Strategic Framework for Learning Technologies

Report of the Learning Technologies Task Force

June 2014

Table of Contents

Appendices

Executive Summary

Over the past five years, the University of Calgary has increased its focus on teaching and learning, and on the integration of teaching and research. In the spring of 2011, we released the *Integrated Framework for Teaching and Learning*, which highlighted a 5 year plan to enhance teaching and learning on our campus. In the fall of 2011, we released Eyes High, our strategic vision, which emphasized three commitments, one of which was to enrich the quality and breadth of learning. In the spring of 2012, we approved two roadmaps to help us reach Eyes High, the Academic and Research Plans. One of the seven priorities of the academic plan is the integration of teaching and research. It is in this context that we are pleased to present this *Strategic Framework for Learning Technologies*.

Learning technologies are changing the ways that students and professors connect, communicate, collaborate, and create in teaching and learning in physical and online environments. The Learning Technologies Task Force has developed a strategic framework to support high impact, research-informed learning experiences that are enabled and enhanced by technology. We have been guided by our *Eyes High* commitment to enrich the quality and breadth of learning, and by the following principles:

- a focus on learners and learning;
- a vision of shared learning among students, faculty, staff, and academic leaders;
- a commitment to integrating teaching and research;
- a recognition of the value of innovation;
- a respect for disciplinary diversity; and
- a commitment to sustainability in an ever-changing post-secondary learning technologies landscape.

This report is supported by internal and external reviews of the learning technologies landscape. The internals scans included surveys of students, faculty, and staff; the recommendations in the recent e-learning report produced by the Faculty of Arts; and a study of our physical and digital learning spaces. The external scans included a robust literature review; consultations with external and internal experts in relevant fields; a discussion of the recent development of open access online courses and their literature; and a review of institutional plans related to teaching and technology, including a recent technology framework developed with and for Alberta's K-12 system.

The conclusions that emerged from the Task Force's review of the landscapes resulted in the development of 5 priority areas that will allow the University of Calgary to become a leader in post-secondary learning technology integration. Within these five priorities are 14 proactive strategies that are essential to the success of this strategic framework:

Priority 1: Governance: The University's decision-making bodies must assess and promote learning technologies and spaces, informed by expertise from the Taylor Institute for Teaching and Learning (TI).

> *Strategy 1*. Enhance the General Faculties Council committee system to provide a governance structure to guide University decision-making about enabling and resourcing the integration of learning technologies.

Strategy 2. Use the General Faculties Council-approved quality assurance framework to assess the impact and integration of learning technologies in the learning experiences of our students.
Strategy 3. Position the Taylor Institute for Teaching and Learning to inform decision-making in building capacity for innovative and research-informed approaches to integrating, developing, and assessing technology-enhanced learning.

Priority 2: Learning Spaces: Our physical spaces and digital platforms must be adaptable, accessible, and designed to be secure and reliable environments for high-quality learning.
Strategy 4. Provide high-quality, flexible spaces for formal and informal learning experiences.
Strategy 5. Develop and support robust, reliable, and sustainable platforms for technology-enhanced learning.

Priority 3: Supportive Environment: We must support the work of students, faculty, and staff in every discipline to integrate learning technologies while respecting the time commitments of all stakeholders.
Strategy 6. Provide mentoring, coaching, and training to students, faculty, and staff.
Strategy 7. Build learning technology capacity to support discipline-specific pedagogies.

Priority 4: Policies and Procedures: Our network of evaluation and reward procedures and our evidence of teaching effectiveness must encourage the integration of sustainable learning technologies.
Strategy 8. Review academic evaluation and reward procedures to enhance recognition for contributions to learning experiences through the integration of learning technologies.
Strategy 9. Enhance institutional policies and procedures to support research-informed, cost-effective, and institutionally responsible technology integration.
Strategy 10. Create a framework to support a sustainable approach to technology integration.

Priority 5: Leadership: Leaders at every level must clear the obstacles to research-informed use and innovation of, and new discoveries about technology-enhanced learning, and support these efforts through communication, resources, and recognition.
Strategy 11. Ensure active, ongoing, and thoughtful reconsideration of high-level factors that inform the strategic framework of technology-enhanced learning.
Strategy 12. Facilitate connections and communication with and among all stakeholders with respect to learning technologies.
Strategy 13. Commit to distributing resources that facilitate effective technology-enhanced teaching and learning.
Strategy 14. Create a culture where the effective use of technology is assessed, valued, and recognized.

The successful implementation of these priorities and strategies will change the culture of learning and teaching at the University of Calgary in a positive and enduring way. This plan is flexible, nimble, and sustainable. It is also universal, applying to and encouraging connection and collaboration among the whole University of Calgary community, including our main campus and our Foothills, Spy Hill, Downtown, regional, and Qatar campuses.

1. Introduction

Technologies that enhance our teaching and learning are causing positive disruptions in higher education. They disrupt local worldviews by putting our ideas and approaches in a global context. They disrupt knowledge held by experts by distributing materials in a crowded online forum in which teachers and learners are active participants. They disrupt traditional post-secondary teaching by fostering collaborative interactions, inviting contributions from novices and experts, peers and professors.

The Learning Technologies Task Force[1] proposes a set of institutional strategies to embrace these disruptions, and their positive potential for our students, faculty, and staff. Now is a pivotal moment to define our shared culture and values with respect to learning technologies. The landscape of learning is changing with the advent of new technologies that facilitate connection, communication, collaboration, and creation.

The University of Calgary is particularly well positioned to engage the diverse ways in which technologies are being developed and utilized to improve knowledge creation, dissemination, and application. The Taylor Institute for Teaching and Learning will create an environment where students, faculty, and staff will design and implement research-informed approaches to learning technologies for diverse contexts and disciplines.

By making effective, research-informed use of learning technologies, our teachers and learners will be poised to integrate valuable traditions with beneficial innovations. We can continue to value and practice time-honoured lectures, labs, discussions, and faculty-student interaction, while integrating digital, online, and asynchronous practices of teaching and assessment that enhance and extend the capabilities of teachers and learners – during university studies, as active citizens, and in pursuit of lifelong learning.

The Learning Technologies Task Force has assessed where the University of Calgary is situated in the contemporary learning technologies landscape, both within Canada and beyond, and has developed a proactive framework that will change the culture of learning and teaching at the University of Calgary. This framework offers a sustainable approach to best and emerging practices for integrating learning and teaching technologies across our community. It is high-level, research-informed, flexible, nimble, and sustainable. It is also universal, applying to the whole University of Calgary community, including our main campus and those at our Foothills, Spy Hill, Downtown, regional, and Qatar sites.

Through the implementation of this strategic framework, the University of Calgary will be a leader in integrating technologies that improve and enrich learning experiences within our walls, and that break down the barriers to our local, provincial, national, and global communities. Future progress and sustainability rely equally on higher education, and on our students emerging from their university studies as informed and knowledgeable digital citizens.

---

[1] For a list of members and consultants of the Task Force, see Appendix 1. For a description of the duties, work plan, and meetings of the Task Force, see Appendix 2.

2. Purpose

The Learning Technologies Task Force was formed to develop a strategic framework for high quality learning experiences that are enhanced and enabled by technology. Guided by its *Eyes High Vision*, the University of Calgary aims to be one of Canada's top 5 research universities by 2016, grounded in our commitment to "enrich the quality and breadth of learning" at the University. Together, the *2012 Academic Plan* and the *2012 Strategic Research Plan* form the roadmap to attain the *Eyes High Vision*. Both plans share a focus on "teaching and research integration." This focus is represented in taking research informed approaches to designing our students' learning experiences and involving students in individual, collaborative and experiential learning. Recognizing the impact of technologies in enhancing learning experiences, the University of Calgary's *Integrated Framework for Teaching and Learning* released in 2011 called for a strategic plan that will support a foundational commitment to enrich learning technologies at the University of Calgary.[2] This report answers that call.

3. Scope

The scope of the LTTF was broad, targeting major areas that included:
- technology-enriched teaching and learning practices;
- enhanced online and physical learning spaces;
- increased access to technologies;
- improved learning support for at-risk students and extended educational opportunities for life-long learning;
- enhanced resources for creating, implementing and assessing technology-enhanced initiatives;
- development of new technology tools;
- policies and practices to support technology integration; and
- partnerships and dissemination strategies that will enhance technology-rich learning experiences across our university and beyond.

4. Statement of Principles

The work of the Task Force and the priorities and strategies that emerged from that work, were guided by the following principles:
- **Focus**. The use of learning technologies is most effective when learners and learning are the focus.
- **Partnership**. In quickly changing technology environments, everyone is a learner: students, faculty, staff, and academic leaders are partners for designing, using and assessing learning experiences enhanced by technology.
- **Integration of Teaching and Research**. The integration of teaching and research is essential to the successful adoption and adaptation of learning technologies. Effective integration is achieved by incorporating disciplinary research in our teaching and by applying research on learning to inform our teaching plans and the design of technology-enhanced learning spaces.
- **Value.** Innovative and exploratory designs for learning and technology integration are valued in faculty work. Resources and support are provided to academic staff and instructional team members who are learning to implement and assess the impact of technologies. Efforts to develop innovative applications of learning technologies are recognized in evaluation and rewards systems.

---

[2] For links to these documents, see Appendix 7.

- **Disciplinary Diversity**. Technology integration is manifested in diverse ways within and across disciplines, and is enriched by sharing and building on how technologies enable and enhance learning in specific disciplinary contexts.
- **Impact.** High-impact recommendations are research-informed, flexible, adaptable, and responsive to changing technology-rich teaching and learning environments.
- **Sustainability**. Research-informed learning technology choices supported by institutional systems will sustain our capacity to be nimble in integrating new and updated learning technologies to support teaching and learning.

5. Contexts

The Task Force sought to gain a clear picture of both the internal and external contexts of learning technologies, details of which will be found in Appendices 3-6. This section provides summaries of these reviews.

5.1. Internal Context

The Task Force examined the internal context of learning technologies in several ways. Firstly, we distributed an online survey (see also Appendix 3). The survey was developed to describe the learning technologies landscape at the University of Calgary. Separate surveys were distributed to faculty, student enrolment services staff, and students. Information was gathered about the types of learning technologies used on our campus in the past two years and on the barriers and enablers to the use of learning technologies. Participants reported using a wide range of technologies in the last two years, including computers; mobile phones; PowerPoint; YouTube, streaming videos, audio clips; the *Blackboard* LMS (at the time of the survey, *Desire2Learn* was just being introduced), Facebook, Google Docs, the library website, e-books and online journals, and Top Hat or other classroom response systems. A smaller percentage of respondents reported using online discussion groups, document cameras, and SMART Boards, and a wide range of discipline-specific technology.

The most common enablers to the use of learning technologies were training, intuitive user interfaces, and peer support. Students identified the effective use of technologies by their instructors as an enabler for their own effective use, which demonstrates the importance of faculty being properly trained in technology. Faculty and staff routinely cited ease-of-use and experience as key enablers to the use of learning technologies. For barriers, the consistent theme was lack of time to learn to use new technologies effectively. Faculty and staff also cited the lack of rewards and recognition offered to individuals who use technology-enhanced learning. Faculty and students often experience difficulties with classroom layout, internet connectivity, and the lack of user-friendly tools and interfaces. Students also cited financial concerns when required to use current technology or devices for class work. They also emphasized their desire to maintain opportunities to interact with and receive face-to-face instruction from academic staff, which they feel might be lost if learning technologies were extensively used without sufficient attention to the value of personal interactions with faculty members.

