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Collected Essays on Learning and Teaching

Empowering Learning, Effecting Change

VOLUME X

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A Message from the President of STLHE: Pathways to Empowering Learners and Effecting Change

Robert Lapp
Mount Allison University

The volume you are reading offers a rich record of the proceedings of STLHE’s 2016 Conference, but it also makes possible new pathways into the wealth of materials shared at that landmark meeting in London, Ontario. Those of us who attended the conference each had our own pathway to through the event itself, and this edition of CELT enables us to re-live some of that experience and to supplement it by “attending” (virtually) some of the sessions we had to miss. For those of us who were unable to make it to London, here is a volume that invites you to follow whatever pathway best meets your needs at this moment into a treasure-trove of evidence-based, learner-centered scholarship and practice.

“Pathways” was the theme of the 2016 pre-conference held at Fanshawe College, suggested by the seamless collaboration of co-hosts Fanshawe and Western University. As we moved along Oxford Street or up Western Road in London, we were experiencing just one of the many empowering pathways being mapped out for 21st-century learners amongst the various sectors of post-secondary education in Canada. And this movement was aligned symbolically with another memorable feature of the 2016 Conference: the final phase of our year-long celebration of the 30th anniversary of the 3M National Teaching Fellowships in the hometown of 3M Canada. What gave this moment extra zest was the renewal of our contract with 3M that included a long-overdue extension of eligibility for the Fellowship to outstanding teachers in all sectors of higher education, including Canada’s Colleges, CEGEPS, Institutes, and Polytechnics. When it comes to teaching and learning, we are all on the same page, despite the apparent differences created by provincial context, institutional size, or curricular mandate.

My own pathway to the 2016 conference wound through the “Threshold Concepts” Conference at Dalhousie University (held the week previous), so I arrived filled with ideas about how our most important work as a Society involves facilitating transformational processes. In 2015 in Vancouver, for example, we had been reminded by Dee Fink that our challenge is to shift the focus from teaching to learning, a shift that involves nothing short of reconceiving our identity: from being “teachers” or “Educational Developers” to being facilitators of learning, regardless of context. From this concept we can trace a path to the 2016 Conference theme: we must think of our work as “empowering learners” in order to “effect change,” whether that be in a workshop for faculty on curriculum design, in a hands-on culinary class, or in a 1000-seat “Introduction to Astronomy.”

This change in perspective, in turn, explains why we always need such resources as the present edition of CELT. The shift in identity and practice from teaching to facilitating learning is itself a threshold concept, and to navigate its liminal space we need continuously to review and re-assess its implications. For college and university faculty, this shift in focus is captured in such phrases as “I don’t teach electrical engineering; I teach students how to learn electrical engineering.” For Educational Developers, it
similarly involves a shift from teaching (say) curriculum mapping to becoming a kind of mentor for metamorphosis: guiding faculty from the self-concept of subject-expert to that of scholarly teacher, and from there to midwife of learning.

With these transformations in mind, then, I invite you to enter this new set of collected essays by whatever pathway best suits your needs at this stage in your process. How fortunate, meanwhile, that we are all on these pathways together: collaborating, sharing our research, guiding and being guided—a “society” in short. And on that note, may I take this opportunity to thank Neil Haave and his editorial team at the University of Alberta and across Canada for editing this volume—and the previous two—with consummate skill and generosity. His work stands as a symbol of precisely how we can “empower learners” (in this case, the readers of these volumes) and thereby truly “effect change.”
Editorial: Assessing Teaching to Empower Learning

Neil C. Haave
University of Alberta

Collected Essays on Learning and Teaching is one venue that enables scholarly teachers to have their educational efforts scrutinized and made public in order to effect instructional change resulting in the empowerment of learning. This volume of CELT publishes authors who are scholarly educators and thus are both researchers and teachers. However, as you will read in some of their articles that follow, faculty members who desire to excel at teaching but feel pressure to be productive in research find themselves in a chicken or egg situation. When administrators in charge of evaluating faculty productivity are tasked with assessing the merits of research, teaching, and service, they often end up relying on measures of research because there is either nothing to distinguish the teaching among colleagues or because teaching is not valued to the same extent as research. But of course, that is because faculty understand that research is the first priority in the development of a successful academic career (Adendorff, 2011; Briseño-Garázón, Han, Birol, Bates, & Whitehead, 2016; Kustra et al., 2015). So, which comes first - administrators placing emphasis on and granting credence to teaching or faculty producing excellent teaching productivity that merits note during the assessment of tenure and promotion applications (Shapiro, 2006)? This question raises the issue of what constitutes productivity in teaching.

The assessment of research productivity uses the rubrics of publications and successful grant applications. In addition, a review of research productivity often includes an assessment of the number and achievements of a faculty member’s highly qualified personnel. The system for assessing research may have its flaws (Donovan, 2007; Feist, 1997; Frey & Rost, 2010; Gibb, 2012; Sahel, 2011; van Gunsteren, 2015) but at least there is a system that is dependent upon review by qualified peers. Indicators of teaching productivity are not as easily quantified. Student evaluations of teaching are fraught with bias (Miles & House, 2015; Nargundkar & Shrikhande, 2014; Ottoboni, Boring, & Stark, 2016; Stark & Freishtat, 2014; Uttl & Smibert, 2017; Uttl, White, & Gonzalez, 2017), though some argue they still have merit if judiciously used (Benton & Ryalls, 2016). Students need to have a venue to speak about their learning experiences, but are they in a position to evaluate someone’s teaching ability when they themselves are still learning how to learn and have difficulty assessing their own learning (Bell & Volckmann, 2011; Lindsey & Nagel, 2015)? Is it appropriate to use the rubric of the number of students and number of courses that someone teaches to indicate teaching productivity? Or maybe we wish to assess excellence/quality of teaching rather than productivity. But, then, are we assessing teaching differently than how research is assessed (Henderson, 2009)? Yes, research assessment is based on quality as indicated by the quality of journals and grants in which the faculty member published and is successful: the assumption is that the peer review process of publication and grant application assesses quality. Is there something similar for teaching?

