

The Task Force on Innovative Teaching Practices to Promote Deep Learning at the University of Waterloo: Final Report

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Executive Summary

The task force members were charged with identifying innovative teaching practices that could be implemented at Waterloo to promote deep learning. One approach to this mandate would be to focus on how instruction is occurring in individual courses and identifying novel practices; however, the task force members felt that a more systemic approach would be better. A systemic approach has, in the task force's view, greater potential for increasing the awareness, uptake, and development of instructional innovations across the institution – a view clearly supported by Christensen Hughes and Mighty (2010a). Hence, the focus of our work shifted more to identifying ways to promote and support an institutional culture that is focused on student learning. Waterloo's culture already embraces innovation and risk-taking – applying those same attributes to the teaching and learning experience is not only desirable but also a logical next step for Waterloo.

The task force's mandate identified deep learning as the desired end goal, and this goal became very central to our work. Deep learning is taken primarily to involve students retaining knowledge and, through making connections, applying that knowledge appropriately in new and different contexts. Effective teaching became synonymous with promoting deep learning, and innovative practices became a means through which to meet this instructional goal.

At the course and program levels, we learned that instructors at Waterloo have been experimenting with new instructional methods to support deep learning. We also learned about existing institutional initiatives designed to help instructors learn more about effective teaching practices. However, we recognized that not all instructors have the knowledge or the skills to implement or support change in their practices. As well, communication about the innovations has been quite limited. As a result, we concluded that institutional initiatives could be added or refocused to better support a focus on student learning. The task force members identified eight key objectives, with recommendations and specific action items, to support Waterloo's instructors as they learn about and try new ways of teaching to promote deep learning. The objectives and recommendations are summarized in the table below.

Objectives	Recommendations
Communicate a University-wide Statement Promoting Deep Learning	Include within the mission and strategic planning documents a statement that is focused on the goal of promoting deep student learning.
Enhance New Faculty Support	Increase support of teaching development for new faculty members.
Expand Department Chair Support and Training	Develop a set of institutional practices to assist department Chairs in their provision of instructional support and leadership.
Build a Community of Faculty Leaders Focused on Teaching and Learning	Appoint and support a number of University Teaching Fellows.

Improve Internal and External Communications about Effective Innovative Teaching	Implement a strategy to collect, highlight, and share effective innovative teaching practices.
Reconceptualize the Teaching Grants Program	Create Learning Innovation and Teaching Enhancement (LITE) Grants for supporting a broad range of initiatives that encourage innovation in teaching.
Engage Waterloo's Instructors in a University-wide Teaching Event	Hold an annual, one-day teaching conference for Waterloo's instructors.
Promote the Strategic Use of Intensive Teaching Development Activities	Revise institutional practices to make participation in CTE's intensive workshops and activities more intentional.

The first of these objectives is the most crucial as it truly involves a change in institutional culture where teaching to promote deep learning becomes one of Waterloo's enduring priorities and commitments to student success. Support from all levels of the university will be needed for such a change to occur. We trust that Waterloo is ready for such a challenge.

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Introduction

An eight-member task force was struck in November 2010 by Geoff McBoyle, Vice-President Academic & Provost, to investigate the implementation of innovative teaching practices at the University of Waterloo. The task force included one faculty member from each of the six Faculties and two staff members from the Centre for Teaching Excellence (CTE):

- Carey Bissonnette, Science
- Donna Ellis, Centre for Teaching Excellence (Chair)
- Steve Furino, Mathematics
- Shirley Hall, Centre for Teaching Excellence
- Tim Kenyon, Arts
- Ron McCarville, Applied Health Sciences
- Gordon Stublely, Engineering
- Clarence Woudsma, Environment

The task force was requested to:

- Provide an overview of relevant innovative teaching practices applied successfully in universities other than the University of Waterloo;
- Document successful innovative teaching practices within the University of Waterloo;
- Suggest innovative teaching practices that could be beneficially applied within the University of Waterloo;
- Develop an implementation plan.

Work began in January 2011 with a report submitted in June 2011.

Underlying our efforts and discussions has been a belief that our main purpose was to identify ways that Waterloo's instructors can help their students retain knowledge and, through making connections, apply it appropriately in new and different contexts – that is, helping Waterloo's students become deep learners. To fulfill this purpose, we have focused on ideas that will engage Waterloo's instructors (faculty members, staff instructors, and teaching assistants) in effective teaching practices so that their students are encouraged to learn deeply. To further inspire changes to instructional methods, we sought to identify innovative methods to promote deep learning that are used at a variety of institutions, including Waterloo. The preceding statements require key terms to be defined to become more meaningful. The following sections provide our working definitions.

What are “innovative teaching practices”?

Rogers (2003) identifies an innovation as “an idea, practice, or object that is perceived as new by an individual or other unit of adoption” (p.12). In the case of innovative teaching practices, they are being defined in this report as instructional or assessment methods that are different from traditional methods, such as lectures and exams, which may be the norm. Often they are

not brand new but rather are new applications of existing approaches and appear novel to others because they have not yet been widely adopted. These practices may be used at the level of an individual course, a collection of courses, or an entire program or institution. Innovative teaching practices are often tried in an effort to make one's teaching more effective or to tackle an instructional problem or challenge – both of these reasons connect to an overall desire to improve students' learning. For the task force members, innovative practices were not the primary focus but rather were viewed as a means to the desired outcome of enabling more effective teaching and deeper student learning.

What is “effective teaching”?

While contested in the research literature, one point of agreement on defining effective teaching is that it is “oriented to and focused on students and their learning” (Devlin & Samarawickrema, 2010, p.112).

Chickering and Gamson's (1987) seminal work puts the focus on students and describes key characteristics needed for good teaching and good learning. Their Seven Principles of Effective Undergraduate Education encompass instruction that:

- encourages contact between students and faculty
- develops reciprocity and cooperation among students
- encourages active learning
- gives prompt feedback
- emphasizes time on task
- communicates high expectations and
- respects diverse talents and ways of learning.

Bain's (2004) extensive longitudinal study focuses more specifically on the key characteristics of effective teachers:

- they know their subjects extremely well and are active scholars – they can do intellectually, physically, or emotionally what they expect from their students
- they use their knowledge to develop techniques for grasping fundamental principles and organizing concepts that others can use to build their own understanding and abilities – they can simplify, clarify, analyze, and evaluate and are effective and adaptable learners
- they have at least an intuitive understanding of constructivist theories of human learning – they focus on knowledge construction that is sustained and has substantial influence on how students think, act, and feel
- they perceive their teaching as serious intellectual endeavours that are of equal importance to their research and that begin by focusing on and later assessing student learning outcomes/objectives
- they expect more of their students, favouring outcomes that embody the kind of thinking and acting expected for life

- they create a “natural critical learning environment” where students learn by confronting intriguing problems and authentic tasks; grappling with their own ideas and assumptions; working with others; and having the opportunity to try, fail, get feedback, and be treated fairly
- they trust their students, believe students want to learn, speak openly with their students, and encourage students to be reflective
- they assess their own teaching and make appropriate changes

For this report, the task force members focused on identifying innovative teaching practices that demonstrated elements of effective teaching in an effort to provide examples that model best practice, at least within their given context. We also concluded that effective teachers create environments where effective learning is very likely to happen. Our mandate particularly emphasized that the practices identified should promote deep learning, which reinforced for us the connections amongst effective teaching, effective learning and deep learning. Key characteristics of the deep approach to learning are outlined next.

What is “deep learning”?

The research literature uses “deep approaches to learning” and “deep learning” somewhat interchangeably; this report will follow the same practice. Students are using deep approaches to learning when they do the following:

- retain knowledge and apply it in new and different contexts
- focus on relating ideas and making connections between new and prior knowledge
- come to see concepts, ideas, and/or the world differently
- engage in independent, critical, analytical thinking in a quest for personal meaning
- regulate themselves as learners
- rely on intrinsic motivation to learn
- engage in active learning by interacting with others and the course material in their learning

(Compiled from: Entwistle, 2010; Lindblom-Ylance, 2010; Millis, 2010; Saroyan, 2010)

Deep learning differs from a surface approach to learning, which is typically characterized by a focus on rote memorization, facts as discrete pieces of unquestioned knowledge, and a superficial understanding of concepts (Compiled from: Lindblom-Ylance, 2010; Saroyan, 2010).

Halpern and Hakel (2003) identify strategies that effective teachers can use to promote long-term retention and transfer of learning – two key characteristics of deep learning:

- require practice at retrieving past learning to produce responses to new questions
- vary the conditions in which learning occurs by using different approaches to teaching
- encourage students to represent knowledge learned in one format in another format (e.g., make a concept map of a textbook reading or draw a graph for a math lesson)

- elicit prior knowledge, experience, and assumptions that may influence the knowledge and skills being taught
- uncover students' beliefs about learning that may impede learning progress
- ensure that students receive timely feedback about their learning, particularly in more authentic settings
- avoid transmission-focused lectures when learning aims to go beyond recall and recognition (lectures can be interspersed with activities that require students to engage with the material or one another)
- identify and reinforce key concepts (e.g., through testing and retesting) to promote easier retrieval
- understand and accept the trade-off between quantity and quality of learning and identify the key concepts and skills that students should be able to recall and use in the future when the instructor is not present
- match learning activities to articulated course goals/learning outcomes
- accept that what students do in a course – not what the instructor does – determines what and how much is learned, how well it will be remembered, and the conditions under which it can be recalled

Meyer and Land's (2003) work helps to operationalize Halpern and Hakel's strategies by providing a theoretical framework for identifying what they call "threshold concepts", key concepts that instructors most want students to understand and retain.