Secondly, as the Task Force was beginning its activities, the Faculty of Arts appointed an e-learning working group, which undertook its own survey of Arts student, faculty, and staff. The working group's findings were reported in November 2013 in *Knowledge Networks: Post-Secondary Education in a Digital Age*, and have relevance for the wider University community. The report concludes with seven recommendations:

- Develop and publish a statement of principles and code of conduct regulating e-learning.
- Define disciplinary e-literacy at the department levels.
- Ensure access to classroom infrastructure that enables the use of e-learning.
- Create a digital mentors website and colloquium series to develop e-learning expertise.
- Customize Desire2Learn so that the interface is user-friendly, reliable, and interactive.
- Develop a strategy on MOOCs that positions the faculty and university in this educational medium.
- Offer resources and incentives to instructors using e-learning methods.

Thirdly, the Task Force was interested in how formal and informal learning spaces at the University of Calgary (both physical and online) were designed and utilized to facilitate active, engaging, collaborative, and technology-enhanced teaching and learning (see Appendix 4). Key conclusions of the study include:
- There are a number of excellent technology-enhanced learning spaces at the University of Calgary, particularly in the TFDL, ICT, and EEEL. These spaces model how we might move forward.
- Faculty and students require more consultation regarding which technology is available in their classrooms, and the design standards that are used throughout the University.
- A committee representing all stakeholders could ensure that new and renovated classrooms are fully functional and purpose-built as technology-enhanced learning spaces.
- Informal study spaces are critical to student success and, in addition to the spaces already available throughout campus, classrooms that lend themselves to technology-enhanced collaborative learning should be readily accessible to students when they are not in use.
- Low-cost technology, such as white boards, can have high impact for teachers and learners.
- Online learning spaces need to be user-friendly, sustainable, safe, secure, and regulated by policies surrounding digital citizenship.

5.2. External Context

The Task Force also examined the external landscape in several ways. Firstly, we generated a review of the literature (see the summary in Appendix 5). While there is much discussion and some innovative uses of learning technologies in higher education, it is still not widespread, and both learners and teachers need support in using contemporary technologies for active learning and knowledge building across disciplines. Several essential conditions for effectively using learning technologies in higher education emerged from the literature, including the following:
- Leadership in developing effective institutional vision and aligned processes.
- A culture that values learning, risk-taking and ongoing faculty development.
- Robust and reliable infrastructure and technologies and hardware/software requirements.
- Technologies for learning need to be incorporated in the course with research-informed outcomes.
- Instructional designs need to consider logistics for effective technology integration and employ pedagogies fostering authentic, learning-centred experiences, creative development activities and collaborative knowledge building, all of which need to be assessed.
- Guidance and support needs to be provided to learners with respect to learning technologies.

Secondly, the issue of open access online courses was discussed in depth by the committee. This discussion was supported by much recent literature on the subject, which has moved toward the conclusion that these courses are not likely to cause significant disruption to post-secondary learning or assessment practices. In large part, the linked challenges of conducting rigorous assessment of learning and generating revenue to support the cost of production and maintenance of open access courses are

preventing large-scale adoption of open access online courses from becoming a sustainable strategy. However, we recognize the public good and the reputational and international advantages that can accrue from offering these types of courses. Drawing on the evidence it has examined, the Task Force believes that the idea of providing open access online learning experiences in selected areas of expertise may be worth considering, particularly in an eCampus Alberta context. This would require identifying the University of Calgary's clear areas of expertise (as other universities have done with respect to their open access online offerings), and targeting resources toward the production of a small number of high quality open access courses that reflect our strategic research themes, particular strengths of our academic programs, and the learning needs of our broader communities.

Thirdly, in order to determine what constitutes an effective learning technologies framework, we consulted with a number of external and internal experts in relevant field (see Appendix 1) and reviewed a number of recent institutional reports on teaching and technology, including a recent technology framework developed with and for the K-12 system in Alberta (see Appendix 6). Sixteen institutional plans related to teaching and technology were examined. The most effective plans provided high-level descriptions of institutional vision and clear expectations from various stakeholders in contributing to the successful development, implementation, and sustainability of the plan. This review, complemented by our consultations, generated the following major themes:
- Strategic investment in resources and infrastructure is needed to support academic integration of learning technologies;
- Dedicated communication and marketing strategies regarding learning technologies are required.
- Increasing use of mobile technologies means people are increasing their capacity for accessing learning experiences. This connectivity needs to be leveraged in a research-informed way.
- Digital technology and cloud computing infrastructures are revolutionizing the manner in which knowledge is created, collected, and communicated across the globe.
- Education increasingly includes experiential learning that is hands-on, globally connected, and research-intensive.
- Collective agreements are beginning to identify the intellectual property rights of faculty members who contribute to online course offerings.

5.3. Conclusion

Our review of the internal and external landscapes has demonstrated the importance of an institutional learning technology strategic framework that is high-level, research-informed, flexible, nimble, and sustainable. In the shifting context of current educational technologies, inflexibility would be a serious liability, so we must be constantly learning about educational technologies and remain open to change. Our ability to adapt is critical to a sustainable learning technologies strategy.

At the same time, we must take a systematic approach in making decisions regarding which learning technologies to support, considering cost, relevance, quality, efficiency, and effectiveness for supporting teaching and learning when assessing tools. It would not be possible for the University to institutionally support all the learning technologies currently used. Therefore, we must critically evaluate which learning technologies we can support and maintain at an institutional level. The context scans have highlighted the importance of supportive governance and leadership; policies and procedures that allow, encourage, and value the use of learning technologies; a commitment to regular and adaptive training for stakeholders; and a robust technological infrastructure that includes reliable connectivity, standardized yet adaptable learning spaces, and mechanisms for renewal and sustainability.

6. Priorities and Strategies

Five priority areas emerged from the Task Force's process of reviewing internal and external learning technologies landscapes:

- **Governance** reflects the need for a strong infrastructure for guiding the coordinated university effort for decision-making in integrating learning technologies. This priority area also acknowledges the need for a comprehensive University effort to support long-term vision and decision-making towards excellence in technology-enhanced learning.
- **Learning Spaces** summarizes the quality of learning spaces, both physical and digital, and the need to design those spaces to facilitate quality teaching and learning. Technology enabled learning spaces need to be research-informed, flexible, responsive, user-friendly, secure, and foster intuitive use.
- **Supportive Environment** highlights the need for institutional support for instructors, staff, and learners to use learning technologies. Stakeholders need to be supported with resources, training, regular communication, and assistance with developing technologically enhanced pedagogies.
- **Policy and Procedures** reflects the need for specific institutional policies to encourage and reward research-informed practice with respect to learning technologies. Policies must set clear expectations, incentives, and guidelines for effective integration of technologies.
- **Leadership** identifies the need for the support and encouragement of technology use, flexible management, and improvements of learning technologies across the institution. Leaders ensure that policies and procedures meaningfully contribute to the empowerment of a community culture required for effective, innovative, research-informed approaches to teaching and learning.

Responding to these five priority areas, fourteen key strategies are presented to guide important next steps for the University of Calgary with respect to learning technologies. Each strategy is accompanied by a series of tactics that will ensure the successful implementation of the strategy.

6.1. Priority Area 1: Governance

Governance strategies include decision-making processes and frameworks to ensure a consistent and sustainable approach to integrating learning technologies. The decision framework should promote the integration of learning technologies and the implementation of appropriate quality assurance processes to achieve measurable benefits to learning. It is clear from our context scans that an institutional environment that encourages and supports the integration of learning technologies is needed. The governance strategies that emerged from the work of the Task Force reflect the university's demonstrable and institution-wide commitment in integrating learning technologies to enable and enhance teaching and learning.

Strategy 1. Enhance the General Faculties Council committee system to provide a governance structure to guide University decision-making about enabling and resourcing the integration of learning technologies.

- Refer all technology decisions that will impact teaching and learning to the Teaching and Learning Committee for consultation. This committee already has responsibility for "monitoring the evolution of technology and its impact on teaching and learning" (2014 and ongoing).
- Create a cross-functional GFC committee/subcommittee that takes an integrated approach to approving design standards, policies for space use, and priorities for investments in learning spaces. This committee should include academic, student, facilities design and management, educational

development, information technologies and financial expertise (2014-2015).
- Provide mechanisms for students, faculty, and staff to offer input on major changes to technology-enhanced learning infrastructure (2014-15).

Strategy 2. Use the General Faculties Council-approved quality assurance framework to assess the impact and continuing integration of learning technologies in the learning experiences of our students.
- Review the Curriculum Review process to ensure that opportunities for enhancing learning through technology integration are assessed as part of every program review (2014-2015).
- Include a Faculty Teaching and Learning Technology Plan as part of the Faculty Unit Review component of the Quality Assessment Review (QAR) process (2014-2015).

Strategy 3. Position the Taylor Institute for Teaching and Learning to inform decision-making in building capacity for innovative and research-informed approaches to integrating, developing, and assessing technology-enhanced learning.
- Ensure that expertise from the Taylor institute for Teaching and Learning is represented in University committees and working groups with responsibilities for learning technologies (2014-2015).
- Increase the visibility of the integration of learning technologies by providing regular updates from the Taylor institute for Teaching and Learning to the Teaching and Learning Committee of GFC and in the President's reports to the Board of Governors (2014-2015).
- Review the implementation of the University of Calgary Teaching and Learning Grants programs on an annual basis to ensure that technology integration is explicitly supported (2014-2015 and beyond).

Metrics for Governance: Proportion of Learning Technologies (LT) decisions moving through GFC TLC Committee for consultation; provisions for LT strategies in Curriculum Review Handbook and Unit Review Guidelines; creation and role of GFC committee/subcommittee that has responsibility for design of learning spaces and learning technologies; reporting of Taylor Institute Technology Integration Group and Educational Development Unit on major changes to LT infrastructure; proportion of Teaching and Learning Grant applications and funding to support of Learning Technologies projects.

6.2. Priority Area 2: Learning Spaces

A learning space is not an inert container, but integral to the design and delivery of learning activities. Many of the pedagogies and methodologies that accompany technology-enhanced learning require properly designed and effective physical and online learning spaces within which to coordinate rich learning activities. One of the barriers to improved learning activities identified by stakeholders was a lack of access to well-designed spaces, or the tools to design these spaces. A high-quality learning space is research-informed, responsive to learners' needs, and flexible enough to allow a range of learning activities and ongoing improvements to technology and teaching and learning strategies. Standards should be established for the design, upgrading, and support of physical classrooms and study areas, and for the user-friendliness, accessibility, and security of online spaces.

Strategy 4. Provide high-quality, flexible spaces for formal and informal learning experiences.
- Review design standards to ensure that new and renovated learning spaces will accommodate multiple uses, users, and modes of technology-enhanced learning by adopting flexible physical

space design, including moveable and multi-purpose furniture and accessible power outlets (2014-2015 and ongoing).