At the Augustana Campus of the University of Alberta, our Committee on the Learning Environment has been struggling with what multifaceted evaluation of teaching means and entails. Clearly, it includes student evaluations of teaching (SETs) but does not rely on them, although some have shown that SETs have no relationship to quality...
Multifaceted evaluation of teaching also needs to include peer review of our teaching, similar to what is done for research grants and publications. In contrast to some scholarly teachers (Wuetherick & Yu, 2016), I am fortunate to work at a Canadian post-secondary campus that understands and accepts that the scholarship of teaching and learning is a valid research pursuit and can contribute to faculty development. But how is a multi-faceted evaluation of teaching done? In my experience, it is incredibly time-consuming and thus only happens to a great extent at the time of tenure application and teaching award nominations. It takes time to attend a colleague’s class and provide constructive feedback and a summative assessment of teaching quality. It also takes time to produce and assess our teaching dossiers to determine the depth of reflection we have attained in considering our understanding of teaching and learning, how that understanding is manifest in the teaching strategies we implement in our classrooms, and whether those strategies are grounded in theory and evidence (Kenny & Evers, 2011). There are, however, many tools and approaches available for moving beyond the numerical ratings of SETs, which involve assessing student engagement with active learning (Eddy, Converse, & Wenderoth, 2015; Lund et al., 2015; Smith, Jones, Gilbert, & Wieman, 2013), critical reflection on SETs (Malouff, Reid, Wilkes, & Emmerton, 2015), cross-disciplinary class visits (Haave, 2014), and the assessment of self-reported teaching practices (Wieman & Gilbert, 2014). Can we develop a culture where it is accepted that the assessment of our peers’ teaching is required to be a member of academia, similar to how we have established and accepted that evaluating our peer’s research quality and productivity is necessary for the academic enterprise to continue? If teaching is valued as a scholarly activity similar to research, as many institutions profess, then maybe teaching quality and productivity needs to be evaluated in a manner similar to research.

So how does one become a quality scholarly teacher? We need to think of teaching as a scholarly activity similar to discovery research in that it requires integrating and interpreting research (Boyer, 1990) that produces a fertile learning ground for our students. We are trying to create for students an environment in which they are able to experience how knowledge is created, interpreted, and communicated. A change in academic culture to view teaching as a scholarly activity on par with research (Kilgore & Cook, 2007) will enable us to empower learners to become scholars in their own right. Teaching and research are two sides of the same coin – they feed each other (Prenkert, 2013) – and when done right, they lead to the third pillar of the academic pursuit, which is service. Empowering our students to develop as scholars produces communities in which citizens are prepared to use their learning in service to the life of their community. Developing our conception of teaching beyond one of knowledge transmission to one in which knowledge is contingent and context-dependent will develop deeper approaches to learning by our students (Varnava Marouchou, 2011).

Once we have accepted the fact that our teaching is a scholarly activity that needs to be developed and regularly peer reviewed, then faculty evaluation committees will be more willing to give credence to one’s teaching ability as significantly contributing to attaining tenure and promotion. When that happens, the incentive will exist to become scholarly teachers who reflect on teaching praxis, study the evidence for how to best teach based on students’ learning outcomes, and, finally, make teaching efforts public so that the academic profession can improve (Quinnell, Russell, Thompson, Marshall, & Cowley, 2010; Schwegler, 2013; Simmons, 2011). To empower our learners, we need to effect change in how we assess and develop our teaching. Doing so will better enable our students to become independent learners – the researchers of the future.

In this 10th volume of Collected Essays on Learning and Teaching, authors have reworked their presentations from the 2016 annual meeting of the Society for Teaching and Learning in Higher Education into peer reviewed papers which reflect the theme of that conference: empowering learners, effecting change. We have grouped these papers into four sections: Empowering Teaching, Implementing
Change, Empowering Learners, and Effective Learning.

The first section leads with “Levers for Change in Educational Development in Canada” by Debra Dawson, the 2016 recipient of the Christopher Knapper Lifetime Achievement Award. One conclusion from her retrospective is that for teaching to continue developing, institutions need to develop more significant approaches for rewarding the efforts of both faculty and educational developers to improve teaching and learning. Without robust incentives, the current hegemony of research in post-secondary education will continue to eclipse teaching to the detriment of our students’ learning. Arshad Ahmad, Denise Stockley, Ron Smith, and Amber Hastings, coauthors of the second paper, found from their survey that “The 3M National Teaching Fellowship” has had a positive impact on teaching at respondents’ respective institutions in Canada, but the nature of the impact may be dependent upon whether or not the institution holds teaching in high regard or whether it is overshadowed by research. The “Empowering Teaching” section ends with “Faculty Teaching Practices and Perceptions” by Gülnur Birol, Adriana Briseño-Garzón, and Andrea Han, which furthers their analysis of their teaching perceptions survey at the University of British Columbia that first appeared in last year’s volume of CELT. Their continued analysis suggests that although many faculty believe that active learning promotes student learning outcomes, the lecture continues to be a common teaching strategy.

The five papers in the section “Implementing Change” all suggest different strategies to implement improvements in post-secondary education. Sawsen Lakhal, Dianne Bateman, and Janie Bédard share their best practices for “Blended Synchronous Delivery Mode in Graduate Programs”, which they have researched and developed for the Master Teacher Program in Quebec. “Implementing Competency-Based Education” by Lynn Curry and Marcia Docherty explains the objectives of outcomes-based education and the requisite considerations in its implementation. At the University of Toronto Mississauga, Fiona Rawle, Tracey Bowen, Barbara Murck, and Rosa Junghwa Hong have been engaged in “Curriculum Mapping Across the Disciplines.” The outcome of their efforts is a greater disciplinary awareness of what students achieve in particular programs and what educational skills are common across the academy, resulting in greater program coherence. In “Engaging in Enhancement”, Jovan Groen discusses the competing tensions between the needs of learner development and the needs of the workplace, and expectations of program funders when academic programs are evaluated for quality to ensure that graduates obtain the skills purported to be developed by the program. Thus, this program assessment runs the risk of being more complicated and time-consuming. However, if the point of quality assurance is the improvement of academic programs and, therefore, student learning for a reasonable cost, then the time commitment and acceptance of complicated negotiations are well worth the effort. This section closes with Danielle Pierre reporting, in “Broadening Understanding”, the results of a survey administered to LGBTQ+ students. Her analysis suggests several strategies which instructors could implement to make such students more welcome in their classrooms.

The first three papers in the third section “Empowering Learners” present different approaches to supporting the particular needs of first-year students. Sheilagh Grills has developed “Learning Skills Workshops Supporting First-Year Courses”, which rescues students from dropping out of post-secondary education and improves their learning outcomes. “Enquiry-Based Learning Online” by Jacqueline Murray, Nathan Lachowsky, and Natalie Green discusses the implementation of an online first-year seminar that develops students’ learning and research skills including teamwork skills. In “The Development and Delivery of a Multidisciplinary Research Course for First-Year International Science Students”, authors Priyanka Lekhi, Meghan Allen, Fok-Shuen Leung, Brett Gilley, Georg Rieger, and Joanne Fox describe the development of the course and explain how it promotes students’ understanding of the contingent nature of knowledge and its construction through research. The last two papers in this section assess the impact of a fall reading week on students. Ken Cramer and Rebecca Pschibul explain
in “Student Time Usage during Fall Reading Week” how stress levels were lower after a fall reading week in students who reported using their week of no classes to complete assignments and to prepare for exams, by comparison with students who reported using their fall break predominantly for leisure. “One Week, Many Ripples”, by Heather Poole, Ayesha Khan, and Michael Agnew, suggests that to improve students’ mental health, institutions need to better coordinate the midterm evaluation schedule so that these assessments do not accumulate before and after such a fall break. Despite this, students’ retrospective view of the value of a full week fall break was positive: it helped them manage their mental health and academic assignments.