Many elements of deep learning also fit with the Undergraduate Degree Level Expectations* adopted by Waterloo in 2008 for program review and quality assurance purposes. These expectations focus on, for example, that Waterloo's graduates demonstrate "critical thinking and analytical skills inside and outside the discipline, the ability to apply learning from one or more areas outside the discipline, an understanding of the limits to their own knowledge and ability, [and] the ability to manage their own learning."

The task force took the fundamental virtues of deep learning to be greater retention of knowledge and enhanced student abilities to apply and connect knowledge across multiple contexts. We also assert that effective teaching is teaching that promotes deep learning; therefore, wherever "effective teaching" or "effective learning" appear in this document, a focus on deep learning is implied. Also, in the absence of universally accepted definitions of "excellence in teaching" or "teaching excellence", the task force has taken the view that these terms refer to teaching that has, in some demonstrable way, resulted in deep learning.

We now turn to providing key ideas that further informed our work.

* *The Undergraduate Degree Level Expectations (UDLEs) formulated by the Ontario Council of Academic Vice-Presidents (OCAV)*. (n.d.) Retrieved June 29, 2011, from the University of Waterloo, Centre for Teaching Excellence website, http://cte.uwaterloo.ca/teaching_resources/OCAV/OCAV%20UDLEs.doc

Contextual Background

In identifying examples of innovative teaching practices that support deep learning and developing objectives and recommendations to promote the implementation of such practices at Waterloo, the task force members also articulated the following contextual factors that helped to frame our thinking and develop actionable recommendations:

1. **When faculty members feel dissatisfied with the level of student engagement in the classroom or the depth of their students' learning, there is a need to consider different instructional practices.** Those attending Waterloo's Teaching Excellence Academy (an intensive course redesign workshop) have routinely expressed such sentiments as did many of the faculty members anecdotally surveyed by task force members. The status quo methods of traditional lectures and exams are no longer satisfying the educational needs of Waterloo's instructors and students. The higher education research literature echoes this message and calls for change. Zundel and Deane (2010) outlined the need to shift the emphasis from teaching to learning and to embrace the myriad ways in which students can learn instead of relying on traditional methods. Barr and Tagg (1995) promoted a similar message more than a decade earlier, challenging numerous conventional practices in higher education including the role of the professor, the primacy of content, and the lack of focus on student learning. When a push for making change exists, innovative practices are looked to as ways to alter traditional practices.
2. **Faculty members affect how their students approach learning.** Trigwell and Prosser (1991) indicated that if students perceive that a course has a high workload or the assessments target rote recall, they are more likely to adopt a surface approach to learning, whereas they will tend to adopt a deep approach in courses that they perceive to have clear goals, an opportunity for some learning independence, and an effective instructor. Trigwell (2010) has continued to explore the connections between teaching and learning, identifying two main approaches to teaching. His recent research suggests that when faculty members focus on what students are doing in their courses and encourage activities such as self-directed learning, debate, questioning, and interaction, their students are more likely to adopt a deep approach to learning. Alternatively, those faculty who focus more on their teaching activities, believe their students have little or no prior knowledge of the content, and focus on transmitting facts for students' notes tend to have students who adopt surface approaches to learning. As a result, how faculty members teach, and the underlying beliefs behind their behaviours, can directly affect students' learning experiences, approaches to learning, and learning outcomes.
3. **Even with a goal of promoting deep approaches to learning, there is no one "best" instructional method to accomplish this.** Instructional methods should be chosen based on their ability to help students learn effectively and achieve intended learning outcomes within specific contexts – one size will not fill all situations and disciplines (Entwistle, 2010). Instructors will need to assess any instructional method in relation to the goals for their course or program, the characteristics of their students and learning environments, and their own strengths as a teacher, and choose new methods

intentionally. However, a key step in contemplating new methods is to become aware of them. There are very good reasons why many instructors are not aware of possible instructional options. Teaching often occurs out of the sight of colleagues (Palmer, 1993) and most instructors have not received any formal instructional training or introduction to the pedagogical literature (Britnell et al., 2010). Our informal surveys suggest that innovative methods are being tried at Waterloo, but they are not being shared routinely within departments or more broadly within the university community.

4. **Having discussions about teaching and exchanging ideas about instructional methods are highly desirable to promote a culture where teaching and learning are viewed as central to Waterloo's mission.** Unfortunately, these types of activities are not currently part of the mainstream organizational culture at Waterloo. From September 2010 to April 2011, the Centre for Teaching Excellence saw 141 different faculty members at instructional workshops/events. That's about 10% of the faculty population. There was much more activity with faculty members in *individual* consultations (n=793) – activities to promote instructional development but not the sharing of instructional practice. Such data suggest that there is solid interest in learning more about teaching, but perhaps not the right topics or venues have been found to promote more extensive sharing about such learning. It may be that putting the focus more on promoting effective student learning than on improving teaching practices may resonate for more instructors and help to create the kind of culture shift needed to make instruction more central at Waterloo.
5. **Support at all levels of the institution will be needed to initiate and sustain any changes to the culture around teaching and learning at Waterloo.** Support from senior administrators – for funding, policy change, and statements about the importance of student learning – is clearly critical. However, the importance of deep student learning needs to be articulated and accepted by all for a change to occur. Academic departments have been identified as a key leverage point in such change since it is at that level where behavioural change will need to occur and be reinforced to support and enact the various recommendations made in this report. Christensen Hughes and Mighty (2010b) concur with the approach to target leadership at local levels to make change.

The Task Force members spent significant time identifying and discussing numerous organizational practices that could help to support instructors' willingness to learn about and try new ways of teaching to promote deep learning. These practices could also help to create a culture at Waterloo where effective teaching and effective learning are viewed as being critical to achieving academic excellence, a priority articulated in the Sixth Decade Plan (Chakma, 2006). These organizational practices represent the main focus of the task force's efforts.

The next section of the report introduces thematic categories for various ideas being implemented to support the adoption of effective teaching practices at the institutional level as well as more specific teaching practices used at the program or course level. Detailed examples, which appear in the Appendix, stem from Waterloo and other institutions in order to provide a sense of the possibilities, but the search was not exhaustive.

Sample Innovative Practices to Promote Deep Learning

Task force members were challenged to uncover effective practices used both externally and internally. Queries asking for examples of instructional innovations that promote deep learning were distributed via educational development listservs and emails to Waterloo faculty members as a means of having higher education professional communities identify noteworthy practices. Our searches revealed more than instructional practices; they also found organizational practices that aim to support instructors' willingness to try new ways of teaching. For examples external to Waterloo, we aimed to identify practices that appeared to have sustainability and recognized profile and be transferable to Waterloo. For examples internal to Waterloo, we chose to include as many as possible to demonstrate the breadth of innovative activity currently occurring. The Waterloo examples may be common within certain programs or departments, but they have not yet been widely adopted beyond those contexts. Not all examples include evidence of success, but they all seemed reasonable in their description to suggest that deep learning would be promoted or supported.

The examples were categorized according to type of innovation. They include ideas that could be implemented at the course, program, or institutional level. The course and program examples come from a variety of disciplines but appear transferable across departments and Faculties. They also vary according to potential cost and ease of implementation. The following table provides a summary of the categories used to organize the initiatives. Brief descriptions of the examples, including contact information and links to further details, appear in the Appendix.

Categories for External Examples	Categories for Internal Examples
Learning technologies	Learning technologies
Active learning	Active learning
Organizational leadership and reform	Organizational leadership and reform
Curricular reform	Student success
Student success	Experiential learning /Community service learning
Institutional initiatives	Blended learning
Learning spaces	Learning spaces
	Assessing learning
	Integrative learning
	Upcoming initiatives

These categories are not unique to the task force report. A review of the tables of contents and article abstracts for two international journals that focus specifically on innovative practices was also conducted to provide a sense of the current topics of interest to the readership of these journals. Of the 245 articles published in *Innovation in Education and Teaching International* and *Innovative Higher Education* from 2008 to 2011, the following thematic categories were the most common:

Overall Themes from Journal Articles	Total Articles
Learning technologies (including e-portfolios, e-learning, wikis, blogs, mobile devices, learning objects)	50
Active learning (including collaborative learning/communities of practice, inquiry-based learning, problem-based learning, and writing assignments)	34
Organizational theory (including leadership and organizational reform)	26
Curriculum design (including quality assurance and curricular reform)	18
Student success	16
Experiential learning (including community service learning)	13
Graduate student preparation	11
Internationalization	11
Instructional development	10
Blended learning	9
Inclusivity	9

“Learning technologies” and “Active learning” saw the greatest frequency of publications and include examples that range from small course components to whole course or program-level applications. “Experiential learning” may have been included in the “Active learning” category; however, given Waterloo’s focus on experiential learning, this type of learning was kept as a separate category. That “Organizational theory” ranked third in frequency speaks to the need to address institutional level initiatives when attempting innovations.

Although the task force was unable to complete an exhaustive search both externally and internally, a representative collection of examples has been identified regarding practices to promote and support deep learning. We also included two examples of upcoming initiatives not yet launched at Waterloo to show that instructional innovations are continuing to be developed. These examples fell primarily into the area of integrative learning, which includes having students make connections across courses and develop lifelong learning skills – examples of deep learning. In general, there appears to be interest, at least from some Waterloo instructors, in using various instructional methods and curricular designs to engage students in effective, deep learning.

We are also confident that many more examples of innovations exist at Waterloo which could be shared if mechanisms were in place to identify and communicate about them. As well, there is a culture of risk-taking and innovation at Waterloo, but not necessarily around teaching. With the appropriate institutional support, we believe that more examples would emerge which would encourage a shift in culture where teaching to promote deep learning becomes an enduring priority. The objectives, recommendations, and specific action items that follow provide concrete plans to provide such support.