- Develop a comprehensive plan to improve and modernize infrastructure and integrated technologies in formal and informal learning spaces, including facilitating the use of personal devices (2015-2016).
- Increase availability of technology-rich physical spaces for informal collaboration and provide the means for students to access these spaces outside of traditional operating hours (2015-16 and ongoing).
- Document available physical spaces on campus, detailing their pedagogical and technological tools, and showcasing innovative uses (2014-2015 for centrally controlled spaces; 2015-16 for locally controlled spaces).
- Use learning technologies to enhance accessibility to University of Calgary degree credit, continuing education, and open access online learning experiences for learners in Alberta, nationally, and internationally (beginning 2014-15 and ongoing).
- Use learning technologies to identify and enhance the success of at-risk students and continue to assist qualified students who require adaptive technologies to support their learning through Student Accessibility services (beginning in 2014-15 and ongoing).
- Systematically investigate the impact of learning space design on student learning and identify gaps to inform ongoing decision-making regarding renovations and new construction across the campuses of the University of Calgary (beginning in 2015-16, with the opening of the Taylor Institute for Teaching and Learning, and ongoing.)

Strategy 5. Develop and support robust, reliable, and sustainable platforms for technology-enhanced learning.

- Establish a process for active collaboration with the University community to examine and make recommendations on the continuous improvement and modernization of physical, blended and online learning environments (beginning in 2014-2015 and ongoing).
- Continue developing resources to support the effective adoption of Desire2Learn and other university-wide learning technology tools, and support this resource development at an institutional level (2014-2015 and ongoing.)
- Create a process for regularly consulting and collaborating with peer institutions, eCampus Alberta and the community at large to ensure we are providing digital, blended, and online learning experiences of the highest quality (2014-2015 and ongoing.)

Metrics for Learning Spaces: Development of design standards for new and renovated spaces; identification of technology-rich spaces on all campuses and plans for renewal; adaptive technologies for at-risk students; support for D2L and other LT tools; consultation with peer institutions and community.

6.3. Priority Area 3: Supportive Environment

A supportive environment is one in which all stakeholders are facilitated in developing capacity and engaging in the process of technology-enhanced learning in physical, blended and online learning spaces on all campuses of the University of Calgary. Faculty support includes infrastructure, training, technical assistance, and access to funding and time to develop and use learning technologies. Student support includes training in learning technologies; reliable, low-cost, and universal access to University-provided software, hardware, and connectivity, in classrooms and throughout the University; and better access to

learning opportunities through technology enhancements. In particular, technology needs to support students in their desire to become more effective learners, both during their university studies and in their quest to become life-long learners. To be most beneficial, this support needs to be provided across both formal and informal learning experiences.

Strategy 6. Provide mentoring, coaching, and training to students, faculty, and staff.
- Ensure that the Taylor Institute for Teaching and Learning and Information Technologies collaborate to provide opportunities to learn about integrating learning technologies on all University of Calgary campuses (2014-2015 and ongoing).
- Provide continued learning opportunities, including online resources and face-to-face training, on the effective uses of the University of Calgary's learning management system (Desire2Learn) and other major learning technologies to all stakeholders (2014-2015 and ongoing).
- Collaborate with the Students' Union and the Graduate Students' Association to provide sessions for students on using learning technologies and online learning resources during orientation programs (2014-2015 and ongoing).
- Ensure that easy-to-follow instructions for all learning technologies are readily available, both in print and online, in order to minimize disruption to scheduled teaching and learning activities (2014-2015 and ongoing).
- Train and provide in-house educational-technology specialists for each Faculty, who will support, mentor, and coach faculty members in their use of learning technologies (2015-2016 and ongoing).
- Create a funding model or release time standard for seconding colleagues to the Taylor Institute for Teaching and Learning as Teaching Scholars to share their expertise or facilitate technology integration projects over an extended period of time (2015-2016 and ongoing)
- Require central IT and faculty IT teams to prioritize learning technologies queries that support faculty and student requirements for effective and sustainable classroom and online teaching (beginning in 2015-2016 and ongoing).

Strategy 7. Build learning technology capacity to support discipline-specific pedagogies.
- Promote the annual University of Calgary Teaching and Learning Grants competition as an opportunity to enable instructors to develop, implement and/or assess the impact of learning technologies in new and ongoing course designs (2014-2015 and ongoing).
- Provide opportunities for Taylor Institute for Teaching and Learning staff to collaborate with faculty colleagues to gain expertise in discipline-specific pedagogies that can be enhanced with learning technologies (2014-2015 and ongoing).
- Assist faculties and departments in defining how discipline-specific learning outcomes at the course and program level can be enhanced through learning technologies (2014-2015 and ongoing).

Metrics for Supportive Environment: Proportion of Taylor Institute resources devoted to LT support; coordination with SU and GSA during orientation sessions; appointment and training of Digital Mentors; evidence of triage system by central and faculty IT; accessible instructions for using IT developed by Com/Media; proportion of Teaching and Learning Grants funding the development and implementation of LT; development of department-level disciplinary LT requirements.

6.4. Priority Area 4: Policies and Procedures

The policies and procedures of a university provide the general rules and processes that guide the actions of individuals and academic units. It was clear from the research conducted by the Task Force

that it is important to align the policies and procedures with the goals communicated in the strategic framework for learning technologies. The strategies that support the Policy and Procedure priority represent the operational commitment to integrating learning technologies to enable and enhance learning. They recognize the university's leading innovators and encourage others to learn from them. They address the documentation and assessment of effective and innovative learning technologies; support for professional development of academic staff; encouragement of research-based teaching innovations; engagement in the scholarship of teaching and learning with respect to learning technologies; and the protection of the digital intellectual property of academic staff. Like most forms of academic work, innovation and building capacity for technology integration do not happen in a vacuum. Policies and procedures form a practical, university-wide framework to encourage practice and inquiry that contribute to continuous feedback and sharing of knowledge to enhance how we use learning technologies to improve learning and teaching.

Strategy 8. Review academic evaluation and reward procedures to enhance recognition for contributions to learning experiences through the integration of learning technologies.
- Explicitly value and reward the integration of learning technologies in department, faculty and university-level teaching awards, online recognition and profiles, public ceremonies to honor excellence in teaching at the University, and in merit, tenure, promotion, and university granting systems (2014-2015 and continuing as processes are reviewed and revised through to 2016).
- Following existing USRI procedures, continue to permit courses to be exempted from USRIs when a new technology is being introduced, and create a university-level formative assessment template for learning technology implementation that results in useful feedback from affected stakeholders while respecting that not all efforts at technology-enhanced learning will be instantly effective (2014-2015 and ongoing).
- Provide further opportunities to share scholarship and effective practices in technology integration through the Taylor Institute for Teaching and Learning and academic units (2014-2015 and ongoing).
- Recognize contributions to technology integration and mentoring in workload and GA(T) allocations, annual report structure, and promotion and tenure guidelines (2015-2016 and ongoing).
- Include in the ways we collect and use evidence of teaching effectiveness opportunities to document contributions to integrating learning technologies that enhance student learning (2015-2016 and ongoing).
-

Strategy 9. Enhance institutional policies and procedures to support research-informed, cost-effective, and institutionally responsible technology integration.
- Develop policy and procedures to guide the oversight, monitoring, and budget planning with respect to learning technologies (2015-2016).
- Develop an approach to course (re)development integrating learning technologies that provides time and space to learn how to use learning technologies and then apply them within a specific course (2015-2016).
- Use the Taylor Institute Teaching Community online forum to encourage collaboration among faculty members to use specific learning technologies both purposefully and widely across classes and programs in order to minimize additional costs to students (2014-2015 and ongoing).
- Embed a system for monitoring student activity in online learning environments to identify areas for improving student learning experiences (2015-2016 and ongoing).
- Review, and if necessary revise policies regarding intellectual property rights with respect to

teaching resources or tools used in online environments, including the dissemination of resources by third parties (2014-2015 and continuing as processes are reviewed and revised through to 2016.)
- Integrate the concept of "digital citizenship" in the responsible use of technology policy (2016-2017).

Strategy 10. Create a framework to support a sustainable approach to technology integration.
- Review current institutional standards for core technology applications, equipment, and service (2015-2016 and ongoing.)
- Maintain an inventory of applications to monitor cost-effectiveness and to document total cost of ownership (2014-2015 and ongoing).
- Establish reliable access to software, and wireless Internet connectivity in all learning environments throughout the University (2014-2015 and ongoing).
- Provide the hardware, software, and training necessary to enable instructors to record, broadcast, stream and share learning materials (2015-2016 and ongoing).
- Establish an evergreening standard and funding strategy for institutionally supported learning technologies as part of a comprehensive evergreening strategy (2015-2016 and ongoing).

Metrics for Policies and Procedures: evidence of LT integration in annual performance reports, promotion and tenure guidelines, and workload; creation of assessment tools for effective LT integration; proportion of teaching awards explicitly valuing LT integration; incorporation of LT into budget process; Taylor Institute Teaching Community disseminating knowledge of LT to all stakeholders; written policies for intellectual property and digital citizenship.

6.5. Priority Area 5: Leadership

The leadership priority includes the strategies that can be undertaken by department, faculty, university, and student leaders to ensure that this strategic framework is enacted and remains relevant, flexible, and sustainable. The leader's role – whether the Board of Governors, executive leadership team, deans, heads, early adopters or student representatives – is to create a culture where the effective use of learning technologies is valued, and to follow through with learning technologies policies and procedures so that they are meaningful and valuable to the teaching and learning community. Leaders must encourage, enable, and empower faculty to use innovative, research-informed, and discipline-specific approaches to technology-enhanced teaching and learning. This involves setting up processes for review and innovation, providing resources that allow the use of learning technologies, demonstrating the importance of technology-enhanced teaching and learning, and serving as a bridge in the communications between and among stakeholders. Student leaders must represent the needs of students with regard to learning technologies, and work with other leaders toward a robust and sustainable learning technology framework.

Strategy 11. Ensure active, ongoing, and thoughtful reconsideration of high-level factors that inform the strategic framework of technology-enhanced learning.
- Review and respond to societal trends, environmental scans, and policy changes regarding learning technologies (2014-2015 and ongoing).
- Develop or incorporate learning technology workshops or colloquia into department, faculty, and institutional professional development activities (2014-2015 and ongoing).
- Ensure learning technology is part of the terms of reference for teaching and learning leaders (e.g. Associate Deans of Teaching and Learning) and committees, in order to maintain flexibility and

sustainability (2014-2015 and ongoing).

Strategy 12. Facilitate connections and communication with and among all stakeholders with respect to learning technologies.
● Provide clear, constant communication to faculty, support staff, and students regarding changes and innovations in learning technologies that are supported by the University (2014-2015 and ongoing).
● Ensure departmental, faculty, and institutional stakeholders are informed of existing or new technologies that build capacity (2014-2015 and ongoing).
● Consult and advise student leaders about technology-enhanced learning (including infrastructure and pedagogy) in order to maintain a dialogue between teachers and learners that enhances the effectiveness of learning initiatives (2014-2015 and ongoing).
● Develop a means by which information about learning technology spaces, training, and research is continuously and clearly communicated to students, faculty, and staff (2014-2015 and ongoing).
● Create a robust and accessible University-wide database, maintained by the Taylor Institute for Teaching and Learning, of people with knowledge of technology to support others as part of their service commitment or regular administrative workload (2014-2015 and ongoing).
● Develop a university-wide statement for use in course outlines that clearly identifies the learning technology support available to students and the standard of conduct that will be adopted when using technology (2014-2015).
● Ensure that faculty members clearly indicate in course outlines the expectations they have for students regarding the use of technology, and the extent to which student exploration of and innovative use of technology will be rewarded in assessment (2014-2015).

