.html]
[2] http://www.ickn.org
[3] http://swarmcreativity.net/ and Gloor, Peter. *Swarm Creativity: Competitive Advantage through Collaborative Innovation Networks*, Oxford University Press, 2006.

being communicated. However, they can implicitly contribute and validate indirectly reporting the value from the rest of the community.

A complementary perspective has been developed in the MIT work on Collaborative Knowledge Networks, which links together three types of community engagement:

- Collaborative Innovation Networks are teams enabled by the Web to collaborate in achieving a common goal by sharing ideas, information, and work. The cooperative projects described in Chapter 5 of the KNEET Report are examples of **Collaborative Innovative Teams**, which would become Networks if their activities continued beyond a short-term project.
- **Collaborative Learning Networks** are comprised of people who come together in a community to know and learn from like-minded people. They can refine and adapt the insights and resources from Collaborative Innovative Teams, although they do not typically engage in cooperative work as project teams.
- Participants in **Collaborative Interest Networks** share the same interests but do little actual work together in a virtual team. The overwhelming majority is made up of non-contributing participants or information seekers.

All together, these differing kinds of collaborations are said to constitute a Collaborative Knowledge Network, an ecosystem by which to carry innovations and shared knowledge exchange can be disseminated and adapted "over the tipping point" within organizations.

2. While the resources listed above focus on the commercial or productivity aspects of online communities, more sociological perspectives have also begun to yield new insights applicable to our investigation of *Knowledge Exchange Networks*. One key concept that appears to be particularly promising is the notion of **Object-Centred Sociality**. The key question addressed in these analyses is "Why do some online social networks work and some don't?" The analyses point to the following conclusion: "*social networking sites' longevity is proportional to their object-centered sociality – that is, the degree to which people are connecting via items of interest related to their jobs, workplaces, hobbies, etc*"[4]. In the work setting, this perspective incorporates research from the sociology of work on how shared artifacts function as points of interaction in the workplace[5], and focuses on work practices and the ways in which these practices interact with shared objects and the interactions around them.

The potential usefulness of this approach can be illustrated by application to the realm of open educational resources discussed in Chapter 4. The perspective of Object-Centered Sociality suggests that we need to focus less on resources as reusable components and more on the

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[4] Engeström, J., (2005), Why some social network services work and others don't , blog entry April 13, 2005 at www.zengestrom.com,. See also the extensions in Breslin, J., and S. Decker, The Future of Social Networks on the Internet: The Need for Semantics, *Internet Computing*, 11 (6), Nov.-Dec. 2007, pp. 86-90 .

[5] Knorr Cetina, K., "Objectual Practice" in *The practice turn in contemporary theory*, edited by Theodor R. Schatzki, Karin Knorr Cetina, and Eike von Savigny (London 2001: Routledge). See also the larger discussion in Blackler, F., and Y. Engestrom, (eds.), Special Issue on the Rise of Objects in the Study of Organizations *Organizations*, Volume 12, No. 3, May 2005.

resources as objects which serve as a focal point for valuable work interactions in a social network. While this kind of shared interaction has always been a goal of work on open educational resources, it has not enjoyed the primacy of simpler measures of success: How many resources are available? How many resources are being used? This perspective supports the view in Chapter 4 of the KNEET Report that the disappointing numbers from many repositories about the quantity of reuse may reflect our failure to provide an objects + interactions combination which fits with the interests and work practices of our intended participants.

3. Some insights from studies of virtual research environments were incorporated into the KNEET Report, in particular the taxonomy of collaboratories cited in Appendix B. Other recent studies of online research collaborations have looked explicitly at educational research collaborations. For example a recent special issue[6] of the research journal *Technology, Pedagogy and Education* reports on experiences in two distributed educational research networks in the U.K.:

- the Economic and Social Research Council's Teaching and Learning Research Program, comprised of over 500 researchers and more than 70 projects. This initiative included a project focused on creating, supporting, and evaluating a Virtual Research Environment for Education, addressing both "the need for an electronic infrastructure to support multi-institutional projects" and the desire to "identify opportunities to use Internet technologies as part of an engagement and dissemination strategy involving research participants and research users"[7].

- the Applied Educational Research Scheme in Scotland, which focused on research projects with schools in learning and teaching issues as well as management and governance. The use of the Virtual Research Environment for collaboration included supporting "communities of enquiry" involving both researchers and practitioners in school-based research.

These studies will provide helpful insights into the development of *Knowledge Exchange Network* for Exemplary Teaching for Ontario higher education. However, many of the studies focus on knowledge transfer rather than knowledge exchange, and none attempt to engage teacher-scholars in a full cycle of sharing, adapting, evaluating, and revising innovations and research insights for teaching and learning.

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[6] *Technology, Pedagogy and Education*, Volume 16 Issue 3 2007. Special Issue on Technologies, Research and Development in the Teaching and Learning Research Programme and Applied Educational Research Scheme

[7] Carmichael, P. Introduction: Technological development, capacity building and knowledge construction in education research, *Technology, Pedagogy and Education*, 16(3). 2007. p. 236.

4. Another body of knowledge providing further ideas is the research domain of distributed teams in other knowledge sectors, in particular in software development[8,9] . It appears that these studies could provide insights into issues concerning both the social and technological infrastructures required for a *Knowledge Exchange Network* for exemplary teaching. However, considerable re-contextualization is required to address the distinctive characteristics of the academic environment, and many of the issues about dealing with differing national cultures are of limited relevance (despite the need for a Knowledge Exchange Network infrastructure to address the differing cultures, contexts, and capabilities across the college and university sectors in Ontario).

Follow up Activities by HEQCO

With ongoing consultation from Ontario higher education faculty, educational developers, academic leaders, and partner organizations, HEQCO is developing a research program in Knowledge Mobilization for Exemplary Teaching and Learning to address the needs and opportunities outlined in the KNEET Report. As the program develops, the various components – including pilot studies, Requests for Proposals and invitational working groups – will be described on the program website at http://kmetl.heqco.ca.

[8] Kotlarsky, J., and I. Oshri. Social ties, knowledge sharing and successful collaboration in globally distributed system development projects, *European Journal of Information Systems*, 14, 2005. pp. 37-48.
[9] Kotlarsky, J., I. Oshri and P. van Fenema (eds.). *Knowledge Processes in Globally Distributed Contexts*, Palgrave MacMillan, New York, 2008.