Proposed Plans: Objectives, Recommendations, and Specific Action Items

The task force has identified eight key objectives to enable Waterloo to meet the vision of developing a culture of teaching to promote deep learning. Each objective includes premises that informed our thinking about the objective, a problem statement, a recommendation to address the problem, and specific action items to assist in implementing the recommendation. Given this format, each objective can be reviewed and operationalized as an independent proposal; however, the objectives are designed to function interdependently if implemented together.

The objectives identify institutional initiatives that would help to support the adoption of innovative teaching practices to promote deep learning at Waterloo. The first four objectives relate primarily to the human side of the teaching enterprise and set the stage for success. The final four objectives focus on resources to support professional development about teaching and are intended to help build the momentum needed to meet the challenge of helping Waterloo's students learn deeply.

We have not identified any particular courses or programs in which to pilot innovative practices; rather, we have focused on proposing initiatives that will help to seed and foster innovative practices across the university by increasing awareness and supporting community building. We believe that by addressing these objectives, an appropriate environment will be set to facilitate greater adoption of innovative teaching practices to promote deep learning.

The key objectives are as follows:

Setting the Stage for Success

- Objective 1: Communicate a University-wide Statement Promoting Deep Learning
- Objective 2: Enhance New Faculty Support
- Objective 3: Expand Department Chair* Support and Training
- Objective 4: Build a Community of Faculty Leaders Focused on Teaching and Learning

Keeping the Momentum

- Objective 5: Improve Internal and External Communications about Effective Innovative Teaching
- Objective 6: Reconceptualize the Teaching Grants Program
- Objective 7: Engage Waterloo's Instructors in a University-wide Teaching Event
- Objective 8: Promote the Strategic Use of Intensive Teaching Development Activities

The following sections expand on each objective. All of these objectives can begin to be addressed in the current fiscal year, given adequate resources.

* In this report, "Department Chair" or "Chair" refers to both Chairs and Directors of Schools.

Objective 1: Communicate a University-wide Statement Promoting Deep Learning

Premises:

- 1. Student learning is at the heart of the educational enterprise.** Zundel and Deane (2010) outlined the need for postsecondary institutions to put their emphasis on student learning. This idea was the key driver behind a recent AUCC retreat for university administrators about transforming higher education. (See the description of the AUCC University Administrators workshop provided in Table 1 of the Appendix.) The Ontario government's new plan for postsecondary education, only very recently unveiled, reinforces this focus; the plan, entitled *Putting Students First*, highlights the goal of providing students with a postsecondary educational experience that is student-focused, engaging, and challenging (see http://www.tcu.gov.on.ca/eng/postsecondary/speech_may.html).
- 2. Instructor behaviours are guided by university culture.** Policies, practices and organizational language need to support the importance of effective student learning in order for faculty to make it their priority.

Problem Statement:

At Waterloo, there is a lack of institutional direction and messaging about the importance of student learning and the need to promote deep learning. Without such direction, Waterloo's instructors are less likely to take the necessary risks to change or enhance their teaching behaviours.

Recommendation 1:

Include within the mission and strategic planning documents a statement that is focused on the goal of promoting deep student learning. Implementing this recommendation will help Waterloo clarify and communicate more effectively the key purpose for its teaching. In addition, putting emphasis on students' learning would make a clear statement about Waterloo's commitment to its students and is consistent with calls from university leaders and the government to have learning be a primary objective, as was outlined in Premise 1 above.

Specific Action Items:

- 1.1 Amendments to the Sixth Decade Plan to make direct reference to deep learning.** The Sixth Decade Plan (Chakma, 2006) currently states that Waterloo's "learning component involves a combination of classroom teaching and experiential learning" (p.6). With Waterloo's adoption of the Degree Level Expectations, which echo many of the tenets of deep learning, the time has come for Waterloo to be more explicit about the type of learning expected from its students.

1.2 Addition of the statement about student learning to various Waterloo communication vehicles. To promote a culture and the practice of deep student learning, the message should be very visible. In particular, messaging should be incorporated into Waterloo websites that are designated to promote Waterloo’s commitment to teaching (e.g., the “Teaching & Research” site).

Objective 2: Enhance New Faculty Support

Premises:

- 1. New faculty members typically have limited formal training as teachers.** A recent Higher Education Quality Council of Ontario study reports that university instructors have minimal or no formal training as teachers (Britnell et al., 2010). Almost all (93.3 %) reported learning how to teach through a “trial and error” or “learn by doing” approach. We believe that Waterloo’s instructors should be trained in teaching and learning processes as they undertake their teaching responsibilities. However, as asserted in Objective 1, policies and organizational language need to support the importance of teaching in order for new faculty to take their development as teachers seriously.
- 2. New members of any community must learn what is expected in order to become successful participants within that community.** It seems appropriate that Waterloo assist its new faculty members by helping them understand both the learning community Waterloo hopes to build and how they can contribute to this community.
- 3. New faculty members can help to reveal and change university culture.** Joining a new community involves asking questions to find out how to fit in – these questions can help existing community members to reflect on existing cultural practices. New faculty may also be the most receptive to sharing teaching practices that they learned elsewhere and experimenting with teaching methods because they are keen to contribute to their new community.

Problem Statement:

Waterloo currently has limited instructional support dedicated to new faculty members. There is also a lack of institutional direction and messaging about the importance of effective student learning. Without such supports or direction, Waterloo’s new faculty are unlikely to be the catalysts for teaching-related change that they could be.

Recommendation 2:

Increase support of teaching development for new faculty members. Implementing recommendation 1 will clarify Waterloo’s intended direction about the key purpose for its teaching, but further actions will be needed to support new faculty.

Specific Action Items:

- 2.1 A formal instructional workshop in which new faculty members would explore teaching and learning issues.** The intent of the workshop is twofold: provide foundational information to help new faculty prepare to teach at Waterloo, and help them reflect on their current and future practices. The workshop would be offered by CTE.

Topics should include but not be confined to: facilitating deep learning, the role of the instructor, aligning learning assessments and activities with course goals, classroom management, and resources available to new faculty on campus to assist with teaching.

Several instructional formats are possible for this session. It may help to have new faculty begin instructional portfolios/teaching plans at this time. Additionally, new faculty should be advised during this session to meet with their Chair to discuss how their teaching will be assessed for their annual merit review and tenure and promotion. For such meetings to be effective, Chairs must also receive appropriate support (as discussed in Objective 3).

In procedural terms, we suggest that this workshop be at least one full day on campus; it may need to be repeated two to three times each year because new faculty members have start dates throughout the year. Further, new faculty members should be required to attend to reinforce the value placed on effective teaching at Waterloo.

2.2 Assignment of professional development mentors. As faculty members begin to undertake teaching responsibilities, they should be assigned a staff member through CTE who can help them prepare for and plan their ongoing professional development as teachers. Related interactions may be through online chats, one-on-one discussions, or group interactions. Teaching Fellows (see Objective 4) could also serve as mentors, but may require training and resources to fulfill their role. In addition, department Chairs should also be instructed on ways they might highlight and promote effective teaching practices to new faculty members (see Objective 3, Specific Action Items 3.3 and 3.4).

Objective 3: Expand Department Chair Support and Training

Premises:

- 1. The role of a department Chair presupposes the abilities to recognize and to foster excellence in teaching.** Department Chairs have responsibility for a range of teaching-related mandates (see Policy 40, <http://secretariat.uwaterloo.ca/Policies/policy40.htm>). These include academic leadership, advancing the academic mission of the unit, implementing the department's academic program to the highest standards, and carrying out annual performance reviews of faculty members. The manner and quality of the delivery of an academic unit's curriculum is ultimately a matter for the Chair's oversight.
- 2. There is no reason to suppose that Chairs take on their positions already possessing appropriate expertise in recognizing and developing instructional excellence.** Chairs may well be outstanding instructors in their own right without having expert or managerial-level skills in department-level curriculum development, course development, or faculty mentorship for teaching.
- 3. Existing practices and policy regarding the appraisal of teaching, which are to be followed by the Chair, have not explicitly allowed for the particular sorts of instructional development and mentorship that are likely to improve student learning across campus.** While the recent Review of the Faculty Annual Performance Evaluation Process recommendations have resulted in requests to change practices around how teaching is assessed, faculty members' experimentation with innovative teaching practices, and university-wide programs aimed at enhancing teaching for individual faculty members, have not been universally integrated with the annual performance appraisal process.

Problem statement:

Academic leadership and performance evaluation of the sorts that most directly impact faculty members – and especially probationary faculty who are forming work habits that can last a lifetime – are exercised by department Chairs. The position of Chair is a crucial element of any proposal that focuses on the quality of students' learning and effective teaching. Informed and uniform Chair-level support for a focus on student learning will be highly effective; while partial, patchwork, or indifferent support from Chairs will undermine even the best institutional efforts to implement excellence in teaching.

Recommendation 3:

Develop a set of institutional practices to assist department Chairs in their provision of instructional support and leadership. There are several elements to the support for teaching, which may require more than one means of engaging and training Chairs. Two existing forums for implementing this recommendation are the current program of information sessions for new Chairs, and the Provost's series of Chairs' Forum lunchtime presentations. A new training program might also be considered, however.

Specific Action Items:

3.1 Explicit administrative support for Chairs on policies and practices devoted to

fostering effective teachers. Chairs should be explicitly encouraged and supported at every level of higher administration in their teaching development mandate. It should be made clear through policy and practice that Chairs are implementing an approach to teaching – and to faculty responsibilities – that reflects both University policy and the academic values of administrators from the President to Associate Deans of Faculties. Recommendation 1 makes this very point in calling for a clear directive about the need to focus on deep student learning. Such high-level messaging and buy-in send the appropriate message to Chairs regarding the institutional importance of this mandate, and to other faculty members regarding the institutional breadth and fairness of the focus on effective teaching. In particular, the explicitness of this broader support will convey to faculty members that the message about effective teaching and student learning is not idiosyncratic to their Chair.