Strategy 13. Commit to distributing resources that facilitate effective technology-enhanced teaching and learning.
● Expand access to grants, infrastructure, awards, training, and IT resources and facilitate responsible distribution of these resources among faculty, support staff, and students (2014-2015 and ongoing).
● Facilitate fair distribution of technology integration resources (teaching staff, duties, and workloads among all teaching faculty) in order to provide time for faculty to enhance their learning technology capacity and ensure that the best faculty-to-student ratio exists where learning technologies are utilized (2014-2015 and ongoing).

Strategy 14. Create a culture where the effective use of technology is assessed, valued, and recognized.
● Implement University policy initiatives on merit, tenure, promotion, and award systems to recognize efforts at improve teaching and learning experiences, even if they are research-informed "productive failures." (2014-2015 and ongoing).
● Recognize and value the efforts of faculty becoming involved in individual or group mentoring and coaching. (2014-2015 and ongoing).
● Ensure faculty efforts to research and publish on the subject of technology-enhanced teaching and learning are recognized as part of the member's ongoing scholarship, particularly if this activity is not part of the faculty member's usual research output (2014-2015 and ongoing).
● Support ongoing, faculty development and improvements in the quality of technology integration in curriculum development, collaborative course design, and team teaching (2014-2015 and ongoing).
● Evaluate teaching effectiveness in a way that recognizes the value of technology-enhanced learning, including opportunities for students to offer meaningful feedback (2015-2016 and ongoing).

Metrics for Leadership: proportion of workshops and colloquia on LT subjects; incorporation of LT responsibilities into term of reference for Associate Deans (Teaching and Learning); active communication linking all stakeholders; database or forum at Taylor Institute listing LT mentors; LT statements on course outlines; distribution of resources to enhance LT implementation; evaluation of teaching that incorporates LT on USRI and separately.

7. Resources

The Learning Technologies Task Force Report identifies 5 priority areas that will allow the University of Calgary to become a leader in post-secondary learning technology integration. These priorities reflect the three foundational commitments of the *Eyes High* vision and provide an integrated framework for how high quality learning experiences can be enhanced and enabled by technology.
Within these five priorities are 14 proactive strategies that are essential to the success of this strategic framework. It is an ambitious plan that will require both financial and human resources.

Some of these resources (like the Taylor Institute for Teaching and Learning, central Information Technologies, and the pockets of expertise that exist in academic units) are already available in our university community, and could have a greater impact if they were more intentionally networked. A number of strategies address how we could achieve synergies through more effective communication and collaboration to build our collective knowledge. Other strategies include tactics that require the reallocation of existing resources, by both local and central leaders. Rethinking how cross-functional teams could contribute to institutional problem solving or how colleagues with expertise in integrating learning technologies could mentor others is a core aspect of the strategies presented. Still others, like the integration of learning technologies support at the local level (a critical need identified in the work of the Task Force), will require new resources.

The table below summarizes the resources that will be required to implement the 14 strategies presented. However, as this report emphasizes the importance of sustainability, flexibility, and nimbleness because of the speed at which learning technologies change, the resource needs to fulfill and maintain the priorities and strategies will change over time and will have to be frequently evaluated. Further, new resources will not be required all at once. A series of annual base budget requests will be made over the next four to five years to support the implementation of the framework.

Resource Needs Identified	Resource Sources	Annual One-time Funds	Base Funds	Time Resources
Infrastructure Support				
• Foundational Fixes				
o Campus WiFi Upgrades	IT Capital Budget	$1,700,000		Project Costs
o Classroom Technology Upgrades	CAR/FAR	$2,000,000*		
o Common basic hardware standards	IT Strategy			
o "Managed Desktop"	IT Strategy			
• Institutionally Supported Learning Technologies (Annual License and sustainment resources)	Existing IT Operational Budget		$1,000,000	Operational Costs
o Desire2Learn				
o Top Hat				
o Adobe Connect				
o Podium Software				Reallocated
• Revise Standards for Learning Spaces (physical and online)				
People Support				
• Central				
o Information technologies	IT Oper. Budget			Operational
o Develop triage system	Existing			Reallocated
o Restructured IT Partners	Existing			Reallocated
o Taylor Institute (Technology Integration, instructional Design staffing)	New		$ 100,000	
o Top up of Teaching and Learning Grants	Existing	$250.000		
• Local				
o Digital mentors (30-40 Faculty Colleagues)	New: Professional development		$ 50,000	Reallocated + PD
o Learning Technologies Support (SME)			$1,600,000	

o Undergraduate Peer Helpers	16 positions in faculties New: Volunteer helpers; Training and leaders compensated	$ 50,000		
Coordination/Communication				
• Taylor Institute Coordination/Communication Hub	Existing			
• Associate Deans (Teaching and Learning) Connectors	Existing			
• Recognition and Valuing				
o Learning technologies contributions recognized in Academic Performance Report	Under development			Reallocated
o Common framework for reporting dimensions of teaching and service contributions, including technology integration	Under development			Reallocated
o Professional learning for Heads on valuing contributions to enhancing learning using technologies	Under development			Reallocated
• Institutional-level cross-functional committee to maintain strategic focus and recommend priorities	Under development			Reallocated
Total resources required		**$3,950,000**	**$2,800,000**	**$6,750,000**
Existing resources (IT Capital and Operating Budgets)		**$1,950,000**	**$1,000,000**	**$2,950,000**
New resources		**$2,000,000**	**$1,800,000**	**$3,800,000**

* Includes renovation and technologies costs.

Appendices

Appendix 1. Members and Consultants of the Task Force

a. Members

- Dru Marshall, Provost and Vice-President Academic – Chair
- Lynn Taylor, Vice-Provost, Teaching and Learning
- Michael Rannelli, Chief Information Officer
- Representatives appointed by Deans of Faculties/Schools
    - Susan Cork (Veterinary Medicine)
    - David Hawes (Continuing Education)
    - Tina Gabriele (Kinesiology)
    - Beaumie Kim (Education)
    - Larissa Muller (EVDS)
    - Ellen Perrault (Social Work)
    - Mike Potter (Engineering)
    - Leslie Reid (Science)
    - Renee Reaume (Libraries and Cultural Resources)
    - Michael Robinson (Business)
    - Ruth Swart (Nursing)
    - Bruce Wright (Medicine)
    - Michael Ullyot (Arts-English)
- Members-at-large
    - Michele Jacobsen (Education)
    - Ken MacMillan (Arts-History)
- Emily Macphail, Vice President Academic, Students' Union
- Liam Cummings, Vice President Academic, Graduate Students' Association
- Patti Dyjur, Taylor Institute for Teaching and Learning
- D'Arcy Norman, Taylor Institute for Teaching and Learning

Support Personnel
- Heather Smith-Watkins, Office of the Provost

b. Consultants

- Gordon Gilchrist, Olds College: Change: Mobile Learning
- Tony Hampshire, Galileo Educational Network: K-12 Learning With Technology
- Amy Park, Galileo Educational Network: Classroom Technology: Examples from Grade 6
- Branko Kolarevic, EVDS: Adaptive Learning Environments
- Richard Levy, EVDS: Technology in the Classroom
- Sharon Friesen and Jennifer Lock, Werklund School of Education: Online design learning environment

Appendix 2. Duties, Work Plan, and Meeting Dates of the Task Force

The Task Force developed the following duties and work plan in the summer of 2013, and has worked to meet timelines throughout the process.

a. Duties of the Task Force

Working in teams and as a whole, the LTTF:
- reviewed the strategic plans of other leading universities and major trends in the research literature to situate the University proactively within the broader context of national and international strategies for learning technologies;
- actively engaged students, faculty, and staff to identify the perceived uses, needs, enablers and barriers with respect to learning technologies;
- explored new applications of technology tools to facilitate and assess student learning;
- examined various learning spaces throughout the University of Calgary to understand what types of environments are the most effective for technology-enhanced learning;
- identified sustainable institutional financial, human, and technical resources to support meaningful student learning experiences, professional development, innovation, and scholarship in learning technologies;
- identified effective practices in change management to optimize the adoption and sustained development of recommendations of the LTTF;
- developed and recommended a *Strategic Framework for Learning Technologies* to GFC and to the Board of Governors through appropriate committee structures.

b. Work Plan of the Task Force

MAJOR TASK	PROCESS	TARGET DATE
1. Collaboratively establish the purpose, terms of reference, and principles that will guide the work of the Learning Technologies Task Force.	Task Force as a whole develops the purpose, principles and processes that will guide its work.	September 2013
2. Determine the context: Critically examine the learning technologies landscape to set the stage for planning. A. Review the **external** landscape, including review of literature and latest institutional reports, to determine the strategic directions of leading universities with respect to learning technologies.	Task force subgroups work in parallel to: 1) Review recent Learning Technology Frameworks produced by peer institutions 2) Review relevant literature to ensure Task Force recommendations are informed by robust research. The Task Force as a whole to discuss findings of 1) and 2) and identify potential	A 1. October 2013 (review of comparator institutions) A 2. November 2013 (a working draft of an overview of best and emerging practices from the literature for using technologies to create outstanding learning experiences)

B. Review the **internal** landscape by conducting an environmental scan, including current initiatives, future directions, policies and procedures, to determine technology-rich initiatives at the University of Calgary and the needs, barriers and enablers perceived by our students, faculty, and staff with respect to learning technologies.	recommendations and strategies as they emerge.

Using a survey developed by the Task Force, members will collect a consistent data set across stakeholder groups in the University. | January, 2014

March 2014 |
C. Identify institutional resources (human, technical and financial) that are available to support learning technologies design, application, and assessment	Information was submitted for thematic analysis conducted by colleagues with expertise in qualitative data analysis.	April 2014
D. Collect institutional data on online courses and the use of technology tools.	Task force subgroup works in parallel to provide evidence for discussion by the whole group.	
3. Identify strengths, gaps and barriers: Based on the analysis of external and internal contexts, identify strengths to build on, and gaps and barriers that need to be addressed to meet the needs of our academic community and to position the University of Calgary as a leader in learning technologies design, application, and assessment.	Task Force as a whole meets to review all of the data collected and to identify potential recommendations and strategies as they emerge.	April-May 2014
4. Recommend a _Strategic Framework for Learning Technologies:_ Based on the evidence reviewed, develop the recommendations and strategies that will form the University of Calgary's _Strategic Framework for Learning Technologies_.	Task Force as a whole reviews iterations of the draft Task Force report and provides feedback. Recommend a _Strategic Framework for Learning Technologies_ to GFC and to the Board of Governors through appropriate committee structures.	Well-developed draft prepared for circulation beyond the LTTF by May 2014

APPC May and June 2014 GFC May and June 2014 BOG May and June 2014 |

c. Meeting Dates

A total of 18 meetings were held between August 2013 and May 2014. Various subcommittees were also formed and met informally to work on sections of the document.