The fourth and last section of this volume of CELT collects four papers that examine different aspects of “Effective Learning.” Sherry Fukuzawa, Cleo Boyd, and Joel Cahn examine the changes in the motivation of novice students to experienced practitioners in their paper “Student Motivation in Response to Problem-Based Learning.” Contrary to expectations, the experienced students reported a decrease in their motivation with this learner-centered teaching strategy, whereas more novice students increased their motivation to engage with the course material. The authors suggest that this may be the result of the experienced students being uneasy to try a new learning approach when they have had past success with instructor-centered, externally motivating approaches. In “The Collaborative Case”, Colleen Sharen, Mark Feltham, and Michelle Braecker elaborate on their experience transforming an undergraduate learning experience into a publishable paper. From their particular case, the authors suggest how undergraduate instructors and students can best facilitate the transition from an instructor-student relationship to a collaborative partnership. Anne Barnfield, in “Did I do good?”, argues that students need ethical training in addition to the teaching of content that occurs in most undergraduate courses, and that this ethical training needs to be more than merely exhorting students to be academically honest. She provides examples for how to embed teaching ethics into disciplinary courses. This 10th volume of Collected Essays on Learning and Teaching closes with an article by Daniel Gillis, Jessica Nelson, Brianna Driscoll, Kelly Hodgings, Evan Fraser, and Shoshanah Jacobs. Their paper, “Interdisciplinary and Transdisciplinary Research and Education in Canada”, raises the concern that insufficient interdisciplinary and transdisciplinary educational opportunities are being made available to students despite the fact that many of the world’s problems will need trans- or interdisciplinary problem-solving. The authors suggest a curricular framework that may overcome the administrative barriers to such educational programs.

This volume brings to a close our tenure as the editorial board of Collected Essays on Learning and Teaching. Roxanne, Janet, John, Michael, Lois, and I thank the support of our reviewers and readers over the last three years. We greatly appreciate that Suzie was able to step on to our editorial board this year so that Geneviève could renew herself on sabbatical. Thank you Kelly Keus and Samantha Christensen for your excellent copyediting and proofreading. Thanks also to the staff at the Leddy Library of the University of Windsor who continued to ensure that the Open Journal System that operates the journal runs smoothly. Dave Johnson, in particular, assisted in assigning DOIs to our articles and navigating the applications to add CELT to digital databases. Our publisher, The Society for Teaching and Learning in Higher Education, has been incredibly supportive of our efforts to transform the presentations at their annual meeting into peer-reviewed scholarly papers. Our thanks in particular to Dianne Bateman, Publications Chair, and Robert Lapp, President. We give our best wishes and support to the next editorial board as they continue the efforts of CELT to effect change and empower learning.

References


Lund, T. J., Pilarz, M., Velasco, J. B., Chakraverty, D., Rosploch, K., Undersander, M., & Stains, M. (2015). The best of both worlds: building on the COPUS and RTOP observation protocols to easily and reliably measure various levels of reformed


Uttl, B., & Smibert, D. (2017). Student evaluations of teaching: teaching quantitative courses can be hazardous to one’s career. *PeerJ, 5*, e3299. VIEW ITEM


Section I

EMPOWERING TEACHING
Levers for Change in Educational Development in Canada: Looking Back, Looking Forward

Debra L. Dawson  
Western University

This paper examines levers or drivers that have influenced the direction of educational development in Canada over the last 40 years and also tries to predict what will be the impact of some current levers on changing the work of developers in the next 20 years. Reflecting on those years, it is apparent our work in the 1980s was very focused on the individual and gradually shifted to become more organizational and sector focused, particularly as the work of developers moved from the periphery to the center of our institutions. The challenge of the next 20 years will be responding to the breadth of areas we are being drawn into in the academy yet, the diversity of our work is one of the strengths of our profession.

In 2016 I retired from 36 years of working in the field of educational development at Western University. This gave me the opportunity to both reflect on the institutional and national change levers that had influenced the direction the profession has taken in Canada over the decades, and to consider what trends might impact us in the next 20 years. Using Western University as a case study in this essay I will examine models of educational development that have influenced the work we do as educational developers, provide a short history of educational development in Canada, and explore those drivers both past and future that have served to shape our profession.

Models of educational development

Fraser, Gosling and Sorcinelli (2010) state that there are three primary models of educational development that have framed educational development over the last 35 years. The first model focuses on the individual where the problems being addressed are often at the classroom level. This includes work on course design, review of student feedback, or classroom visits, and is often designed to help instructors develop teaching competence. The second model of educational development concentrates on the institution or organization. This model is more about educational developers facilitating organizational change. Educational development activities are therefore more related to institutional priorities. The final model of educational development emphasizes outcomes at the post-secondary sector level. This model looks at national or provincial concerns with a focus on accountability and the need to provide stronger student outcomes and ensure a high quality of education. As I reviewed each decade of educational development I reflected on which model was dominant at my institution at that time.
The 60s and 70s

The 1960s and 70s were a time of firsts in educational development. In 1962 the first educational development unit was established in the United States at the University of Michigan (Lewis, 2010) followed in 1968 by the first centre in Canada for teaching and learning at McGill University (McDonald, 2010). The establishment of this first educational development unit in Canada was rapidly followed with many others being founded including those at the University of Waterloo in 1977 (Knapper, 2010) and the one at Western University in 1979 (J. Purves, personal communication June 12, 2016). Lewis (2010) speculates that the investment in these new centres occurred because of the rapid expansion of enrolment in higher education in the 70s. Knapper (2010) suggests that government willingness to invest in such centres was largely driven by concerns that the quality of education they provided this new cohort of students remained adequate. These new centres often provided audio-visual or technical support to faculty, including supporting computer-aided instruction (Knapper, 1985). Therefore, technology as a driver for change in educational development was evident even in these early days.

The 80s

My first position in 1980 at the university was being a preceptor, ‘a teacher of teachers’, who prepared graduate teaching assistants (GTA) to be lab instructors in an introductory psychology course. To learn best practices in GTA development, I first visited McMaster University in Hamilton, where Alan Blizzard and Dale Roy were already established as developers and had written a guide on TA development. Nationally the 80s saw the expansion of educational development programming occurring from St. Mary’s University in Nova Scotia to the University of Victoria in British Columbia (Smith, 1991). In addition, there was a definite interest by both educational developers and faculty to form a Canada-wide organization devoted to enhancing teaching and learning in higher education. This interest was particularly evident in Ontario where the first national conference on teaching and learning had been held at Guelph University in 1981 (Knapper, 1985) and the educational development movement had firmly taken hold (Wilcox, 1998). When the fourth national conference occurred at Western University in 1984 the 110 participants became the charter members of the newly formed Society for Teaching and Learning in Higher Education (STLHE), with Christopher Knapper as the organization’s first president (Knapper, 1985). I was among those charter members in addition to Chris Knapper (University of Waterloo), Harry Murray (Western University), Dale Roy and Allan Blizzard (McMaster University), Ron Sheese (York University), and Ron Smith (Concordia University).