3.2 Selection processes that acknowledge the central importance of the teaching

enterprise. New faculty members should be chosen for their interest and capacity in teaching as well as in research. However, current hiring practices are uneven across the university regarding the ways in which candidates demonstrate their teaching expertise and hiring committees assess them. All Chairs should have a hiring process that requires candidates to teach a typical undergraduate class for that unit. Interview protocols may also include discussions about instructional practices that focus on what students will do to learn rather than on what instructors will do to teach.

3.3 Chair training to implement and support instructional development for new faculty.

Chairs should be provided with concrete strategies for the support of effective teaching by new faculty, and to assist with the acculturation of new faculty into a view of teaching that values evidence-based approaches to facilitating and assessing deep learning in that field. This is a corollary of the Committee's Recommendation 2 that the University provide strong instructional training for new faculty as early as possible after their hiring. The messages from early instructional training workshops must be supported and reiterated by Chairs if they are to take root, however. Instructional training for new faculty is less likely to succeed if:

- Chairs are unaware that it has taken place;
- Chairs deliver explicit professional advice to new faculty in a way that minimizes the incentives to focus on teaching quality;
- Chairs explicitly denigrate it;
- Chairs implicitly denigrate it by distributing praise or rewards (of various sorts) without regard to teaching excellence or efforts to achieve it. New faculty members can be exquisitely sensitive to messages about the professional activities that presage career success within an academic unit.

Information to help Chairs support effective teaching by new faculty, and to avoid these and similar pitfalls, should be incorporated into training for new Chairs and into periodic refresher seminars for existing Chairs.

3.4 Resources to deliver real-time assistance to Chairs in their teaching-support mandates.

While training will help to mitigate the problem, in general Chairs cannot be presumed to have either the time or the expertise to directly provide teaching advice to faculty members. They should be given decision procedures for referring faculty members to central resources and contacts; and these central teaching-support resources (Teaching Fellows, it is envisioned, as well as personnel and resources based in CTE) must be sufficient to accommodate the referrals they receive in an effective and timely manner.

3.5 Official policy or clear direction regarding performance appraisals that provide faculty members with “freedom to fail” in their use of innovative teaching techniques.

Innovation in teaching is apt to be difficult when first tried out; new strategies can destabilize an approach to teaching that has risen to a local maximum of success. It would not be surprising if student evaluations, or the instructor’s own perceptions of success, show a decline when an innovative technique is first employed, even if a better teaching and learning outcome is eventually achieved. The Committee recommends policies and practices that enable faculty members to try out something new in their teaching without being punished in their annual performance appraisals for lower teaching scores should the novel approach not be an instant success.

Constraints on such an approach should include provisos such as: it be limited to major innovative approaches; that the new approach be explicitly cleared in advance with the Chair; and that such clearance would be judged as mitigating lower teaching scores only periodically. Such conditions would help preclude the worry that sub-standard teaching could be rationalized year after year, or rationalized post hoc by appeal to innovations that had been attempted without notification.

3.6 Chair training in the sound use of teaching evaluation information for mentorship.

Student evaluations of teaching are valuable not merely (perhaps not even *primarily*) for their use in assigning scores for annual performance appraisals, but because they can guide Chairs in mentoring faculty members on teaching matters. This mentorship typically will comprise the Chair’s arranging the appropriate contacts between faculty members and the relevant teaching instruction experts. Normally this will be the CTE but may also be a Teaching Fellow as outlined in Objective 4.

In order to perform this function, Chairs should receive uniform, consistent guidance on how to interpret evaluation scores and individual student comments in a manner that respects sound evidential principles. This means neither overlooking signs of teaching that requires a fresh approach, nor overreacting to outlier comments or scores. Furthermore, Chairs should be acquainted with the range of options for instructional assistance that CTE offers and to which faculty members may be referred.

Objective 4: Build a Community of Faculty Leaders Focused on Teaching and Learning

Premises:

- 1. University instructors' teaching motivation primarily comes from a passion for their specific discipline.** Instructors typically begin their careers with a deep and focused knowledge of a particular problem area within their discipline. For most instructors, there is a natural desire to share this knowledge and to make sure that their students' understanding is accurate and meaningful. Since the discipline knowledge and desire to share that knowledge are common values within departmental units, placing resources within the departmental units to promote teaching for deep learning is likely to be highly effective. Britnell et al.'s (2010) survey findings support this idea – nearly 75% of faculty respondents indicated that they learn about teaching by consulting with colleagues (p. 21).
- 2. Most instructors do not have formal education on learning in higher education and tend to rely on “intuitive” strategies to guide their teaching practice.** “Intuitive” strategies are typically developed from observations of their own teaching and learning experiences. However, the teaching methods which are sufficient or effective for students destined to become professors may not be adequate or effective for students with more typical destinies. Therefore many “Teaching Rules of Thumb” used by instructors are virtually myths and may have limited applicability in spite of the best efforts of the instructors.
- 3. To achieve the level of cultural change suggested in this report, it is insufficient to provide initial training for new instructors without supporting their on-going development as teachers and without supporting instructors already in the ranks.** As discussed in Objective 3, Chairs can play a role in these continuing supports but are often limited by the nature and demands of the Chair position. In many units, some form of mentoring focused on teaching development will help to ensure ongoing support for both new and established instructors. An environment supportive of teaching development to promote deep student learning will foster a willingness to take the risks necessary to attempt innovation and change.

Problem Statement:

Waterloo is challenged to improve the depth, effectiveness, and efficiency of student learning through its faculty members' teaching. From the ranks of the faculty, there are ample numbers of motivated and willing instructors to rise to this challenge but who may be limited in their ability to be expert practitioners of university level teaching. Additionally, this group of instructors has neither a “community of practitioners” nor the focused leadership necessary to guide the innovations and changes in practice required to promote deep student learning.

Recommendation 4:

Appoint and support a number of University Teaching Fellows. The University Teaching Fellows should be selected from within the teaching units (departments) and each Fellow should have the mandate to provide leadership in teaching within their unit in order to develop

a set of best practices for teaching which will improve the depth, effectiveness, and efficiency of student learning in their unit. It is expected that there would be sufficient number of Fellows throughout the University that their expertise would penetrate to all units. Christensen Hughes and Mighty (2010b) reinforce the value of this type of distributive leadership.

Teaching Fellow Qualifications

- Established credibility and stature as a successful instructor within the unit or discipline
- A demonstrated ability to provide collegial leadership
- Predisposition to working with colleagues from a diverse range of disciplines who have interests and expertise in teaching
- Willingness to seek guidance from the pedagogical scholarship in higher education for selecting and/or recommending evidence-based best practices

Example Activities

- Mentoring of neophyte instructors
- Assisting in developing and providing formative feedback to instructors
- Consulting on strategies for addressing particular teaching challenges
- Liaising with CTE (and other experts) to facilitate solutions to specific teaching challenges and share instructional innovations
- Facilitating teaching seminars and discussion groups
- Identifying effective, innovative teaching practices within the unit and celebrating the achievements that follow from these practices
- Promoting participation in professional development activities (i.e., Teaching Excellence Academy, Instructional Skills Workshop)
- Exploration and/or engagement in pedagogical scholarship in higher education

Specific Action Item:

4.1 The creation of a Teaching Fellows program. The above proposal provides a vision for a new institutional position, the University Teaching Fellow, which will enable Waterloo to encourage and support the development of a strong group of instructors with the necessary skills to promote deeper learning amongst Waterloo students. If this vision is accepted, then the following details of the position will need to be specified:

- Total number to be supported across campus – the Sixth Decade Plan (Chakma, 2006) currently calls for 20 Teaching Innovation Fellowships (p.6)
- Term of office
- Amount of stipend
- Budget for teaching relief – recognition that “teaching the teachers” takes significant time commitments (similar to those for conventional teaching activity)
- Research account/grant criteria, application procedure, and overall budget for incremental costs associated with the Fellows’ activities
- Infrastructure for building a community of best practices (i.e., equivalent to annual retreat for university level administration)

Objective 5: Improve Internal and External Communications about Effective Innovative Teaching

Premises:

- 1. Before contemplating new instructional methods, instructors have to be aware of them.** Active learning strategies most often associated with facilitating deep learning may not be known to instructors because they did not experience them as students and have not received training on available options or how to implement them.
- 2. Uptake of new instructional methods is more likely to happen when instructors have access to focused and filtered resources.** In today's information arena, there is no shortage of sites and resources about teaching and learning in higher education. The challenge for instructors is to understand how this wealth of information relates, if at all, to their instructional challenges and then how to assess the quality of the practices being shared. A vetted, centralized resource to disseminate materials and opportunities adaptable to the Waterloo context would assist instructors.
- 3. Innovative teaching practices are being tried at Waterloo, but they are not routinely being shared.** CTE data suggest that there is solid interest in learning more about teaching, but perhaps not the right topics or venues have been found to promote sharing about such learning. Our informal surveys of Waterloo's instructors suggest that innovative methods are being tried (See Table 2 in the Appendix), but they are not regularly being shared within departments or more broadly to the university community.

Problem statement:

For many instructors, their desire to enhance learning in their courses using innovative approaches is constrained by a number of factors, as outlined above. An underlying issue is the lack of an institutional communication strategy for highlighting and sharing teaching innovations that promote deep learning.

Recommendation 5:

Implement a strategy to collect, highlight, and share effective innovative teaching practices.

The strategy should facilitate communication among those willing to share their experiences and those eager to learn about them. Further, the presentation of relevant experiences from Waterloo and other institutions as well as effective background materials (research, resources, and practical experiences) would be a critical component.

Specific Action Items:

- 5.1 Development of 1) a strategy for collecting examples of innovative teaching practices and assessing them in terms of their potential for promoting deep learning, and 2) a mechanism and tools for sharing these examples with instructors.** Collecting, highlighting, and sharing innovative teaching practices involves much more than "adding

a section” to an existing website. It is vital that the resources are first critically evaluated and then presented effectively.