August 14 2013	February 14 2014
September 11 2013	February 21 2014
September 24 2013	March 4 2014
October 8 2013	March 19 2014
November 7 2013	April 16 2014
November 20 2013	April 24 2014
December 18 2013	April 28 2014
January 23 2014	May 6 2014
February 10 2014	May 29 2014

Appendix 3. Summary of Learning Technologies Survey

A learning technologies online survey was developed to describe the learning technologies landscape at the University of Calgary. Separate surveys were distributed to faculty, staff and students in October 2013. Information was gathered about the types of learning technologies that faculty, staff and students have used on our campus in the past two years and on the barriers and enablers to the use of learning technologies. A total of 749 people participated in the survey (564 faculty, 135 students, and 50 staff). Seventy five percent of the participants were faculty, and most of the students participated in the survey were undergraduates (84%). Participants answered variations of two main questions: Each survey was specialized to its stakeholder group, but they all focused on two principal questions: *Which learning technologies have you used in the last two years at the University of Calgary?* And: *What has enabled or been a barrier to your use of learning technologies?*

a. Learning Technologies Used in the Last Two Years

Participants reported using a wide range of technologies at the University of Calgary in the last two years. Technologies that have been in existence for a longer period were the most commonly used. These included desktop and laptop computers; mobile phones; digital and overhead projectors; PowerPoint; YouTube, streaming videos, and audio clips; and the Blackboard Learning Management System. Students noted that they heavily used Facebook, Google Docs, the library website, e-books and online journals, and Top Hat monocle or clicker classroom response systems. A smaller but significant percentage of respondents reported using online discussion groups, Skype, document cameras, Smart Boards, and audio speakers. Few respondents had used any other form of social networking resources (Twitter, blogs, wikis, LinkedIn, Pinterest), other presentation software (Prezi, Keynote, Adobe), or graphic and audio editing software. As a number of these lesser-used technologies are relatively new, future usage of learning technologies may shift as further tools become available and as advances occur in online environments.

b. Enablers and Barriers to the Use of Learning Technologies

The most common enablers to the use of learning technologies were presentation devices, eager instructors, training, intuitive user interfaces, and peer support. Students identified the effective use of technologies by their instructors as an enabler for their own effective use. Faculty and staff routinely cited ease-of-use, experience, and gaining training through formal means and peer support as key enablers to the use of learning technologies. Other enablers included the ability to connect reliably to the Internet. For barriers, the consistent theme in faculty and staff responses was lack of time, within an already busy schedule, to learn to use new technologies effectively. Another important point for faculty and students was the frustration in dealing with unsuitable infrastructure when trying to utilize new technologies (i.e. inflexible classroom layout, challenges with connectivity, and limited support to deal with technical challenges), and with the lack of user-friendly tools and interfaces. Staff, in particular, cited lack of training as a barrier. Students also mentioned financial concerns when required to have current technology or devices for class work. In open-ended responses, students emphasized their desire to not to lose opportunities to interact with and receive instruction from academic staff, which they feel might happen if learning technologies were extensively used without sufficient attention to learning outcomes. The following table summarizes some of the key findings from this data:

c. Themes and Trends

Training. Respondents emphasized the need for training and professional development on learning technologies. This involves learning not only technical aspects of using tools, but also how to leverage technologies to enhance teaching and learning experiences. Training is particularly required because of concerns about the lack of user-friendliness in the technology, the use of a number of technologies with similar purposes throughout the University, and the frequency with which technology is updated. The University needs to offer a wide range of training at various levels (department, faculty, and in the Taylor Institute for Teaching and Learning).

Centrally Supported Technologies. Respondents noted that they were better enabled by technology that is user-friendly and with which they have experience. This suggests that the University should make decisions about which technology should be centrally supported. To an extent, this common suite of technologies already exists, in the form of SMART Boards, Top Hat Monocle, Desire2Learn, and Elluminate. These and other centrally supported tools need to be continuously reviewed, to ensure they keep apace with current technology and instructional needs. Factors such as cost, relevance, quality, efficiency, and effectiveness also make it undesirable and impossible to officially support all learning technologies. However, some instructors have indicated a need to use less common or easily available and cost-free tools (e.g. Twitter), which might be discipline-specific. There should be some support for these tools, such as through a peer-mentoring system (tied to faculty/staff service requirements) or a digital database/blog of these tools.

Infrastructure. Respondents identified the common theme of enhancing infrastructure to provide reliable and robust access across devices and formal and informal learning spaces, both on and off campus. More generally, faculty identified space as an opportunity area. The need for more technology-rich learning spaces for large classes was identified, as was more consistent standards for technology availability across centrally booked and locally administered spaces. More flexible options for classes of 100 or more where students can engage in small group work enabled by learning technologies is also a priority. Among students and faculty, simplifying technology use was also reported as a way to encourage learning technologies integration. Academic staff expressed a desire to provide input and research into learning technologies development, and to have grants available to support some of this work.

Time and Rewards. Faculty often cite lack of time as a key factor that limits their ability to learn about and implement new technologies, a problem partly caused by lack of rewards for making this effort. In order to encourage "faculty buy-in", the desire to learn about and implement appropriate technologies in the classroom should be properly evaluated (through multiple metrics) and rewarded. The University needs to emphasize the value of faculty devoting their time to technology-enhanced learning.

Cost. Students have identified cost as a barrier to their access to technology-enhanced learning. The need for updated technology in order to access required tools (e.g. the need for a computer or phone for Top Hat Monocle or Twitter), plus the purchase of e-books and subscriptions (which cannot be re-sold to recover some of the initial outlay), all place financial burdens on students. The University needs to ensure that technology is widely accessible to students at minimal cost, and that faculty members are using technology both purposely and widely across classes/programs in order to ensure students can gain maximum value from their financial outlays.

Appendix 4. Review of Formal and Informal Learning Spaces

The Task Force was interested in how formal and informal learning spaces, both physical and online, at the University of Calgary were designed and utilized to facilitate active, engaging, collaborative, and technology-enhanced teaching and learning. This information was gathered through an informal survey of the University community (#learningspaces) to find out students' favourite and least favourite learning spaces on campus, through a guided tour of various learning spaces throughout campus, and from a series of documents and presentations listed in Appendix 7.

During the campus tour, the Task Force visited the Taylor Family Digital Library and viewed the Collaborative Workrooms, Presentation Practice Rooms, Learning Rooms, the Digital Media Commons, and the Visualization Studio. These rooms seat between 4 and 120 learners and are purpose-built to allow students to work independently or collaborate as teams. SMART boards, Team Spot, and Class Spot technology facilitate technology-rich and creative learning environments. These technology-enhanced learning environments serve as a model of what can be accomplished with sufficient resources and design standards. These rooms are also easy to book for both faculty and students, although it was unclear how frequently they are used or whether faculty and students were aware of their existence.

We also observed the regular and highly effective use of white boards, both in the TFDL and in the Engineering classrooms in the ICT building. This shows that low-cost forms of technology, when deliberately designed for active teaching and learning, can have extremely high impact for learners. However, there were times when technology came into conflict. In a study room of the EEEL building, an under-utilized SMART board (for which no training or instructions were available) was permanently attached in the centre of a white board, which prevented students from using either technology. This suggests the need for forethought and fundamental design standards when learning spaces are created and renewed. It also indicates the need for accessible instructions in order to maximize the use of learning technologies. In the Simulation Labs at the Faculty of Nursing, we saw the benefits of interactive rooms that enabled students to participate in disciplinary-specific activities under several levels of observation, in a safe and supportive environment that enabled students to practice their skills through repetition. By design, these learning spaces were both formal and informal, in that students could be formally observed and trained, and informally practice their skills.

The Task Force also visited large lecture halls (140+ seats) and mid-sized classrooms (50-80 seats). We recognize the value of some classrooms having tiered, fixed seating that focuses on the instructor and formal presentations. We also recognize that not all classrooms can suit all purposes. Nevertheless, many classrooms on campus do not provide instructors and students with the flexibility and adaptability they need to engage in collaborative teaching and learning. Many instructors transition in the same class period from lecturing to interactive projects. This requires transformable classrooms that accommodate multi-modal learning. There is a need for moveable tables and chairs that allow for group interaction, and an infrastructure that facilitates a flipped classroom experience, such as the use of round tables and the availability of technology such as computers, white boards for brainstorming sessions and group projects, and even such basic technology as access to power outlets. Again, the ICT Engineering rooms provide models of this type of classroom.

Furthermore, the Task Force observed the need for design standards that make classrooms more attractive, welcoming, and accessible. Many classrooms on the first floor of ICT, for example, have poor lighting and excessive noise, stark walls, poor acoustics (echoing), and poor sightlines between

instructors and students. Others, such as in EEEL, are visually attractive and appear to respect both the seriousness of purpose of classroom learning, and the amount of time students spend in their classrooms. Likewise, the placement of fixed computer stations, overhead projectors, monitors, screens, light switches, and clocks (which must display the correct time), and the size and function of presentation stations at the front of classrooms needs to be taken into consideration at all stages of design and renewal. For example, in MFH, the fixed computer stations in large lecture classrooms are positioned so that instructors making active use of the computer during class are not able to look at their students. A number of universities have added "confidence monitors" to the back of their classrooms. These monitors display the same presentation that students see at the front of the room, but allow instructors to facilitate the flow of discussion while maintaining eye contact with their students.

Informal learning spaces (breakout rooms), and the areas of transition (hallways) between formal learning spaces (classrooms and labs) are also extremely important to the student learning experience because students use these spaces between classes to prepare and study. There are many popular study spaces on campus. Students and faculty cited the TFDL, ICT, Kinesiology, the basement of MacKimmie Library, and several hallways in Social Sciences as popular spaces. The most popular spaces have good lighting, purpose-built study areas, access to power outlets and computers (we discovered that although many students have laptops, they prefer to use the University computer stations when these are available), and technology that facilitates collaborative work, such as white boards and movable furniture. Other informal study spaces appear to have been haphazardly constructed and contain old study carrels that lack access to power or the opportunity for collaborative or creative output.

In addition, students find empty classrooms to be valuable study spaces, in part because they have access to white boards, chalkboards, and quiet spaces to study and collaborate. It would be beneficial if classrooms could be easily converted to student study space, and if a mechanism was developed to allow for the use of classrooms as open study space when there are no classes scheduled. This might involve the presence of class schedules placed outside each classroom at the beginning of term, an online database directing students to free spaces, and the ability of students to book empty classrooms in the same way they book the technology rooms in the TFDL. The use of swipe card technology outside classrooms that are designated as occasional open study space would be an added measure to provide safety and security for students and equipment. The second and third floors of ICT are currently models of this multi-purposing of rooms; students have 24-hour access to these rooms during the academic year using their ID cards, which fosters a sense of community and collaboration, and emphasizes how formal learning can transition into informal opportunities to practice.