Similar to many instructional development offices across the country (Smith, 1991), the teaching and learning centre at Western, the Educational Development Office (EDO) had a half-time director and minimal support staff. Smith mentions that to overcome the lack of support provided at the University of Victoria, the University of British Columbia, and Simon Fraser University, the three post-secondary institutions banded together to form the tri-university Instructional Development group. Western’s centre was effectively run by a campus-wide committee that did much of the work of the Center, such as organizing an annual conference on teaching and learning and approving book purchases (J. Purves, personal communication September 10, 2015). As in many centres, the sessions presented focused on teaching tips (Boice, 1989), with workshops often being taught by teaching award winners who provided expert advice to participants. Therefore, the work they presented in such sessions was grounded primarily in practice rather than theory. This model of educational development was aimed primarily at individual concerns and was very teacher-focused (Fraser et al. 2010). This was the dominant model for educational development in the 80s, where developers often spent much of their time working with individual faculty (Boice, 1989). By 1982 I knew working in a teaching and learning centre would be my dream position, yet the small size of most centres made this career goal seem unlikely.
The establishment of the STLHE in 1984 was a significant step forward in Canadian higher education for educational developers, but concurrently an event was occurring that would dramatically shape the face of post-secondary education in Canada. John Myser, the President of 3M Canada in the 80s, became very interested in creating what he hoped would become the “Stanley Cup” of teaching (C. Knapper, personal communication June 21, 2016). As 3M Canada is located in London, Ontario, he met initially with faculty from Western about such an award and that discussion led to his meeting with members of STLHE (Roy & Knapper, 2013). In 1985 the new award, the 3M National Teaching Fellowship (3MNTF), was created in collaboration with the Society with the first members being invited into the fellowship in 1986.

The 90s

The 1990s marked other significant changes for educational development both, internationally and nationally. In 1993, the International Consortium for Educational Development (ICED) was established with five national teaching and learning networks, including STLHE. ICED also sought to connect with emerging networks to support the development of educational development worldwide (Mason O’Connor, 2016). Today ICED has 24 member organizations (Mason O’Connor, 2016). In 1996 ICED launched the International Journal of Academic Development (IJAD) providing a forum for research on educational development to be shared globally. It has now published 50 issues including 410 articles (Baume, 2016).

Nationally, as recommended by Smith (1991) and reinforced by the AUCC task force on the “Report on the commission of inquiry on Canadian education” (Segal, 1992), we saw the establishment of student evaluations of teaching and teaching dossiers at many universities as key components of evaluating teaching competence for promotion and tenure. At Western University this lead to additional funding for the Educational Development Office as its work became more central to the prime mission of the university.

During this period STLHE began to publish materials that were groundbreaking nationally, such as the “Ethical Principles in College and University Teaching” that was authored in 1996 by five 3MNTF faculty members from Western University: Harry Murray, Madeline Lennon, Eileen Gilles, Paul Mercer, and Marilyn Robinson. This document was endorsed by many other 3MNTF such as Arshad Ahmad, Colin Baird, Guy Allen, Bev and Norman Cameron, Allan Gedalof, Gary Poole, Pat Rogers, Peter Rosati, and Wayne Weston. Another tremendously influential piece published in the STLHE newsletter in 1997 was “Making Teaching Count in Canadian Higher Education: Developing a National Agenda” by Ron Smith. This article became a call to arms for educational developers as it demanded that we view teaching from a scholarly perspective, and proposed that faculty should be required to develop teaching competence in addition to research competence to do their work properly as academics. It was during this very exciting period in educational development that my role moved from an academic department at Western to the central educational development unit.

The need for making teaching count was nowhere more evident than in Ontario where the Harris government (1995-2002) severely cut funding to universities (Jones, 2004). As a result, universities started creating large classes as a response to this funding crisis. In the 90s at both Western and the University of Toronto, there were suddenly classes that had enrollments of over 1000 students – a size previously thought to be unteachable. One response to this concern was the 1998 publication of Allan Gedalof’s “Teaching Large Classes”, the first of STLHE’s Green Guide series. The new technologies made connecting with many students far more viable with most universities adopting a learning management system for the first time. However, concern about the quality of education provided in these mega classes led to an expansion of funding to educational development units to provide supports to faculty to facilitate large class teaching.
Therefore during the 90s, the framework for educational development had moved beyond the focus on the individual faculty member to emphasizing more closely institutional needs. As Fraser et al. (2010) noted, concentrating on individual concerns does not often address the systemic issues that may be hindering the improvement of teaching and learning at the institutional level. Government attention to the quality of education meant that universities, especially the research intensive universities (the G10 or what is now the U15), started to measure and post on their websites quality indicators, such as student retention rates and student time to completion of their undergraduate degrees, to allow for comparative analysis and benchmarking (Davenport, 2005). Furthermore in the 90s Canadian educational developers became more involved with contributing to university strategic plans and teaching and learning centres became embedded in a variety of task force initiatives (The University of Western Ontario, 2001; University of British Columbia, 2000). Thus, educational development was now much more closely aligned with institutional needs and priorities as defined by senior administration and impacted the strategic directions they adopted. We had started to move from the periphery to the center of organizational change within the institution (Dawson, Mighty, & Britnell, 2010).

The 2000s

Drivers that were dramatically transforming the landscape of higher education in the 2000s included the need for faculty renewal with many universities having their largest hiring of new faculty since the 1970s, increased interest in internationalization of university curricula and increasing international student presence on Canadian campuses (Canadian Bureau for International Education, 2015), and within Ontario, the double cohort on campus and the strong call for graduate student expansion (Williams, 2005). All of these drivers led to changes in the work of developers on our campuses and, in many cases, increased funding for educational development centres. At Western University the number of full-time staff increased from less than 2 in the 90s to 11 in the 2000s. This expansion of the mandate of the centres—from remediation centres to drivers of change shifted the work of our centres throughout the country (Dawson, Mighty, & Britnell, 2010). For example at Western, the work with graduate students moved from simply providing GTA training to supporting these students throughout their graduate years, to ensure the timely completion of their degrees, and to assist them with successfully applying for future employment. With the sudden expansion of new faculty, a mentor program was created to help ensure retention and for international graduate students, a full-time language instructor was hired to facilitate the international students’ transition to the Canadian classroom.