5.2 The solicitation and development of examples from Waterloo to highlight innovative teaching practices, as part of action item 5.1. Examples collected for this report (see the Appendix), as well as examples drawn from projects funded by LIF/PIF grants or LITE grants (see Objective 6), provide a starting point. The presentation of these examples should employ a multimedia approach to broaden the appeal to the spectrum of Waterloo instructors and facilitate global exposure of the innovative teaching that occurs at Waterloo.

5.3 The expansion of the Open Classroom Series. CTE’s Open Classroom Series features Distinguished Teacher Award winners who agree to open their classes to interested colleagues. This type of activity should be expanded to feature instructors employing innovative approaches, so that instructors from across the institution have the opportunity to see “innovation in action”. A course registry with brief descriptions of the innovations used and links to the course e-learning environment should be developed. The registry should take advantage of available scheduling technologies to allow featured instructors to communicate to members of the Waterloo community the dates on which their classrooms are open, and incorporate a sign-up tool. Waterloo should also consider the possibility of allowing recipients of LIF/PIF grants or LITE grants (see Objective 6) to use the Open Classroom Series as one means of disseminating their results.

5.4 Sharing of online course elements. When instructors have innovative online elements in their courses, these elements should be made widely available through the learning management system (LMS). D2L, Waterloo’s new LMS, allows for easy sharing. This feature of D2L should be advertised and exploited. CTE liaisons could facilitate the practice of sharing online course elements.

Objective 6: Reconceptualize the Teaching Grants Program

Premise:

1. **The focus of the current teaching grants program, which is based on the Learning Initiatives Fund (LIF) and Program Initiatives Fund (PIF), is too narrow to foster various kinds of innovation projects.** Teaching grants provide useful support to promote innovation in teaching and learning. Currently, the LIF/PIF grants encourage and support projects that have an explicitly stated research focus. As a result, they may seem inaccessible to instructors who are not engaged in the scholarship of teaching and learning, lack knowledge of the existing higher education research literature, or are unfamiliar with designing and analyzing the results of a research project that is focused on teaching and learning. In addition, the total allocation for LIF/PIF grants and the allocations for individual grants are not sufficient for the diversity of projects that instructors might envision.

Problem Statement:

There are instructors who recognize opportunities to improve student learning or resolve instructional challenges, and who have the desire to implement innovations. However, they lack resources needed to investigate. The current teaching grants program has limited potential for fostering innovation in teaching and learning because, as discussed in the premise above, it is not accessible to a significant number of instructors, not flexible enough to support a wide variety of initiatives, and not funded adequately to cover the costs of substantive experiments.

Recommendation 6:

Create Learning Innovation and Teaching Enhancement (LITE) Grants for supporting a broad range of initiatives that encourage innovation in teaching. These grants should support only those initiatives for which the proposed innovation is fundamentally focused on deep learning. These grants should replace the existing Learning Initiative Fund (LIF) and Program Initiative Fund (PIF) grants currently managed by CTE. They should be available to both practitioners interested in improved learning in their course or program and to scholars of teaching and learning. The funds for these grants should be not only substantially larger than the current allocation to LIF/PIF grants but also in base budget.

Specific Action Items:

- 6.1 **Specification of total allocation, in base budget, to be made available for LITE grants, as well as the maximum dollar amount and maximum duration of a single grant.** The funds for these grants should be substantially larger than the current allocation to LIF/PIF grants because certain projects could, for example, include:

- hiring of contract personnel for up two years
- extensive training of existing department personnel (e.g., to develop and deploy a repository of online learning elements for use in multiple courses)
- renovation costs for converting existing classrooms (e.g., to create active learning spaces)

LIF/PIF grants do not currently provide a level of funding that would permit such projects to be piloted or assessed. A total allocation of 0.2% in base budget for the LITE grants is both realistic and achievable. (In Table 1 of the Appendix, we included information about an innovative institutional initiative implemented at the University of Sydney for providing substantive funding for teaching grants.)

6.2 Development of guidelines, eligibility criteria and selection criteria. The initiatives supported by LITE grants should be effective, efficient, sustainable and, whenever possible, transferable. They should focus on investigating new methods and assessing their impact, and are not intended for permanent funding. They may be situated within a course or a program. They may focus on activities in the classroom or out of the classroom. They may be as narrow as specific learning objectives or as broad as curricular renewal. They may be pedagogical or logistical in character. Also, successful grant applicants should be expected to share the outcomes of their project with the wider university community.

Proposals should be encouraged from all individuals or teams who teach and directly support teaching and learning at the University. They should be assessed in terms of:

- **Effectiveness.** Does the proposal clearly identify an important teaching/learning/logistical problem or opportunity? Does the proposal state clearly how that problem or opportunity will be addressed and include plans to assess the success of the project?
- **Efficiency.** Does the proposal identify existing resources, provide a viable budget and identify how to most constructively deploy personnel time?
- **Sustainability.** Does the proposal demonstrate the financial sustainability of the initiative beyond the grant funds? Does the proposal contain a statement of support from the applicant's Dean, Chair or Supervisor as appropriate?
- **Transferability.** Does the proposal develop or assess content or practices that other teachers and learners at Waterloo can use?

Objective 7: Engage Waterloo's Instructors in a University-wide Teaching Event

Premises:

- 1. Waterloo's instructors constitute a community capable of helping its own members make informed choices for increasing the depth and effectiveness of their students' learning.** In broad terms, Waterloo's instructors may be divided into three groups:
 - (i) Instructors who are actively engaged in the scholarship of teaching and learning and who contribute to the body of knowledge about evidence-based practices that promote deep learning;
 - (ii) Instructors who are knowledgeable about, and perhaps use, some of these practices;
 - (iii) Instructors who are less knowledgeable about, or perhaps largely unaware of, these practices.

The wide-scale application of practices that promote deep learning is more likely to happen if instructors from all three groups convene regularly to discuss these practices.

- 2. A teaching conference is a highly-visible, cost-effective, and efficient method of bringing together instructors for the purpose of sharing evidence-based practices that promote deep learning.** Teaching conferences/events hosted at Waterloo currently (i.e., Opportunities and New Directions Conference, the Presidents' Colloquium on Teaching and Learning) and in the past (i.e., the Learning About Teaching event) have had limited success in bringing together Waterloo's instructors and hence have somewhat limited potential for positively affecting teaching and learning at Waterloo. Typically, conferences/events hosted at Waterloo have drawn instructors primarily from groups (i) and (ii).

Problem Statement:

Waterloo is challenged not only to demonstrate to the entire University community (faculty, staff and students) that its instructors belong to a community of learning that cares about improving the depth, effectiveness and efficiency of student learning but also to bring its instructors together regularly to identify, share, and discuss effective, innovative teaching practices.

Recommendation 7:

Hold an annual, one-day teaching conference for Waterloo's instructors. The conference should focus on sharing effective pedagogical practices as well as scholarship about teaching and learning to broaden the appeal of the event and make it more inclusive of the campus community.

Specific Action Items:

7.1 Participation from Waterloo instructors at all levels. Broader participation should be sought than has been experienced in past years, but there needs to be an explicit intention to increase the participation of instructors from group (iii). It is expected that instructors from groups (i) and (ii) will not only participate but also provide leadership in the design and organization of the conference. In Objective 4, we have recommended the creation of a Teaching Fellows program. The Teaching Fellows would be obvious choices for providing leadership in the design and/or organization of a teaching conference and to assist with increasing participation.

7.2 Provide not only the resources needed to hold an annual teaching conference but also the opportunity for all instructors to participate. Waterloo should consider the merits of (1) identifying and reserving a day on which an annual teaching conference could be held; and (2) treating this day as a professional development day for its instructors, with no other university business being officially scheduled for the day. Ideally, the conference would be held during the term, rather than near the end of term or between terms, which would enable students or student leaders to participate.

Objective 8: Promote the Strategic Use of Intensive Teaching Development Activities

Premises:

- 1. Rethinking one's approach to teaching and beliefs about learning take focused time and background knowledge.** Faculty members rarely have much time available to focus independently on revising a course to help promote deep learning, nor do they necessarily have the knowledge required about the changes that would most help students achieve deep learning. Having access to a structured program provides guidance as well as designated time to focus on learning more about teaching.
- 2. To consider adopting instructional strategies that support deep learning, faculty members may benefit from the opportunity to practice new methods and receive feedback in a supportive environment.** Having more than one day to focus on instructional issues enables faculty members to not just learn new theories or methods but also put them into practice and receive feedback from their peers and skilled facilitators. When the environment feels safe, which can be achieved in a multi-day event, faculty may be more inclined to take risks and approach instructional issues creatively. As well, the opportunity to try out new ways of approaching teaching tends to increase the likelihood that new practices will be transferred to the participants' actual teaching.
- 3. Working with peers on developing new ways of approaching teaching will help to build a community of practice.** Spending multiple days discussing and taking risks with one's teaching helps to build a camaraderie with the other participants that can extend beyond the timeframe of the workshop and help to build cross-disciplinary connections that expedite the sharing of instructional practices and challenges across the institution.

Problem Statement:

CTE currently provides two main intensive workshops: the Teaching Excellence Academy (TEA) and the Instructional Skills Workshop (ISW). These intensive workshops draw faculty members and staff instructors who are interested in learning more about course design and delivery and who want to rethink how they approach their courses and teaching. CTE has also piloted a few Learning Communities (i.e., Graduate Student Supervision, Teaching Large Classes), which have brought together small groups of faculty members who are experiencing a similar challenge and want to investigate evidence-based ways of dealing with their challenge. Although these workshops and learning communities are currently available, participation in them has not necessarily been driven by departmental plans to rethink teaching within the unit.