The Task Force also discussed the effective use of digital, blended, and online learning spaces, which are becoming increasingly common at the University and throughout the post-secondary landscape. These spaces include the Desire2Learn learning management system, distance education courses delivered online, as well as a wide range of social networking platforms that are being used to facilitate teaching and learning. The latter include, for example, Facebook, Twitter, blogs, vlogs, and wikis, which are often collaborative online environments mediated by instructors and students. When used in a research-informed way to improve learning outcomes, these online environments are exceptionally valuable learning spaces that positively disrupt the traditional "bricks and mortar" approach to teaching and learning. Online learning spaces can be nimble and flexible, allow for regular updating and engagement, and enable better opportunities for feedback and enriched learning. In order to be highly effective, these spaces need to be user-friendly, with either intuitive design or ready access to instructions and training. They also need to be places where all users feel safe and secure, personally, socially, and

technologically. This emphasizes the need for active digital citizenship and the development, review, and enforcement of University-wide policies regarding such concerns as cyber-bullying, cheating, and infringements on personal freedom. Policies should clearly identify whether or not students are required to use specific online learning spaces, particularly social networking sites that are also used for personal reasons, as part of their course assessment. We are also mindful that many online activities are archived for lengthy periods of time and might be used by third parties (particularly cost-free social media services such as Facebook and Twitter) for purposes that are beyond the learning outcomes of an individual course or program. This requires the University to protect students, faculty, and staff from unwarranted use of course work product, particularly when student identities or rights could be compromised.

Ultimately, learning spaces -- whether formal or informal, physical or online -- need to be designed to help teachers and learners create and enjoy spaces that will facilitate collaboration and creativity, and help to realize learning outcomes. This can best be facilitated when all stakeholders are involved in the process of classroom design and digital citizenship. Clarity of roles and responsibilities at the institutional level is required to determine who is responsible for the design and renovation of learning spaces, and for policies regulating the use of online spaces. This suggests the need for more effective governance and policy regarding classroom design, which should include consultation from all stakeholders and fundamental design standards, particularly for new buildings. Similarly, faculty have expressed a desire to have control over which technology is available in their classrooms, which suggests that the needs of instructors should be known and taken into consideration when classrooms are being assigned. Finally, we recognize the importance of sustainability, which involves the oversight of a university-level body that is responsible for the updating of learning spaces, and for communicating with all stakeholders in this process. The Taylor Institute for Teaching and Learning is likely the best institutional body to oversee this process of design standards, sustainability, and communication.

Appendix 5. Summary Review of Literature on Learning Technology Environments in Higher Education

Contemporary educational technologies can enhance and extend teaching and learning on campus and have become a disruptive influence in higher education. Learning technologies can change the ways learners and professors connect, communicate, collaborate and create knowledge for learning and teaching both on campus and in blended and online learning spaces. Learning technologies can also change who participates in a university learning experience, learners' expectations for the experience, the kinds of learning environments in which learners thrive, and the new opportunities and challenges faced by learners, teachers and leaders on campus. Successful universities aim to leverage learning technologies to enhance the depth and breadth of learning experiences and to improve the quality of teaching which is critical to students' success in their chosen fields and to their development as engaged citizens.

The purpose of this literature review is to present a research-informed summary of the ways in which learning technologies change teaching and learning experiences in higher education. This executive summary is organized into three sections:
1. Higher Education Learning Environments
2. Framework for Exploring Technology for Teaching and Learning
3. Implications for Higher Education

In the first section, changes in higher education learning environments are discussed along with challenges and implications for faculty, leaders and institutions of learning.

1. Higher Education Learning Environments

Higher education learning environments are undergoing changes in the context of major societal and technological shifts. A review of trends impacting higher education is summarized in Table 1.

*Changes and challenges involved with using learning technologies in higher education*

Areas of change in higher education	Associated challenges
1. Learning environments	It can be challenging to develop/use/sustain effective instructional strategies across the spectrum of different course-delivery modalities.
2. Technological advances	Programs need continuous research-informed review and renewal to keep pace with technological advances and the changes in how people socialize and learn.
3. Theoretical influences on pedagogy	Educators are challenged with a new role in developing continuous research-informed designs for learning.
4. Technological influences on pedagogy	Support for faculty is needed in advancing knowledge building and social constructivist approaches in technology enhanced and enabled learning environments.

5. Communities of learners	Advances in learning research challenge faculty to ensure that practices and designs for learning are research-informed and foster both individual development and collective growth in communities of learners.
6. Connected Learning	Networking infrastructure and classroom technologies need to support faculty and students to be open, flexible, responsive and connected leaders of learning.
7. Assessment for Learning	Changed approaches to teaching coupled with recent research on learning with technology challenge higher education to develop authentic approaches to formative and summative assessment.

Current research on learning and signature pedagogies (Shulman, 2005; Schank, 2011) influences faculty course designs to include more meaningful, relevant and connected learning experiences. For instance, several qualities of participatory cultures, such as openness, collaboration and interactivity (Jenkins, 2009, 2006), can be combined and actively designed into technology enhanced learning experiences to promote knowledge building and to make learning and teaching more visible in higher education (Bereiter & Scardamalia,2010; Clifford & Friesen, 1993; Hattie, 2009; Jacobsen & Friesen, 2011; Sawyer, 2012, 2006; Thomas & Seely Brown, 2011). Technology plus transformative pedagogies enable teachers to expand beyond being the sole information provider and embrace their role as designers of engaging and interactive, technology enabled, participatory learning experiences.

2. Framework for Exploring Technology and Teaching

Siemens and Tittenberger (2009) offer a framework for considering how contemporary technological resources contribute to the changing information cycle and group the technologies according to six categories: access, presence, expression, creation, interaction and aggregation (p. 41). The literature review identified four categories emerging from the current research, focusing on technologies used for teaching and learning in higher education as shown in Figure 1. Studies demonstrate that technology can increase connections, communications and interactions among learners for collaborating and creating, all of which contribute to deep and meaningful learning experiences (Sawyer: 2006).
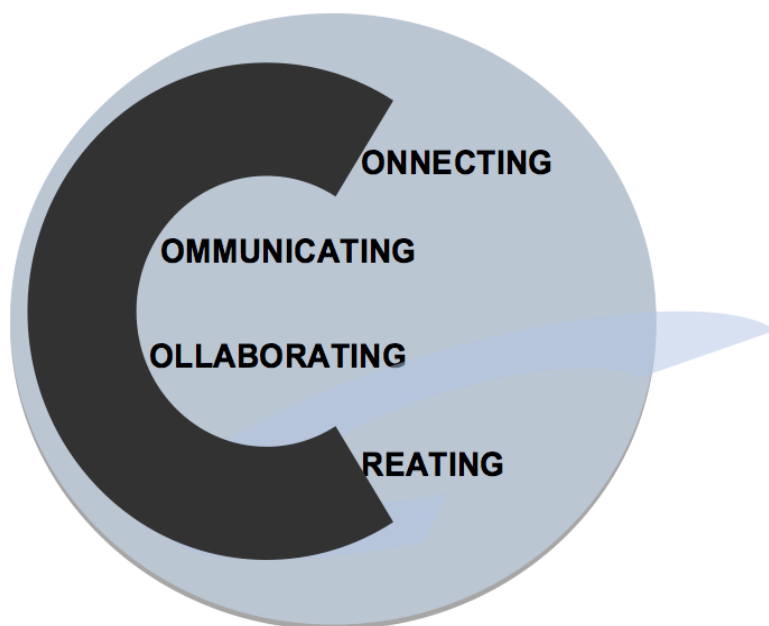
Figure 1. The Four Cs Framework for exploring technology for teaching and learning in higher education.

The four categories: connecting, communicating, collaborating and creating are characteristic of engaging learning experiences in higher education. Many of the technologies described in subsequent sections can be used as an example in more than one category of the framework. The technologies selected for illustration of each category are not an exhaustive list.

2a. Connecting

Connecting refers to an extensive number of ways in which professors and learners as well as learners and learners are connected to each other on campus, connected in global communities and with expertise within and beyond the classroom and in blended and online learning experiences beyond bricks and mortar using various learning technologies.

In the past, connections were fixed and primarily established through common classroom enrolments in face-to-face learning experiences that did not include online spaces or communities. Now, social networking and communication technologies can enable teachers and students to self-organize and form dynamic connections in virtual spaces.   Smith (2013) identifies three characteristics of a connected learning environment:
● Seamless integration with planning and advising services to help students plan for degree completion;
● Personalized learning with diverse learning options (online, on campus, or through a blended alternative); and
● Engaged and authentic learning experiences. (p. 1)

Connected learning has implications for learners and how they meet their educational goals, for instructors and how they plan and design learning across different learning environments and for institutions constructing new programs and models of learning (Abel, Brown & Suess, 2013). Moreover,

tools and practices such as learning analytics are emerging that can provide insights for researcher and practitioner innovation in education (Siemens et al., 2011). A number of technologies are used for connecting by learners and teachers in higher education:

- Tablets can be used for staying connected to learning networks, to search for resources (i.e. search engines, library websites, news websites, etc.), during fieldwork, and for organization purposes, such as taking notes or annotating lecture templates.
- Learning analytics or data analysis techniques of large data sets (Siemens et al., 2011; van Barneveld, Arnold & Campbell, 2012) can be used to inform and intentionally design and shape higher education learning environments around the learners and for strategic planning and to improve course delivery in online and blended learning environments.

Open access online courses, commonly known as Massive Open Online Courses (MOOCs) also facilitate connection. Two types of MOOCs are discussed in the literature. The first, commonly described as "xMOOCs", emphasizes the role of content and formal assessment, as seen by large scale course offerings by Coursera, EdX, and similar organizations. The second form, commonly described as "cMOOCs", emphasizes connection between participants, as well as experimentation and collaboration as part of an organic and open community. Examples of this form of cMOOC include DS106, which is characterized by "its distributed structure, mimicking the Internet itself" (Levine, 2013). These "cMOOCs" follow strategies typified by the emerging learning theory of connectivism (Siemens, 2005), which emphasizes networks of learners and learning as opposed to content and isolated learners. Recent literature (Baggaley, 2014; Kolowich, 2014; Tritelli, 2013) indicates skepticism regarding the usefulness and impact of MOOCs, and demonstrates the importance of developing a business plan for MOOCs (Finkel, 2013), ensuring that MOOCs fit within an existing program curriculum (Schneider, 2013), and dealing with the challenges associated with providing credit due to secure assessment and grading issues (Meyer & Zhu, 2013; Sandeen, 2013). Research had also shown the value of partnering with a group of like-minded organizations or providers as potential partners (Guthrie, 2012; Kolowich, 2013). Partnership helps resolve issues surrounding registration, analytics, course design, technological platforms, videography, graphic design, and support for assessment/grading.