The focus on technology also changed the work of developers with Western University creating a new centre, The Teaching Support Centre, which was seen as a one-stop-shop for enhancing teaching and learning on campus and included both instructional technology services and the libraries in the new centre. Physical movement of the centre from the administration building to one of the main libraries also demonstrated how the centre’s status had shifted on campus.

This growth in educational development activities at Western was echoed throughout the country. In the 1990s the Instructional Development Officers (as the leaders of educational development units were called) used to have an annual meeting in Vancouver where they could all sit around a table in a large room together. By the early 2000s, this group had grown and it was evident that educational development as a unique profession had come of age. 2003 saw the creation of the Educational Development Caucus as a unique constituency within STLHE. This group has now had four chairs and currently has a membership of approximately 300 (personal communication S. Chu February 20, 2016).

Within Ontario, another driver that was strongly influencing higher education at this time was the Rae (2005) report and its recommendations (Ontario: A leader in learning). In particular, the recommendation for the formation of the Higher
Education Quality Council of Ontario (HEQCO) changed the emphasis at universities from their strong research mandate to also focusing on teaching. Educational developers within Ontario for the first time had the opportunity to apply for funding specifically for projects related to the scholarship of teaching and learning and the scholarship of educational development. The list of funded projects from HEQCO has been truly impressive over the past 10 years (see http://www.heqco.ca/en-ca/Research/Research%20Publications/Pages/Home.aspx).

HEQCO’s emphasis on quality assurance led universities to support educational development initiatives. Sector-wide there was now a much stronger focus on quality assurance of the programs offered by post-secondary institutions. In Ontario, there was the development of a more regimented program review process mandated by the provincial government. Our work as developers had now moved into the third realm proposed by Fraser et al. (2010) in that it now stressed outcomes at the post-secondary sector. We were working at a level previously unknown to most developers.

Nationally, another disrupter for higher education at this time was the teaching of the first massive open online course (MOOC) by George Siemens and Stephen Downes of the University of Manitoba in 2008. This course which had an enrollment of 2200, demonstrated the impact technology could have on changing the nature of higher education, not just in Canada, but worldwide (Dennis, 2012).

The 2010s

The 2010s illustrated it was not just the use of technology in MOOCs where technology was rapidly having an impact on higher education and in turn the work of educational developers. As the Horizon report of 2015 stated new technologies had been developed that allowed the reach of education to go significantly beyond the classroom. Universities were starting to investigate makerspaces that would facilitate the design, and more importantly, the creation of objects with 3D printers (Johnson, Adams Becker, Estrada & Freeman, 2015). The use of wearable technology, such as smartwatches, smart clothing, and Google glasses, could connect students to the Internet without a computer while adaptable learning technologies would adjust to their individual needs. Finally, the Horizon report suggested the Internet of Things would connect the Internet to real items in the world. These types of technologies, they suggest, would be a game changer in higher education. However, the inclusion of the new technologies to enhance teaching and learning broadened the scope of what we must be doing as educational developers in terms of programs provided and support for faculty.

Another change that has occurred in the 2010s is that centres’ support for internationalization moved beyond assisting international faculty and graduate students with teaching in the Canadian classroom and facilitating the development of international curriculum development, to also connecting more widely with educational developers and faculty worldwide (Mason O’Connor, 2016). Western University has hosted faculty from the University of Dar es Salaam, the Aga Khan University, and the University of the West Indies at a number of workshops. Other universities have formed similar partnerships, with Queen’s University frequently working with faculty and developers from Japan and the University of Windsor hosting visiting fellows from China, Australia, New Zealand, Nigeria, Jamaica, England, and the United States (see http://www1.uwindsor.ca/ctl/visiting-fellows). EDC has formed a close relationship with the Scottish Higher Education Developers (SHED) working together to develop a webinar series on educational development. More recently, board members from STLHE were invited to give several educational development workshops and a symposium on the scholarship of teaching and learning at Teikyo University in Japan (J. McDonald, personal communication June 21, 2016). Again, this broadened the global reach of educational development.

Although the International Society for the Scholarship of the Teaching and Learning was founded in 2004, the increasing importance of SoTL in Canada was established in the late 2000s, with the emergence of two new peer-reviewed journals on the
scholarship of teaching (SoTL) with STLHE launching the annual *Collected Essays on Learning and Teaching* in 2008 followed two years later by the *Canadian Journal for the Scholarship of Teaching and Learning*. More recently we have seen SoTL Canada becoming a formal constituency of STLHE. The work of educational developers now has broadened with many centres such as the ones at McMaster University, the University of Calgary, and the University of British Columbia all devoting a significant amount of their time and budget to fostering an environment that strengthens SoTL on their campuses (Simmons & Poole, 2016). Randall, Heaslip, and Morrison (2013) found that SoTL is thriving within British Columbia’s higher education system as indicated by the many institutions involved in SoTL conferences, research, and the publication of another Canadian online journal: *Transformative Dialogues*. Educational development work has shifted to not just incorporating an evidence-based approach to practice but to supporting the creation of that evidence. The complexity of the lives of educational developers cannot be understated.

Another prominent driver for changing the work of educational developers across the sector Canada-wide was the release in 2015 of the Truth and Reconciliation Report and its calls to action to transform education at all levels. Many universities across Canada have developed Indigenous strategic plans specifically to address this report (see for example the University of British Columbia’s strategic plan http://strategicplan.ubc.ca/the-plan/aboriginal-engagement/). It is too early to see what the impact of the report will be but within the EDC there is tremendous interest in supporting this vital initiative and an Action Group has been established to determine how we as educational developers might support the report’s recommendations. This will be a challenging task for developers as only 3% of the university population are currently Indigenous (Association of Universities and Colleges of Canada, 2011). Plus as Mighty, Ouellett, and Stanley (2010) argue there have been many missing voices in the field of educational development and this is certainly true of Indigenous voices in educational development in Canada.

Finally, another major trend in the 2010s has been the shift towards students becoming collaborators in teaching and learning research projects rather than being seen as the research subjects of such inquiries. A recent 2016 issue of the *International Journal for Academic Development* highlighted such initiatives. McMaster University developed a student scholars program in 2013 and now has approximately 50 students per year working actively on projects associated with their centre (see http://mi.mcmaster.ca/student-partners-program/). This supports Bovill and Felton’s (2016) contention that educational developers have a unique role to play in facilitating the development and sustainability of such student-faculty relationships.

These, then, are some of the trends and drivers that I believe have shaped educational development until this point. Our work has shifted from a focus on the individual in the 1960s, 70s, and 80s to one on the organization in the 90s to today’s concentration on the entire post-secondary sector. What, then, are new trends or drivers that are likely to influence the work of educational developers in the next 20 years?

**Looking forward**

The significant trends or levers I see on the horizon are changing faculty roles, changing student demographics, the scholarship of educational development, and, as always, technological innovation. Let me briefly elaborate on each of these.