Recommendation 8:

Revise institutional practices to make participation in CTE's intensive workshops and activities more intentional. Through revised institutional practices, participation in such events could be shifted to support explicitly the institutional mission of promoting deep learning.

Specific Action Items:

- 8.1 Requests for courses or series of courses that are candidates for redesign.** The templates or instructions for preparing, for example, program review reports, annual faculty member merit reviews, and departmental or Faculty-level strategic plans should include prompts for identifying courses or series of courses that are candidates for redesign, as well as brief information about the intensive training opportunities available through CTE. Identification of courses in these documents would not be punitive but rather proactive, and would help to locate future participants for the TEA and ISW who have an interest in or need to make a change to their course design and/or delivery. Having a regular prompt on institutional documents would also help to increase the awareness of instructors – and Chairs – about the training opportunities available to assist with instructional changes.
- 8.2 The expansion of the TEA to provide at least one extra offering that focuses on the redesign of a group or series of courses.** Whereas redesigning individual courses can be effective, students' learning experiences will be affected much more broadly if Waterloo starts to conceive of and support redesign at a curricular level.
- 8.3 Explicit marketing of the TEA and ISW as opportunities to explore instructional methods that promote deep learning.**
- 8.4 The use of Teaching Fellows as facilitators for the TEA, ISW, and learning communities.** The TEA, ISW, and learning communities all require more facilitators, particularly facilitators drawn from faculty. In Objective 4, we have recommended the establishment of a Teaching Fellows program. The Teaching Fellows would be ideal candidates to provide such facilitation. With more facilitators, more events could be offered, including follow-up sessions, and instructors from more departments may be encouraged to come and engage in a cross-disciplinary community of practice if more of their colleagues are involved as facilitators. The Teaching Fellows could also help to identify possible participants for intensive training. Having more faculty facilitators would also help to identify more learning community topics since they would be more likely to hear about topics of interest within their own departments and Faculties. For these additional reasons, the Teaching Fellows program should be adopted.
- 8.5 A one-time increase of 0.25 in the annual merit rating for faculty members who complete an intensive workshop or contribute significantly to a learning community on teaching and learning.** This increase would recognize and reward their commitment to developing their instructional knowledge and skills. Examples of significant contributions to a learning community would include facilitation of a workshop or preparation of instructional materials or resources of use to the Waterloo community.

Concluding Remarks

Student learning is at the heart of the educational enterprise. Whether it is helping students learn the ways of knowing about a discipline or generating original research to contribute to that discipline, the focus should be on students and their learning. To best understand a discipline, students need to fully engage with it. This full engagement is consonant with using and demonstrating deep approaches to learning in which students retain knowledge and, through making connections, apply it appropriately in new and different contexts.

This report focuses primarily and intentionally on deep learning, rather than on innovation. The task force feels strongly that, because of Waterloo's culture of innovation and risk-taking, innovation in teaching is likely to happen almost naturally if Waterloo is intentionally focused on student learning. The crucial objective for Waterloo is surprisingly simple yet, to date, confoundingly elusive: a change in institutional culture where teaching to promote deep learning is embraced as one of Waterloo's enduring priorities. This change will take time and effort, but through consistent messaging and organizational structures that clearly support putting time and effort into teaching and learning, change seems inevitable.

The task force is heartened by the fact that instructors at Waterloo have been experimenting with new ways to engage their students in deep learning and taking the risks associated with trying new methods. But we know that Waterloo could do more to support the efforts of its instructors. In this report, we have identified eight key objectives and recommendations that will help to promote adoption of, and further experimentation with, innovative instructional practices. We have also identified a number of innovative practices being used here and elsewhere as starting points to foster further innovation.

The work of this task force, while extensive, could be extended. First, the initiatives outlined in this report identify ways in which Waterloo can help its instructors adopt new methods of teaching to support effective learning. The specific resources needed to implement these initiatives must still be explicitly identified. Second, the student perspective has not been considered in this report. Efforts to change instructional practices will obviously involve Waterloo's students; therefore, developing a strategy and mechanisms for eliciting and responding to their perspectives is a logical next step.

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Appendix: Examples of Innovations in Teaching and Learning

Preamble

The Task Force was asked to compile examples of innovative teaching practices that promote deep learning. Our searches uncovered more than just teaching practices; they also found organizational practices that support instructors' willingness to learn about and try new ways of teaching. Table 1 provides examples of innovations in teaching and learning at institutions external to Waterloo. Table 2 lists examples of innovations currently underway at Waterloo.

The external examples provided are not an exhaustive compilation; instead, they are a cross-section of innovations from various higher education institutions that are considered to be leaders in fostering deep learning. Whereas the contexts of these institutions may differ from Waterloo in terms of discipline, size, faculty-student ratio, and so on, the examples may provide new institutional and course-based ideas that could potentially be adapted and/or adopted at Waterloo. The examples from Waterloo represent a cross-section of practices being used here to demonstrate the breadth of initiatives already in existence.

Table 1: Examples External to Waterloo

Learning Technologies		
Type of Innovation	Institution	Description
On-line educational resource repository	University of Buffalo, State University of New York	The National Center for Case Study Teaching in Science is a repository of case studies of innovative materials and sound educational practices for case teaching in the sciences. It was developed in response to a need for change in traditional lecture methods to promote student participation and engagement in critical thinking and cooperative and team learning. http://sciencecases.lib.buffalo.edu/cs/
Extensive math and science repository	Khan Academy	An extensive repository of self-paced science, math and other subject area learning tools and objects incorporating innovative tracking metrics. Students can use the extensive video library, practice exercises, and assessments on-line, and teachers can access student data to improve their teaching and student learning. http://www.khanacademy.org/

Active Learning		
Type of Innovation	Institution	Description
First Year Seminars	University of Guelph	Initiated in 2003, the pilot project for the First Year Seminars in Bachelor of Arts and Science program at Guelph enabled faculty of a research-intensive university, to bring their intriguing research interests into the undergraduate classroom as first year seminars, providing a link between research activities and teaching and learning. Constant participation requirements help students learn “how to learn” more effectively and actively. In introductory-level courses, students are still in transition to the new environment, responsibilities, and opportunities of post-secondary education and these seminars help to engage students actively in the learning process. President Alastair Summerlee teaches several seminars.
Inquiry-based learning	McMaster University Susan Vajoczki	Inquiry based learning is a pedagogical approach emphasizing research processes and skills. By incorporating structured and guided approaches to teaching research processes and skills, faculty help students to demonstrate positive learning outcomes and deep approaches to learning. Inquiry methods are used in all years and sizes of courses, and a longitudinal study suggests that students who take an inquiry-based course in first year have better academic success throughout their program than those who do not. Justice, C., Rice, J., Warry, W. & Laurie, I. (2007). Taking an “inquiry” course makes a difference: A comparative analysis of student learning. <i>Journal on Excellence in College Teaching</i> , 18 (1), 57-77. Vajoczki, S., Watt, S., Vine, M. & Liao, X. (2011, January). Inquiry learning: Level, discipline, class size, what matters? <i>International Journal for the Scholarship of Teaching and Learning</i> , 5 (1). Downloaded from: http://www.georgiasouthern.edu/ijstol
Problem-based Learning	McMaster University Don Woods	Problem based learning creates motivation and students develop problem solving skills that serve them well in future learning and in the workplace. Success assessed via Course Perceptions Questionnaire and the Lancaster Approaches to Studying Instrument. For table comparing Inquiry and PBL see: http://csl.mcmaster.ca/resources/misc/whats_unique_about_inquiry.html#6

Type of Innovation	Institution	Description
Peer Instruction	Harvard University Eric Mazur	<p>Lectures are interspersed with conceptual questions, called <i>ConcepTests</i>. <i>ConcepTests</i> are based upon Halloun and Hestenes (1985) and Hestenes, Wells, Swackhamer 's (1992) <i>Force Concept Inventory</i> research which showed that conventional instruction had little effect on changing beliefs of first-year physics students. Students' initial and basic physical knowledge (which provides the basis for a conceptual vocabulary for understanding physical phenomena) is filled with misconceptions, and the design of these tests helps to correct these misconceptions.</p> <p>The method gives students the opportunity to discover and correct their misunderstandings of the material and, in the process, learn the key ideas of physics from one another. Does not require retooling of entire courses or curricula, or significant expenditures of time or money. A collection of <i>ConcepTests</i> would need to be developed by the instructor and willingness to spend some of class time on student discussion.</p> <p>http://www.bestteachersinstitute.org/id106.html</p> <p>Halloun, I. & Hestenes, D. (1985). The initial knowledge state of college physics students. <i>American Journal of Physics</i>, 53, (11), 1043-1055. Halloun, I. & Hestenes, D. (1985). Common-sense concepts about motion. <i>American Journal of Physics</i>, 53, (11), 1056-1065. Hestenes, D., Wells, M., & Swackhamer, G. (1992, March). Force Concept Inventory. <i>The Physics Teacher</i>, 30, 141-158.</p>
"Reacting to the Past" series	Barnard College	<p>Reacting games are designed to reflect the multiple causal forces that shape history—economic, political, sociological, technological, and cultural. Unlike conventional history courses, which teach what happened and why, Reacting games may depart from the actual events and outcomes of the past. This innovation is being used in core honours courses, where students learn by taking on roles, informed by classic texts, in elaborate games set in the past; they learn skills—speaking, writing, critical thinking, problem solving, leadership, and teamwork—in order to prevail in difficult and complicated situations. Reacting roles, unlike those in a play, do not have a fixed script and outcome. While students are obliged to adhere to the philosophical and intellectual beliefs of the historical figures they have been assigned to play, they must devise their own means of expressing those ideas persuasively in papers, speeches or other public presentations; students must also pursue a course of action they think will help them win the game. Currently implemented at over 300 colleges and universities in the U.S. and abroad.</p> <p>http://reacting.barnard.edu/</p>