2b. Communicating

Communicating includes untethering and expanded notions of time and space, flexible designs that move from limited one-time interactions to opportunities for students to control pacing and playback, and expanding the audience for knowledge sharing beyond the instructor-learner interaction/transaction. Studies exploring students' uses of the Internet have mainly focused on findings related to transmissive, or broadcast communications (Bretag & Hannon, 2010; Jones et al., 2008). For example, using an auto-ethnography and a discourse analysis approach, Bretag and Hannon (2010) analyzed the ways of writing and talking about technology in higher education and found three categories emerged when exploring online learning (1) technology as a bridge to globalized opportunity; (2) technologies as delivery of learning; and (3) technology as communication and building relationships for learning. There is room for growth in the innovative use of learning technologies to increase opportunities for learner-learner and faculty-learner communications about content and learning in higher education in classroom or lecture like environments and in virtual formats. Moreover, social technology, such as personal learning networks, social networking tools and other Web 2.0 applications create opportunities for educators to develop new educational approaches (Schneckenberg et al., 2011) and increase the level, depth and reach of communications (Siemens & Tittenberger, 2009, p. 39). A range of technologies are used by learners and teachers in higher education for communication:

- Clickers - easy-to-use, increase performance through instantaneous feedback, increased attention, attendance and participation and student engagement.
- Mobile applications - engage students, promote higher-order thinking skills in lectures and interactive processes; can extend reach of communications beyond the classroom.
- Videos can be used for a flipped classroom or inverted approach in which the lecture and homework are reversed and many faculty experiment with the flipped classroom model. Studies found video lectures and access to online recordings/tutorials for repetition or adapted pacing can result in achievement gains and positive student ratings.
- Students value access to managed course content and communications even though LMS are modeled after traditional pedagogies and emphasize content delivery.
- Discussion boards offer asynchronous text-based communications, reflection and interactions can promote social presence, a shared sense of belonging, shared social identity (Rogers & Lea, 2005) and deep learning in scholarly communities of inquiry.
- Email is used for class communications, announcements, to seek/provide clarification, submit assignments, share resources/course materials, set up meetings and can positively impact student engagement and provide a sense of community
- Individual blogs are mainly used for self-expression and dissemination of ideas with potential for commentary and discourse and authentic writing and reflection. Community blogs with co-ownership provide opportunities for contributions to a larger professional learning network
- Microblogs are used for interactions, information/resource sharing, requesting/offering assistance, commentary, and networking with others, to name a few.
- Web conferencing is used for synchronous virtual learning mainly for seminar presentations. Although technical issues are often cited as a barrier for web conferencing, web conferencing useful for brainstorming and group decision-making in comparison to other communication tools, such as discussion boards.

2c. Collaborating

Collaborating is working alongside others to learn, create and share new knowledge. Contemporary pedagogies and learning technologies enable instructors to design ways and means for diverse learners to draw upon multiple perspectives and ideas to collaboratively build and share knowledge that matters to the world. The current shift from a distributive to a collaborative mode of learning is enabled by Web 2.0 tools (Schneckenberg et al., 2011), commonly described as "interactive and participatory information sharing, creation and collaboration by users on the World Wide Web" (Jacobsen, 2013, p. 325). Likewise, Schneckenberg et al., (2011) define Web 2.0 as a "portfolio of emerging tools, which form the basis for a more mature and responsive Internet, in which users collaborate, share information, and create network and scale effects in large communities" (p. 750). In other words, Web 2.0 technologies provide opportunities for participation and a collaborative model of knowledge building in global learning environments.

There is a workforce demand for learning experiences and competencies developed through collaboration (Johnson et al., 2013). For instance, Karpova et al., (2009) argue that "learning while working together is becoming mandatory to meet workplace performance requirements, and it is important for students to have authentic experiences while earning a degree" (p. 45) and more collaborative work and play spaces for creative products are needed (Moyle, 2010). Contextual features such as time structure, obligation for participation and technological tools can support collaboration;

however, there are methodological challenges in studying the complexity of collaborative knowledge building (Arvaja & Poysa-Tarhonen, 2013).

It is important to note that online collaboration tools are among technologies most expected to improve learning in the future (Economist Intelligence Unit, 2008). Collaborative technologies used across higher education include:

- Personally owned networked mobile devices: enable learners to consume and produce content, learning designs can increase participation, communications and collaboration with peers.
- Online collaborative workspaces using cloud computing and shared applications allow for collaborative creation (feedback, tracking changes) and shared knowledge building (group contributions), and can increase student engagement and positive student ratings in online collaborative learning sessions using technologies like Google Apps.
- Open access wikis or secured wikis integrated in the learning environment: academic writing is improved through a collaborative, iterative and competitive process of publicly sharing, reviewing and critiquing peers' contributions.

2d. Creating

Creating refers to participatory cultures of learning in which the learners, the teacher and the environment all have a mutually reinforcing and reciprocal capacity to make valuable contributions to continual idea improvement and development of "new concepts, processes and artifacts" (Martin, Morris, Rogers, Martin & Kilgallon, 2009, p.3). Thomas and Brown (2011) describe new cultures of learning that are made possible by relationships formed through shared interests, passions and goals and a system of reciprocity. All learners can contribute to knowledge creation, solve knowledge problems and participate in knowledge-building environments (Bereiter & Scardamalia, 2010). A creating environment is considered a collective and learning takes place continuously in the collective. Given pervasive networked technology, experts and amateurs can easily join efforts for increased data collection and the potential for collectively creating meaningful results (Thomas & Brown, 2011).

Creating in higher education learning environments can be challenging (Oblinger, 2013) as it involves changing established systems and traditional pedagogies such as knowledge transfer by lecture (Allen, Caple, Coleman & Nguyen, 2012; Martin et al., 2009), knowledge transfer by providing answers or authoritative interventions (Schwartz & Fischer, 2003), and the persistent value for assessing and recognizing individual expressions of learning.

Teaching and learning in higher education is influenced by access to Internet-based technologies and cloud computing that brings increasing opportunities for the design of engaging, technology-rich and creative open learning environments (Blessinger & Wankel, 2013; Jahnke, 2011) that can foster collective creation. Schwartz and Fischer (2003, 2006) argue pedagogies in higher education courses need to place less emphasis on knowledge transfer or borrowing ideas for understanding and should place more emphasis on building personal understanding through sense making and deep learning experiences through collaborative knowledge building. While more could be added, the following two technologies are examples of knowledge creating resources:

- Educational **games** (e.g., computer games, video games) and **gamification**, that is a combination of game and non-game elements, are reported to support critical thinking, creative problem solving, team work and active learning. Students are also motivated and engaged through design and creation of games for learning.

- Higher education institutions are experimenting with personalized and immersive online environments to supplement classroom learning or for online learning in **virtual worlds**, such as Second Life. Potential uses of virtual worlds include communication, collaboration, interaction through role-play activities, synchronous meetings, simulations, group projects, problem-based learning and collaborative creative design tasks.

Learning technologies and research informed, signature pedagogies and authentic assessment practices can and should be combined to create outstanding learning experiences in contemporary higher education. A variety of factors can influence (enable or inhibit) the adoption of emerging practices and innovations in higher education, such as leadership, faculty and staff capacity, institutional characteristics and technological infrastructures (Buabeng-Andoh, 2012; Buchanan, Sainter & Saunders, 2013). One challenge for higher education leadership is to draw upon the extensive research base and to evaluate the internal landscape to identify and address the diverse range of factors that can and do influence the adoption of learning technologies in the development of strategic frameworks for high quality learning experiences that are enhanced and enabled by technology. The next section discusses some of the implications of this review of promising practices for higher education teaching and learning with learning technologies.

3. Implications for Higher Education

This review of learning technologies research has illustrated a range of promising practices that are transforming learning experiences and learning environments in higher education. The research is clear that learning technologies can redefine the role of educators and higher education in the design, delivery and evaluation of technology enhanced learning experiences on campus.

Learning technologies impact teaching and learning in higher education. Learning is becoming less dependent on closed classroom spaces; diverse options for designing and providing open technology enabled learning environments include hybrid learning, online learning, and collaborative models (Johnson et al., 2013). Learning environments are considered a global campus with self-service on demand opportunities for learning (Contact North, 2012). Learning is less teacher-centred and more learner-centred (Dunlap & Lowenthal, 2011).

A key challenge is to address the ongoing need for educational development both for contemporary approaches to teaching using signature pedagogies and for incorporating or implementing learning technologies using research-informed learning and teaching designs. Brown et al. (2013) provide three recommendations for instructors, instructional designers and faculty administration:
1. Establish collaborative instructional design teams to develop high quality online learning experiences and to provide continuous professional learning and growth for faculty and instructors;

2. Leverage current digital technologies and resources to facilitate instructor and student collaboration, communication and community building; and

3. Support and extend instructor-to-instructor communications beyond the design phase into the course delivery and online teaching phase, and post-course evaluation phase, to benefit from the mutual support provided when dealing with emerging course issues and outcomes.

Simply stated, higher education institutions are challenged to rethink how to provide outstanding learning experiences for learner and faculty success and must consider how technology-enhanced learning environments can support both quality teaching and engaged learning across disciplines. There is a need to develop frameworks and a critical evaluation of the technologies for teaching and learning in open environments ranging from face-to-face models to complete online courses.
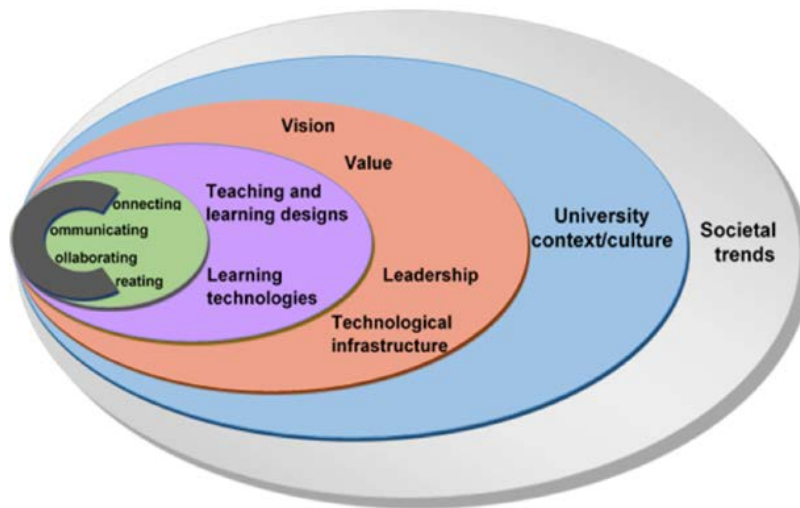

Figure 2. Contexts influencing the Four Cs

In this emerging context, it is important to consider the nested contexts that influence learning through the Four Cs: connecting, communicating, collaborating, and creating (Figure 3)*.* The four Cs are influenced by and nested within research-informed teaching and learning designs that are supported by robust, reliable and well-supported technological infrastructures. High quality teaching and learning with technology is influenced / enabled by and nested within strong leadership, a shared vision for the use of learning technologies, and both a culture of expectation and value for innovative learning designs on campus. The university context and culture continues to be influenced by and is nested within changing societal trends.