Shifting faculty roles includes the emergence of teaching-stream faculty and the increase in sessional appointments (Austin & Sorcinelli, 2013). Teaching-stream faculty can now be found at many universities across Canada such as the University of Toronto, Simon Fraser University, and the University of British Columbia. As we move away from the traditional 40, 40, 20 faculty role (research, teaching, and service) this may create a unique opportunity for developers to provide programming to instructors whose attentions are not divided between teaching and their disciplinary research. However, many of these teaching-stream faculty are
participating in the scholarship of teaching and learning so our role is shifting to facilitate their development of this new research area. Concurrent to the growth of teaching-stream faculty has been the rise of sessional faculty within our institutions (MacDonald, 2013). This will require us to re-think traditional educational development models of programming to accommodate their diverse needs, such as instructors being on campus only in the evenings or weekends or never being on campus at all due to their teaching being entirely online. More of our educational development programming will need to be online, and we will need to find a way to create as good a sense of community in this new environment as what we currently produce in our face-to-face settings (Kanuka & Rouke, 2013). Also, in general, new faculty feel more stretched than ever about the need to increase their research productivity while maintaining quality teaching (Sorcinelli, Austin, Eddy & Beach, 2006). All of these changes in faculty work life will require educational developers to become more nimble in response to these diverse needs.

Not only are our faculty changing but so are our students. The Association of Universities and Colleges of Canada (AUCC, 2011) reported that 24% of our students are now working part time with many working full time or close to full time. The report suggests that increases in government funding to higher education has come about largely in recent years as a result of an increase in the number of students, but this growth in student numbers is not sustainable. If we wish to continue to grow we need to diversify our traditional student base to include non-traditional students, such as mature and part-time students, and then improve the quality of education to increase the retention of these students.

Students within our universities have a greater diversity of backgrounds than previous generations (Austin & Sorcinelli, 2013) and at some universities, the percentage of international students is now 30% (AUCC, 2011). In Canada, if we are to be responsive to the needs of Indigenous students then we will need to integrate the principles suggested by Universities Canada in 2015 and help support the Indigenization of curricula. Knapper (2016) suggests this increasingly diverse student body poses a challenge to developers who must respond to these changing demographics yet often still do not have a significantly strong voice within the university to influence how the senior administration will respond to these pressing needs. However, our centres are often places where diverse members of the academic communities meet and we need to be part of a discussion that helps bring Indigenous and more inclusive pedagogies into our post-secondary classrooms (Dimitrov & Haque, 2016).

The scholarship of educational development (SoED) is also coming into its own as a distinct area of study (Geertsema, 2016). Much as fostering SoTL within the academy was a major driver for educational developers starting in the 2000s, it is apparent now that the scholarship of educational development has taken off as the primary research of many developers. Geertsema comments that not only are we interested in examining critical questions about teaching and learning in our classrooms, we are now taking a far more theoretical and research-based approach to our own practice in order to provide evidence that the outcomes of educational development activities are being achieved. The emergence of this new form of scholarship seems critical to our identity formation as educational developers. As McDonald (2010) found most of us migrate to the profession of educational development from disciplines not directly related to higher education so learning how to perform SoED remains a challenge. Yet, I believe that this is essential if we are to continue to grow as a profession within higher education. We must take as rigorous an approach to our own practice as our faculty colleagues do to their discipline-specific research.

Finally, one lever for change that remains from the 80s is technological innovation. Now more than ever it is an extremely powerful factor affecting both how we teach and how students learn (Austin & Sorcinelli, 2013). Therefore, it is not surprising that many centres for teaching and learning have merged with centres for technology (Lewis, 2010). However, much as these new technologies offer many possibilities to transform how students learn, they also present many challenges for both developers and the faculty with which they work, as the types of innovations are ever changing (Austin & Sorcinelli, 2013).
Johnson et al. (2015) purport that more opportunities need to be available for faculty, and I would suggest educational developers experiment with innovative technologies. More importantly, they state that within our universities research is still valued over teaching. The lack of recognition for exemplary and innovative teaching within the post-secondary sector is what they call “a wicked challenge” (p. 1). A problem they say is hard to define and even harder to solve. This wicked challenge was identified many years ago in Canada in the 1991 Smith report that discussed how undervalued teaching was in higher education. Recent work by Kustra et al. (2014) has sought to find ways to measure and enhance the teaching culture found at many Canadian universities. Without a reward structure for the time and energy faculty must invest in learning about new technologies it will remain difficult for us to convince faculty to fully integrate and keep up-to-date on the use of technology in the classroom. This is a major challenge currently for educational developers.

Conclusion

Sorcinelli & Austin (2010) state “educational development is a key strategic lever for ensuring institutional quality and supporting institutional change around the globe” (p. 25), therefore developers need to be aware of and responsive to educational change drivers such as quality assurance policies or technology innovations. Many educational developers have stressed in the last few years the need for us to become change leaders both on our campus and throughout the higher education sector if we are to be successful in our role on campus (Austin & Sorcinelli, 2013; Baume, 2016; Taylor, 2005). Much as these changes add to the complexity of our roles on campus, they are also what makes educational development such a fascinating profession requiring individuals who thrive on new challenges and are truly dedicated to lifelong learning. Fraser et al. (2010) identify the prevalence on our campuses of the three models of educational development at the individual, organizational, and sector level all leading to our increasing influence. If we are to continue to be seen as essential to our institutions we must as Knapper (2016) indicates see “our changing role as inevitable [if] we are to play a part in the transformation of teaching to meet the new demands and realities of the twenty-first century university” (p. 114). I am honoured to have spent my working life in such an environment and am excited to see how educational developers will meet the demands of the next 20 years.

References


David Baume (2016) Analysing IJAD, and some pointers to futures for academic development (and for IJAD). International Journal for Academic Development, 21(2), 96-104. VIEW ITEM


Davenport, P. (2005). Performance and activity indicators: Annual report to the Board of
Governors. London, ON: The University of Western Ontario. VIEW ITEM

Dawson, D., Mighty, J., & Britnell, J. (2010). Moving from the periphery to the center of the academy: Faculty developers as leaders of change. New Directions for Teaching and Learning, 2010(122), 69–78. VIEW ITEM

Dennis, M. (2012). The impact of MOOCs on higher education. College and University, 88(2), 24-30. VIEW ITEM


Fraser, K., Gosling, D., & Sorcinelli, M. D. (2010). Conceptualizing evolving models of educational development. New Directions for Teaching and Learning, 2010(122), 49–58. VIEW ITEM


McDonald, J. (2010). Charting pathways into the field of educational development. New Directions for Teaching and Learning, 2010(122), 37–45. VIEW ITEM


Universities Canada (2015). *Principles on indigenous education.* VIEW ITEM


Acknowledgements

This paper is based on Debra Dawson’s keynote address upon being awarded the 2016 Christopher Knapper Lifetime Achievement Award from STLHE. The keynote was a tribute to Dr Knapper’s lifetime of work in educational development and his role as an incredible mentor and colleague to Debra and many others in the Educational Development Caucus community.