Organizational Leadership and Reform	
Organization	Description
Association of Universities and Colleges of Canada (AUCC) University Administrators workshop Darlene Moll Program Manager	<p>The AUCC hosted workshops for academic leaders from AUCC member institutions to develop an understanding of what needs to change in undergraduate education in Canada.</p> <p>http://www.aucc.ca/undergraduate_workshop/index_e.html</p> <p>Bringing together academic leaders for focused discussions can lead to actionable recommendations. For example, following up on the workshop, Arshad Ahmad, President of the Society for Teaching & Learning in Higher Education, articulated in an open letter concrete steps that university presidents might take to improve undergraduate education:</p> <ol style="list-style-type: none"> 1. Listen to more students and parents. 2. Identify institutional learning goals. 3. Use measures of teaching effectiveness that are more comprehensive than those currently in use. 4. Embrace and champion a broader definition of scholarship. 5. Encourage, support and recognize interdisciplinary approaches to teaching and learning. 6. Involve students deliberately in producing, interpreting and disseminating knowledge. <p>For a more detailed account, including context and rationale for taking these steps, see http://www.universityaffairs.ca/six-suggestions-for-presidents-to-improve-undergraduate-education.aspx</p>
Curriculum Design (Quality Assurance, Curricular Reform)	
Olin College Engineering Debbie Chachra	<p>Curriculum level changes for undergraduate Electrical, Computer and Mechanical Engineering programs. Olin has adopted an interdisciplinary, project-based approach to teaching. During the summer months, Olin hosts a week-long institute where participants develop designs and action plans for curricular change at their home institutions to meet 21st century challenges.</p>
National Effective Teaching Institute (NETI) Richard Felder Hoechst Celanese Professor Emeritus of Chemical Engineering at North Carolina State University	<p>The National Effective Teaching Institute (NETI) is an annual three-day workshop providing information and hands-on practice in effective teaching practice, supporting new faculty and engaging them in exercises with experienced faculty who have been nominated for their teaching abilities. Workshop participants report positive effect on their students' learning and evaluations.</p>

Student Success		
Type of Innovation	Institution	Description
Assessing student learning approaches (deep vs. surface)	Utah Valley University Anton Tolman	<p>Upcoming study will assess the impact of metacognitive instruments on student learning. For example, the R-SPQ (Revised Study Process Questionnaire) is as an established instrument that assesses the degree to which students adopt a surface versus a deep approach to learning in their course. The main purpose of this study is to assess the influence of metacognition and personal study plans on the academic success of students. The study will use pre- and post-tests of student knowledge and thinking skills. Specifically, students will receive a pre-test during the first class and then a post-test during finals week that contains the same test questions. The greater the improvement between pre- and post-test, the greater the learning. Additionally, student comments will be analyzed to determine the impact of the metacognitive instruments on their study habits. It is hypothesized that students who used the metacognitive instruments and a study plan will show greater changes towards deep learning as compared to students who do not use the instruments or study plan.</p> <p>Kremling, J. & Tolman, A. (2011. April). <i>Assessing the Validity of Three Metacognitive Instruments: TTM, R-SPQ, and LSSA</i>. Presented at the California State University Symposium on University Teaching.</p>
Institutional Initiatives		
Ability-based and Assessment-as-Learning Curriculum	Alverno College, Wisconsin	<p>Alverno College has developed a college-wide curriculum aimed to develop mastery of eight core abilities: communication, analysis, problem solving, valuing, social interaction, developing a global perspective, effective citizenship, and aesthetic engagement. Students are assessed and receive feedback from instructors, working professionals, fellow students, and themselves. Students' learning progress is captured in their Digital Diagnostic Portfolio, which enables them to process feedback received and reflect on patterns in their academic work so they can become autonomous learners. The tool is available to other institutions. For more details, see: http://www.alverno.edu/academics/ourability-basedcurriculum/</p>

Type of Innovation	Institution	Description
The UBC Science Education Initiative	University of British Columbia	Carl Wieman leads the UBC Science Education Initiative, an innovative program to reshape science education. Interactive activities prove more effective than traditional lectures for deep learning in a first-year physics course. The study prompted a revamping of large first-year physics classes at UBC and attendance also increased 20%. The more interactive techniques promote student engagement in actively using new reasoning skills and knowledge and are now being adopted in more than 50 courses in seven science departments. While the teaching methodology promoted deeper learning, the greater innovation here was the creation of the teaching chair and recruitment of a respected expert. For more information, see: http://www.cwsei.ubc.ca/
Scholarship Index	University of Sydney	The purpose of the Scholarship Index is to provide financial rewards to departments whose staff members contribute to teaching quality through the scholarship of university teaching. The Scholarship Index is sourced from 0.5% of Operating Grant Money and 0.5% of the previous year's International student fee income. In 2008, for example, a total of AUS\$1,003,087 was distributed to faculties. For more information, see: http://sydney.edu.au/learning/quality/si.shtml
Learning Spaces		
SCALE-UP Project	North Carolina State University	SCALE-UP is an acronym for Student-Centered Active Learning Environment for Undergraduate Programs. Students sit in groups at 6 or 7 foot diameter round tables. Instructors can walk around the room and move from teams to individuals, engaging them in Socratic-like dialogues. Tables have three networked laptops and there are always lively interactions. NC State used nationally-recognized instruments in a pre-test/post-test with portfolios of student work to collect data comparing physics students' learning in traditional classrooms compared to those in SCALE-UP classrooms. Findings include: students' ability to solve problems is improved, conceptual understanding is increased, attitudes are better, failure rates (especially for women and minorities) are drastically reduced, 'at risk' students do better in later courses. Successful pilot project paper with findings was published in the first issue of <i>Physics Education Research</i> (supplement to <i>American Journal of Physics</i>). See: http://scaleup.ncsu.edu/
Active Learning Classroom	McGill University	Based on the SCALE-UP Project, McGill formed a Teaching and Learning Spaces Working Group (TLSWG) who developed Principles for Designing Teaching and Learning Spaces . They also drew upon the National Survey of Student Engagement (NSSE). In their two classrooms, which have 50-72 seats, students sit in small groups of 6-9 and, through computers, can share their screens at their tables or with the whole class. Have writing space on walls for collaboration too. For more details, including videos, see: http://www.mcgill.ca/tls/alc/

Table 2: Examples Internal to Waterloo

Learning Technologies (blogs, wikis, twitter, interactive simulations, e-portfolios)	
Contact	Description
Josh Neufeld Biology	BIOL 466: Students access a 'Biogeochemistry in the News' blog which is updated weekly by students and the instructor, with important updates highlighted at the beginning of each lecture. Video tutorials, prepared using Camtasia and a tablet PC, are used to teach hard-to-grasp skills of balancing redox equations and calculating free energy yield. Students' presentations of current literature are enhanced by video interviews of the international authors of these papers created for and embedded in the course.
James Skidmore Germanic & Slavic Studies	GER 383: ProfBlog feature used as a running commentary on course readings; students required to comment as well. Online open chat sessions to improve student interaction in this online-only course.
Mat Schulze Germanic & Slavic Studies	GER 261/REES 261/ENGL 220A: Wiki assignment modelled on the conventions of Wikipedia: students created an encyclopedia entry on Discourse Analysis.
Andrew Maxwell Management Sciences	MSCI 454: Twitter was integrated into classroom activities to enhance interactions among students and with the professor. When students or the professor made presentations, other students would pose questions and comments, which were visible to the TAs via Tweetdeck. The TAs would select the best questions for immediate response. The remaining questions would be answered after class or during the week, extending the interactions in time and location. The effectiveness of Twitter was measured using Tweetpoll. Feedback on the use of Twitter enabled improvements to be incorporated in the subsequent year.
Rhys McKinnon Philosophy	PHIL 215: Business Ethics uses Live Twitter feed for in-class questions and comments.
Bill Power Chemistry	CHEM 120: Twitter is used in certain sections of a first-year chemistry course to communicate with students (e.g., make announcements) and to get students to think about concepts outside of class time (e.g., broadcast a link to a question via Twitter; students follow the link, answer the question, and see in real time the distribution of responses).
Steve Forsey Chemistry	CHEM 262/CHEM 266/NE 122: Top-Hat Monocle is used to create interactive and dynamic visualizations (simulations) of important concepts in organic chemistry. Students can access them using a laptop or smartphone during class or at home.
Katherine Lithgow, CTE	E-portfolios can be used at the course or program level to help integrate various elements and enable students to articulate their insights and experiences.
Doris Jakobsh Religious Studies * also an example of Integrative Learning	RS 495: Students travelled to India for a three-month course with the course professor. They were required to complete weekly reflections in their e-portfolios, complete weekly readings, and participate in group discussions. A month after they returned, they were required to reflect on their learning by revisiting journal entries and reviewing artifacts from their trip. Students had to describe and illustrate how the time given to review and reflect upon their journal entries, combined with the creation of their e-portfolios, allowed them to see their growth and development and learn more about themselves as learners.