Several essential conditions for effectively using learning technologies in higher education started to emerge from the literature, including the following:
● Leadership in developing effective institutional vision and aligned processes (Dziuban et al., 2012; Jackson, 2013; Taylor & Newton, 2013)
● A culture that values learning, risk taking and ongoing faculty development (Dziuban et al., 2012; Jackson, 2013)
● Robust and reliable technological infrastructure and technologies (Dziuban et al., 2012; Inman et al., 2010; Kenny et al., 2009; Mang & Wardly, 2012) and hardware/software requirements
● Technologies for learning need to be integral components purposefully incorporated in the course with clear objectives and across different course delivery modalities (Inman et al., 2010; Lin et al., 2013; Kerawalla et al., 2009; Mang & Wardly, 2012; Pegrum, et al., 2013)
● Instructional designs need to consider logistics for use and pedagogies fostering authentic, student centred learning experiences, creative development activities and collaborative knowledge building,

all of which need to be surrounded by authentic approaches to formative and summative assessment (Inman et al., 2010; Jackson, 2013; Karpova et al., 2009; Kerawalla et al., 2009; Lin et al., 2013; Mang & Wardley, 2012)

● Student guidance and support with techniques/benefits/scaffolded experiences with learning technologies (Inman et al., 2010; Lin et al., 2013; Kerawalla et al., 2009; Mang & Wardly, 2012)

Many young people are empowered by creating and curating original content and publishing information on wikis, blogs, and social media sites (Brenner, 2013). This review also demonstrates a growing number of professors who actively use and examine the role of learning technology for facilitating learning across various disciplines of study (Kay & Kletskin, 2012; Mang & Wardley, 2012; Inman et al., 2010; Siemens & Tittenberger, 2009; Veletsianos, 2012). There are learners and teachers in higher education who enact and study learning with mobile devices, social networks, and gaming systems (Jacobsen & Friesen, 2011; Law, 2011; Louis, 2013). While there is innovative use of learning technologies in higher education, it is still not widespread and both learners and teachers need support in using contemporary technologies for active learning and knowledge building across the disciplines of study.

The emphasis for learning technologies on campus needs to be on new approaches to connecting, communicating, collaborating and creating using research informed and research active contemporary pedagogies and participatory learning designs. When learners come to campus, they both expect and need engaged teachers who can help them to leverage promising and emerging learning technologies as resources for active learning and knowledge creation in contemporary learning environments.

Appendix 6. Review of Institutional Learning Technology Plans

A number of post-secondary institutions have produced institutional plans related to teaching and technology, and a small working group from the Task Force was instituted to review a series of documents.

a. Institutional Plans Reviewed

- Alberta Education: The Learning and Technology Policy Framework
- Carleton University
- Concordia University
- McMaster University
- Massachusetts Institute of Technology
- Mount Royal University
- Oxford University
- Queens University
- University of Alberta
- University of Calgary (Comprehensive Institutional Plan)
- University of Lethbridge
- University of Ottawa
- University of Saskatchewan
- University of Toronto (Continuing Education and Professional Development, Faculty of Medicine)
- University of Victoria
- York University

b. Common Themes of Plans

Plans were largely divided into two categories, strategic and adaptive, and specific and technological. The strategic and adaptive plans appear to be the most useful in describing the role of learning technologies in the context of the respective institutions. These plans provided high-level descriptions of institutional vision, as well as clear expectations from various stakeholders in contributing to the successful development, refinement, and execution of the plan. Specific and technological plans were likely to be more readily implemented, but were connected closely to the context in which the document was written. These plans get "stale" quickly, as specific technologies change over time, and as the institutional structures evolve. Some plans incorporated learning technologies into the general academic plan, while others produced separate plans. Some institutional plans did not directly address learning technologies at all.

c. Key Components of Good Plans

- Background and context
- Clear institutional mandate
- Alignment with academic priorities and teaching philosophy
- Commitment of resources, in terms of personnel and budget
- Clear recommendations, including timelines
- Focus on activities and pedagogies, rather than specific technologies
- Description of faculty development, and how these activities will be developed and sustained

- Description of the role of teaching, including incentives, rewards, and recognition for innovation
- Targeted resources for research (Scholarship of Teaching & Learning) and pilot projects
- Specific initiatives, intended to gather information about innovations in pedagogy and/or technology (these included blended learning, podcasting, lecture capture, etcetera)

d. Key Themes of Environmental Scans

- Continuing sophistication and lowering cost of networked communications
- Strategic investment in resources and infrastructure to support development, facilitation, support and sustainment of academic activities
- Course evaluation and quality assurance – curriculum review and learning outcomes at an institutional or faculty level
- Dedicated communication and marketing strategies, both internal and external
- Shift towards cloud computing infrastructures (Provide global media services at a low cost)
- Increasing use of mobile technologies means people are increasingly always connected
- Increasing diversity among student in terms of background means it is difficult to design one course that is appropriate for all students
- Digital technology is revolutionizing the manner in which knowledge is created, collected, and communicated across the globe
- Research has found students in online course achieved higher grades than students in traditional lecture courses; however, students in blended learning classes perform better than those in fully online classes.
- Offering the potential for innovative ways to facilitate learning and the opportunity to explore and develop new models
- Education will increasingly consist of experience-based learning that is hands-on, globally connected, and research-intensive
- MIT is considering the Oxford model of individualized tutors for students in combination with the Harvard Medical model of student/practitioner-based teaching, which could be facilitated using technology.
- At York, faculty retain rights to the intellectual property they develop, less what the University contributes to the materials.
- San Jose State University Pilot Project - MOOCs for disadvantaged students who had already failed math courses or placement exams lead to even higher failure rates for students, so project has since been suspended
- Growing concern by faculty members about MOOCs rendering them redundant as universities seek to lower costs by replacing high-cost research-oriented faculty members with lower cost facilitators of online classes
- Concern that the future may be divided into a small number of star professors who will earn large MOOC royalties and an army of lower paid teaching assistants who do the grunt work
- UNICON (Executive Education) – "At least in the beginning, the professed business model adopted by major MOOC organizations is to focus on building the user and course base and to figure out how to monetize it later."
- UNICON (Executive Education) – Survey respondents favour blended-learning programs as compared to face-to-face programs.

Appendix 7. References

#learningspaces. What makes a Great Learning Space? Michael Ullyot. March 2014.

Adaptive Learning Environments. Branko Kolarevic presentation to LTTF February 14, 2014

Baggaley, J. (2014). MOOC postscript. *Distance Education, 35*(1), 126-132, DOI:
10.1080/01587919.2013.876142

Bill Gates, Foundation's Health and Education Campaigns (regarding MOOCs).
http://www.businessweek.com/articles/2013-08-08/bill-gates-on-his-foundations-health-and-education-campaigns#p2

Change at Olds College: Olds College Mobile Learning. Gord Gilchrist presentation to LTTF, February 10, 2014

Engaging Faculty in Online Education: Rightsizing Incentives and Optimizing Support. 2010 The Advisory Board Company, Washington, DC.
www.educationadvisoryboard.com/ulc

Finkel, E. (2013). Is there a business model for MOOCs? Considering the costs of offering massive open online courses and the return on investment. *University Business.* Academic OneFile. Retrieved May 2, 2014.

Guthrie, D. (2012). Jump off the Coursera bandwagon, *The Chronicle of Higher Education, 59*(17). Academic OneFile. Retrieved May 2, 2014.

Higher Education Strategy Associates. Intelligent Deployment of MOOCs, Alex Usher.
higheredstrategy.com/blog.

Inside Higher Education. Delving into Digital Learning. Carnegie Mellon University.
http://www.insidehighered.com/news/2013/11/12/carnegie-mellon-u-launches-initiative-improve-student-learning-technology#.UoJKlTWUYYk.email

JISC. Designing Spaces for Effective Learning.
http://www.jisc.ac.uk/whatwedo/programmes/elearninginnovation/learningspaces.aspx

JISC. Learning Spaces Final Report
http://www.jisc.ac.uk/media/documents/programmes/elearninginnovation/learningspaces_finalreport.pdf

K-12 Learning with Technology. Tony Hampshire (Galileo Educational Network) presentation to LTTF February 10, 2014.

Knowledge Networks, Post-Secondary Education in a Digital Age. University of Calgary Faculty of Arts E-Learning Working Group Report. http://knowledge.ucalgaryblogs.ca/

Kolowich, S. (2013). How EdX plans to earn, and share, revenue from free online courses. *The Chronicle of Higher Education, 59*(25). Academic OneFile. Retrieved May 2, 2014.

Kolowich, S. (2014). Doubts about MOOCs continue to rise. *The Chronicle of Higher Education, 60*(19). Academic OneFile. Retrieved May 2, 2014.

Laptop use Lowers Student Grades. Canadian Press.
http://www.cbc.ca/news/technology/laptop-use-lowers-student-grades-experiment-shows-1.1401860?cmp=rss

Learning and Technology Policy Framework. Richard Levy presentation to LTTF February 14, 2014.

Learning and Technology Policy Framework, Government of Alberta, 2013.

Learning Experiences with Technology: Moving from Here to There. Jennifer Lock and Sharon Friesen presentation to LTTF February 14, 2014.

Learning from peer Institutions: A review of Selected Institutional Learning Technology Plans. Prepared for Dru Marshall and LTTF.

Levine, A. (2013). ds106: Not a course, not like any MOOC. *EDUCAUSE Review, 48*(1), p. 54.

Meeting the Challenge of Technology in Higher Education. Keynote presentation by Tony Bates at COHERE Blended Learning Conference, 2012. www.tonybates.ca

Meyer, J. P., & Zhu, S. (2013). Fair and equitable measurement of student learning in MOOCs: and introduction to item response theory, scale linking, and score equating. *Research & Practice in Assessment, 8*(10), p. 26.

Notosh. Learning Spaces #3 – the Seven Spaces.
http://notosh.com/lab/learning-spaces-3-the-seven-spaces/

Ontario Online Learning Portal for Faculty and Instructors. Contact North. 10 Principles to Select Technology.
http://contactnorth.ca/tips-tools/10-principles-select-technology

Sandeen, C. (2013). Assessment's place in the new MOOC world. *Research & Practice in Assessment, 8*(1), p. 5.

Schneider, C. G. (2013). Holding courses accountable for competencies central to the degree. *Liberal Education, 99*(1), p. 14.

Siemens, G. (2005). Connectivism: A learning theory for the digital age. *International Journal of Instructional Technology & Distance Learning, 2*(1), p. 3. http://www.itdl.org/Journal/Jan_05/Jan_05.pdf

Technology Enhanced Learning Environments in Higher Education: A Review of the Literature. Michele Jacobsen, Barb Brown and Deb Lambert.

TEL Technology Enhanced Learning Research Programme. Beyond Prototypes: Enabling Innovation in Technology-enhanced learning.
http://tel.ioe.ac.uk/wp-content/uploads/2013/11/BeyondPrototypes.pdf

The Question of the Continued Relevance of the American College Campus, Charles Warner (Duke) Oakley. http://campusmatters.net/guest-commentary/

Tritelli, D. (2013). From the editor. *Liberal Education, 99*(4), p. 4.

University of Calgary Eyes High Vision and Strategy, 2011.
https://www.ucalgary.ca/eyeshigh/files/eyeshigh/Eyes_High.pdf

University of Calgary Academic Plan, 2012.
http://www.ucalgary.ca/provost/system/files/AcademicPlan2012.pdf

University of Calgary Strategic Research Plan, 2012.
https://www.ucalgary.ca/research/files/research/strategicresearchplan2012.pdf

University of Calgary Integrated Framework for Teaching and Learning, 2011.
http://www.ucalgary.ca/provost/files/provost/ILTP_forGFC_June2011_0.pdf

Waldman, J., & Smith, C. E. (2013). *Hybrid Learning in a Canadian College Environment*. Toronto: Higher Education Quality Council of Ontario.

Wharton MBA Courses. Bloomberg Business Week article.
http://www.businessweek.com/articles/2013-09-13/wharton-puts-first-year-mba-courses-online-for-free