Biography

Dr Debra L. Dawson was the Director of the Teaching Support Centre at Western University from 1997 to 2016, the Chair of the Education Developers Caucus from 2012-2016, and currently, is the Director of the Centre for Research on Teaching and Learning in Higher Education at Western University.
The 3M National Teaching Fellowship: Findings from a National Questionnaire on the Impact of the Program

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Denise Stockley, Queen’s University
Ron Smith, Concordia University
Amber Hastings Truelove, Queen’s University

In 2016 the 3M National Teaching Fellowship reached a milestone in celebrating the 30th anniversary of the first fellowship in 1986. The fellowship is the premier award of the Society for Teaching and Learning in Higher Education and each year up to 10 fellows are announced. Thus far, there has not been a systematic review or evaluation of the fellowship program. This study is a starting point to engage the various stakeholders and gather their perspectives regarding the fellowship program. This paper highlights the findings of a national questionnaire that targeted 3M National Teaching Fellows, administrators, educational developers, faculty, and students. The findings provide a snapshot of the awareness of the fellowship, the impact of fellows on their institutions and beyond, and recommendations for the future of the program.

The 3M National Teaching Fellowship (3MNTF) is seen by many as Canada’s most prestigious recognition of excellence in university teaching and educational leadership. In fact, 42% of the administrators, faculty, educational developers (EDs), and students who responded to the survey were aware of the Fellowship, compared to 18% who were aware of other national teaching awards. Since 1985, 3M Canada and the Society for Teaching and Learning in Higher Education (STLHE) have recognized 308 3MNTFs, from more than 80 Canadian Universities representing almost all of the disciplines in the Academy. This paper is part of a three-year study that explores the overall impact of the 3MNTF. The study began in 2012 at the 3MNTF Retreat in Banff with focus group interviews of 3M senior administrators, 3M Fellows, 3M retreat facilitators, EDs, and program coordinators. A detailed account of the focus group findings has been accepted in Innovations in Education and Teaching International. In the second phase of this study, and the focus of this paper, we developed a questionnaire which was sent to 3M Fellows, faculty, administrators, students and members of the STLHE community at several Canadian universities to assess various aspects about the Fellowship program including awareness, influence, process related questions, and overall impact.
Rationale for the Study

In the 30 years since the first 3MNTF was awarded, many people have been involved in the program; not only those who have won the award, but also faculty who have been nominated, EDs who helped mentor nominees and assembled nomination packages, administrators who have nominated colleagues, and students who have been taught by 3M award winners. Despite the potential for the award to have a far-reaching impact, this study is the first attempt to define that impact on diverse members of the academic population. As the 3MNTF award program enters its next 30 years, we have an opportunity to define how the award program, and its Fellows, have impacted their institutions, and the impact that Fellowship has had on successful nominees. For the purposes of our study, we defined impact in terms of the effect that the 3MNTF has had on individual winners, the influence that fellows have been able to exert within their institutions after being awarded the 3MNTF, and the national and international influence of the 3MNTF award program. For members of the teaching and learning community who are currently developing their teaching portfolios in anticipation of a 3M nomination, recognizing the diverse impacts of the award could be very beneficial.

Teaching awards that recognize teaching excellence in higher education have existed for a number of years, and there have been numerous attempts to define the impact that they have had on the landscape of higher education (Aron et al. 2000; Brawer et al., 2006; Frame, Johnson, & Rosie, 2006; Olsson & Roxå, 2008; Skelton, 2004). Sorcinelli and Davis (1996) reported that the University of California awarded its first institutional teaching award in 1959, while the University of Massachusetts, Amherst launched a similar program in 1962. At the departmental and institutional levels teaching awards can be a way to publicly acknowledge outstanding teachers. Nancy Van Note Chism (2006) found that teaching awards were instituted for three main reasons: “Institutions hope to symbolically acknowledge their support for teaching, to recognize the accomplishments of excellent teachers, and to encourage other faculty to achieve similar levels of performance in teaching.” National awards schemes, like the Canadian 3M Fellowship, the National Teaching Fellowship Scheme of the Higher Education Funding Council for England, and The Australian Awards for University Teaching use teaching awards to officially provide recognition for teachers who demonstrate excellence and who often go beyond their discipline and institution. Halse et al. (2007) argue that “unofficially, the awards seek to counter the privileged position of research by improving the importance and status of teaching in universities” (p. 731). The desire to recognize and encourage higher levels of teaching excellence may explain why countries are increasingly instituting national teaching awards programs. The 3MNTF’s holistic approach to teaching awards, by demanding evidence not only of teaching excellence, but also of leadership in teaching, has been used internationally by countries seeking to set up their own national teaching awards programs (Leibowitz, Farme, & Franklin, 2012; Alexander & O’Mahony, 2015). South Africa started the National Teaching Excellence Awards in 2009, and The National Academy for the Integration of Research and Teaching and Learning (NAIRTL) Excellence in Teaching Awards scheme existed in Ireland from 2007 to 2012. Both of these awards programs were modelled after Canadian programs and the 3MNTF program in particular (Leibowitz et al., 2012; Alexander & O’Mahony, 2015).

Methodology

In March of 2016, we sent out a survey to administrators, faculty, EDs, and students at Canadian Universities to determine their perceptions of the impacts of the 3M National Fellowship program and 3M Fellows. This survey was approved by research ethics boards at McMaster University and Queen’s University. We received 1084 responses to this survey; however, not all participants responded to each question. In a gateway question on the first page of the survey, we asked respondents “are you aware of the 3M National Teaching Fellowship (3MNTF)”? If
they answered no to this question, then the survey was terminated. This eliminated 515 surveys. There were also a number of respondents who did not continue the survey beyond the first question. In total, 379 participants provided usable responses for the entire questionnaire. Although we collected demographic information from all of the respondents, only those who were aware of the Fellowship were included in the data analysis.

Results

When asked to identify their primary academic discipline, 21% of the 1084 respondents from the full dataset indicated that they primarily identify with the Health Sciences, 20% with the Social Sciences, 20% with the Natural Sciences, 9% with Engineering, 13% with the Humanities, and 6% with Business. Of the respondents, 8% identified with other disciplines, including Education and Law. While the student category provided the largest number of terminated responses for the gateway question, it was surprising to see that 31% of administrators, 22% of faculty, and 9% of EDs were also unaware of the Fellowship. Respondents self-identified across a range of positions (administrator, faculty, ED, student) and disciplines from institutions across Canada.