Active Learning	
Contact	Description
Alan Huang & Ranjini Jha Accounting and Finance	AFM 472: The Investment Poster Competition is a case competition used in an investments course to mimic the real-world decision-making process of either financial analysts or portfolio managers. Student groups present their work, on either a stock valuation project or an active portfolio management project, to a panel of faculty and finance industry leaders. The stock valuation requires student groups to analyze the investment value of a publicly listed firm and present and defend their investment recommendation. In the portfolio valuation project, students choose an investment strategy and actively manage a hypothetical portfolio of \$1 million over eight weeks on a virtual trading platform. The competition requires each student group to prepare and present a poster, and should a group advance to the final round, present in front of industry experts. The competition emphasizes student team-working and applications of classroom theories to real-life settings, and provides a networking opportunity among students, faculty, and industry leaders.
Carey Bissonnette, Steve Forsey, & Betsey Daub Chemistry	SCI 227: Students research a topic of their choice and write an article for <i>CHEM 13 News</i> , following the guidelines of that magazine. The audience is mainly high school chemistry teachers.
Rick Helmes-Hayes Sociology	SOC 405: Senior seminar in Sociology. Students read 3 short books (1/wk), and prepare a 4-5 page summary, handed in before class, in successive weeks. They contribute to the in-class formulation of a collective book summary, first with notes and then without. Marks are awarded for individual summaries and for in-class participation. Students do better individual reports after working in a group and the collective book reports improve each week. Working without notes in particular seems linked to deep learning.
Hamid Jahed, Bill Owens, & William Melek Mechanical & Mechatronics Engineering	ME 380: Instructors use small focused learning exercises to demonstrate design project management skills instead of lecturing on skills. These management skills are identified as an intended outcome of the course.
Kashif Memon Faculty of Science	SCBUS 122/123/223/225: A series of workshop courses based on theoretical frameworks and case studies from top-notch business schools. The courses incorporate student-team case analysis, debates, discussion, group work, presentations and independent work. Students cycle through the various roles of the case study – presenter, questioner, audience – throughout the term.
Simon Chuong & Susan Lolle Biology	BIOL 120: Instructors require students to work in groups to make time-lapse movies of plant movements. Students are encouraged “go above and beyond” by adding music and decorative material to coordinate with plants wrapping around objects or moving toward light sources, etc. At the end of term, there is an awards ceremony (modeled after the Oscars) with prizes for students to showcase the finished films. Instructors say the project helps with team building and development of various soft skills.

Contact	Description
Grit Liebscher German & Slavic Studies	GER 303: Long-distance intercultural Germany/Canada project to have advanced German language learners in Canada interact with German students at a German university by using online interaction tools (UW-ACE) and conferencing tools (Skype). Resulted in a cross-Atlantic group project (PowerPoint presentation) on an intercultural topic.
Michael Boehringer & Barbara Schmenk German & Slavic Studies	GER 101/102: Skits are performed at end of term as a summary of what students have learned. Performed in German, either live or as YouTube/Facebook videos. Incredible creativity is displayed. Also, Lernstationen (= learning stations) are used. In practice, it is much like speed dating, but instead of getting someone's phone number, the students go in small groups from table to table to perform a language task (usually a game or some sort of activity). Very simple and very effective. Students support each other, teach each other, and review the course materials in a fun fashion.
Organizational Leadership and Reform	
Contact	Description
Gordon Stublely Mechanical & Mechatronics Engineering	Inaugural Waterloo Teaching Chair who served as champion/organizer/resource for developing teaching abilities and promoting student learning in Mechatronics and Mechanical Engineering (MME) programs and courses from 2007-2010.
Tim Kenyon Philosophy	Teaching Excellence Academy (TEA) uptake. Since 2007, 4 of 12 faculty have gone through the TEA. This has generated a critical mass of people in the department who take the core ideas (e.g., alignment) seriously and want to see them implemented in departmental best practices or policy.
Student Success	
Contact	Description
Khan Erkorkmaz, Bill Owens, Soo Jong, & Steve Waslander Mechanical & Mechatronics Engineering	ME 360: Student Understanding Growth – These instructors developed and administered a test instrument to measure the improvement in student understanding of essential concepts of control systems engineering.

Experiential Learning /Community Service Learning	
Contact	Description
Nancy Waite School of Pharmacy	The School of Pharmacy is the first in Canada to incorporate co-op education and has a very strong Community Service Learning component. They are progressive in trying alternative teaching and assessment methods. E-portfolios and group/individual coaching with pharmacists assist students in becoming reflective practitioners, assessing career alternatives, and demonstrating achievement of pharmacy outcomes. The Program Learning Outcomes Tracker (PLOT) was developed in Pharmacy to assess students' progress towards professional learning outcomes during their co-op work terms.
Diana Denton Faculty of Arts	Community service learning (CSL) is at the forefront of new techniques for building transformative university-community partnerships. Students in Professor Diana Denton's leadership courses (cross-sectoral leadership and federal public service leadership) are able to work directly with a community group on projects related to the course goals, which helps students to apply course concepts in authentic situations. As a result of these experiences, many students have made different career choices. CSL integrates academic study with hands-on service and active reflection in order to enrich learning, foster civic responsibility, and build stronger communities.
Judene Pretti Co-op WatPD	The WatPD program aims to enhance the professional skills of all co-op students by augmenting experiential learning with academic credit online courses. The courses provide opportunities to develop skills for improving employability and workplace productivity. http://www.watpd.uwaterloo.ca/
Mario Sillato Spanish	SPAN 450: Students are engaged in translation work within the KW community as a requirement for Theory and Practice of Translation course. Students work at the NGO World Accord and this experience gives them the opportunity to apply their knowledge in the area of translation and at the same time to get to know the humanitarian work that this organization does in developing countries.
Blended Learning (for more examples see the CTE website)	
Contact	Description
Jane Holbrook Centre for Teaching Excellence	Blended courses integrate structured online activities into face-to-face courses. Students interact with textual or graphic lecture notes, audio or video files, and learning materials that help them achieve specified course learning outcomes. Contributes to student success by preparing students for class discussions or lab experiences; promotes understanding of challenging course concepts; assesses student retention of course concepts and skills; and enhances the sense of community within the course. Face-to-face contact time or class time should normally be reduced.
Mario Coniglio Earth Sciences	EARTH 235: The instructor transformed a fully face-to-face course to a blended course. Course materials are developed in advance and made available on UW-ACE. Face-to-face time is now used for group discussions and for Q&A.

Contact	Description
Andrea Edginton Pharmacy	PHARM 220: Blending online and in-class activities is an innovative teaching approach for Pharmacy in Canada. A combination of online lectures and activities are designed to engage students in a course with a heavy mathematics component. Online pieces are integrated with face-to-face problem solving tutorials and small group tutoring sessions. Research has been conducted around measuring the students' reaction and increase in enthusiasm for this approach over time.
Learning Spaces	
Contact	Description
Jesse Rodgers Velocity	The world's first student residence designed to enable budding entrepreneurs to work with like-minded colleagues on mobile communications and digital media. An example of one innovation is "lvlr" (pronounced "leveller"), which is a website that stimulates students to learn and do better in their university courses through healthy competition with their peers. http://velocity.uwaterloo.ca/
Shannon Dea Philosophy	Philosophy Learning Commons: Small, quiet, comfortable departmental space for undergraduates to gather and talk philosophy. Created through LIF grant funds in 2007-9. Based on the idea that peer learning is profoundly influenced by architectural and geographic factors.
Assessing Learning	
Contact	Description
Ehsan Toyserkani Mechanical & Mechatronics Engineering	ME 212: Student/Grader Practice to focus students on major concepts and reinforce concepts. Lecture time is used to have students work in pairs – one solves a problem and the other marks the problem. Significant discussion time is included in the cycle.
Integrative Learning (for more examples see the CTE website)	
Contact	Description
Katherine Lithgow Centre for Teaching Excellence	In integrative learning, students aim to integrate their learning across courses, in- and out-of-class activities, and even extracurricular activities. Using an integrative learning approach can assist students in preparing for their personal, professional, and civic life. Integrative learning strives to transcend academic boundaries, and encourages students to address real-world problems, to synthesize multiple areas of knowledge, and to consider issues from a variety of perspectives.
Ed Jernigan Bachelor of Knowledge Integration (BKI)	The Bachelor of Knowledge Integration is a transdisciplinary program which offers students the opportunity to explore interests in both arts and sciences, build a core of skills that equips them to understand and solve complex problems, communicate effectively, and be able to adapt to a changing world.

Contact	Description
Robert Sproule Accounting and Finance	The School replaced Co-op work term reports with Student Reflections to address the need to develop process skills. Work term reflections address: teamwork, oral communication, written communication, and leadership. To provide a framework for each reflection, a template is provided that refers to courses or activities that occurred as part of the program, and prompts students to apply/connect their learning in school with their learning in the workplace. A number of other resources are also provided to support reflective activity: tips for writing effective reflections, checklists for both the students and reviewers, and the rubric for assessing reflections.
Kyle Daun & Sean Peterson Mechanical & Mechatronics Engineering	MTE 250 and MTE 351: Integration of two courses covering related but clearly different subjects, thermodynamics and fluid mechanics, in a manner that helps stress the connections between seemingly independent concepts.
Upcoming Initiatives for 2011-2012	
Course Contact	Description
Sanjeev Bedi, Khan Erkorkmaz, & Ehsan Toyserkani Mechanical & Mechatronics Engineering	MTE 1A term: Planned initiative to provide a set of courses with intended learning outcomes that are aligned not only within each course but that also create an aligned curriculum across the 1A term. Revised courses set to launch in September 2011.
Nancy Vanden Bosch Accounting and Finance	<p>An integrative course sequence called “Learning to Integrate”, which is intended to help students develop the capacity to integrate, through the use of simulations, projects, and cases. The courses will be taken in terms 1B, 2B, 3B, and 4B, and will seek integration of five types of knowledge: facts, procedures, concepts, strategies, and beliefs (Mayer, 2009). Demonstration of communication, leadership and collaboration capabilities of accounting and finance professionals and application and synthesis of major components are identified as intended outcomes. The courses will use a team of professional accountants and School staff to provide feedback. To launch in September 2011.</p> <p>Mayer, R.E. (2009). Advances in specifying what is to be learned: Reflections on the themes in chapters 6-8. <i>Development of Professional Expertise: Toward Measurement of Expert Performance and Design of Optimal Learning Environments</i>. (pp.203-211). New York: Cambridge University Press.</p>