To determine the impacts of the 3MNTF on individual segments of our survey population, we applied branching within FluidSurvey as a way to ask specific questions of different demographic groups. We asked respondents “what role do you most identify with (choose one even if multiple roles apply)?” Based on the participants who were aware of the Fellowship, almost half (47%) identified themselves as faculty, while 32% identified themselves as students, 8% as EDs, and 8% as administrators. There was a range of responses from the 6% who identified as other, including researcher, staff, graduate student, and alumni. Student responses were excluded from questions related to the institutional impact of the award, and questions directed to faculty.

Looking at all responses to the survey, we found that a correlation analysis identified a weak, positive relationship between the number of years a person has spent in higher education, and their awareness of the 3M Fellowship; \( r(N-2) = 0.30, p<0.001 \). This is encouraging since it suggests that as individuals progress in their careers, and become more aware of the award, they can begin engaging in leadership in teaching activities that can place them in a position to be nominated for a 3MNTF.

The 3MNTF is regarded by many faculty, staff, students, and administrators as the best known and most prestigious teaching recognition/awards program in Canada. Slightly fewer than half (42%) of all survey respondents were aware of the 3MNTF. Students were the most likely to respond that they were not aware of the fellowship (77%), while almost all EDs were aware of it (91%) (Table 1). Only 18% of all respondents answered yes when asked: “are you aware of other national teaching and learning awards?” Examples provided by those who were aware of other awards included the Alan Blizzard Award, the Knapper Award, and the College Sector Educator Award. Many respondents also included the 3M National Student Fellowship on this list, and while this is not a teaching award, it may speak to the close association that has been forged between 3M and the teaching fellowship.

We also asked respondents whether “teaching awards at your institution have been influenced by the 3M National Teaching Fellowships.” 236 respondents (faculty, administrators, and EDs) provided answers. Of these, 25% responded yes, 13% responded no, while the majority, 61%, were unsure. For those who answered yes, we provided a text response box asking for additional details. Of the 56 people who elaborated on this question, eight suggested that the 3M has helped to raise the visibility of teaching excellence at their institutions. For one respondent, the importance of the 3MNTF as an award has also helped to draw attention to other, more localized teaching awards:

Absolutely! There appears to be a growing sense of the importance of recognizing teaching excellence at the school/department, institutional, regional, and national levels. In that regard, there are initiatives to encourage
nominations for such awards at each level and where possible through these progressive stages. Ten respondents indicated that their institutions have brought their local awards in line with the requirements for the 3MNTF. One respondent pointed out that “we have recently aligned our Institution-wide awards to the 3M process,” while another noted that “we designed an educational leadership award to parallel the leadership half of the 3M.” Six respondents pointed out that the alignment between university awards and the 3MNTF can help to identify and prepare future 3M nominees. That the structure of the 3MNTF has helped to shape local and regional teaching awards is indicative of its importance as a national award.

Nomination Process

The majority of EDs, faculty, and administrators (82%) are aware of faculty at their institutions who have been nominated for a 3MNTF. And while the 3MNTF call for nominations (STLHE www.STLHE.ca) provides clear and specific guidelines about what is expected in the dossier in terms of criteria to be included and the types of evidence that are expected, the responses to our survey suggest that there is some confusion among these groups about who initiates the nomination process. Almost half, 30%, are unsure who initiates the nomination process at their institutions (Table 2). Nine out of the 22 text responses to the “other” option indicated that the process involved self-nominations.

The primary aspect of the nomination process requires nominees to create a dossier that presents evidence of their teaching excellence and their leadership in education (Knapper & Wright, 2001). Evidence of these qualities can take many forms. Ahmad, Stockley, and Moore (2013) provide the following examples for excellence in teaching and in leadership:

Examples of teaching excellence include the candidate’s philosophy of teaching, the teaching strategies used to support the philosophy, teaching awards and recognition, student ratings, course development, letters of support and other related evidence. Examples of leadership evidence include the candidate’s statement of what leadership in teaching excellence means and how it is accomplished; this is supported by actual contributions including workshops on teaching and learning, mentorship, research on teaching, and impact on educational development with the institution and beyond. (p. 184)
Putting together a dossier involves contributions from a variety of people. When asked if they have “participated in preparing a 3M National Teaching Fellowship nomination for yourself or others, 69% of administrators, students, faculty and EDs responded “no.” Of the 31% who have participated in preparing a nomination, 25% wrote a reference, 12% assisted as the principal nominator, 11% provided administrative support, and 1% provided research support (Table 3). Of the 49% who responded “other” most seemed to use this option to identify the multiple roles in which they provided support. As one participant pointed out, “I was a nominee and prepared all the written portions; I was also a mentor for another nominee; and I have also written letters of support.” Those nominated for a 3MNTF require the support of colleagues, students, administrators, and students to write letters of reference and to assist in assembling the nomination package. To be nominated for a 3MNTF is a group effort that goes

<table>
<thead>
<tr>
<th>Knowledge of who initiates the nomination process cross-tabulated by role</th>
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<tbody>
<tr>
<td><strong>Administrator</strong></td>
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<tr>
<td>Administration</td>
</tr>
<tr>
<td>Department Heads</td>
</tr>
<tr>
<td>Deans</td>
</tr>
<tr>
<td>Colleagues</td>
</tr>
<tr>
<td>Centre for Teaching and Learning</td>
</tr>
<tr>
<td>Unsure/Other</td>
</tr>
</tbody>
</table>

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<tr>
<th>Support for nominations provided by role</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Administrator</strong></td>
</tr>
<tr>
<td>Administrative support</td>
</tr>
<tr>
<td>Principal nominator</td>
</tr>
<tr>
<td>Reference writer</td>
</tr>
<tr>
<td>Research support</td>
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<tr>
<td>Other</td>
</tr>
</tbody>
</table>
Table 4

Relationship between role within a 3M application, and the number of hours contributed to the application process

<table>
<thead>
<tr>
<th>Hours</th>
<th>Administrative support</th>
<th>Principal nominator</th>
<th>Reference writer</th>
<th>Other</th>
<th>Total Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-30</td>
<td>8</td>
<td>8</td>
<td>22</td>
<td>24</td>
<td>62</td>
</tr>
<tr>
<td>31-60</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>10</td>
<td>18</td>
</tr>
<tr>
<td>61-90</td>
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<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>91-300</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>9</td>
<td>12</td>
</tr>
</tbody>
</table>

well beyond the individual nominee.

Preparing a nomination package for the 3MNTF can be a daunting undertaking because of the time commitment involved. Those who have participated in producing a nomination package were asked, “approximately how many hours did you spend in preparing the nomination from start to finish?” The 95 respondents to this question had answers that ranged from one hour to 200 hours (Table 4). The vast discrepancy between the two extremes may reflect the particular role that a respondent played in the nomination process. Writing a letter of reference may only require a commitment of one or two hours, while coordinating the application process may require 30 or 40 hours. Nominees who must reflect on their teaching practices, articulate their teaching philosophy, and provide evidence for their teaching effectiveness and leadership may dedicate a large number of hours to the process.

Impact

The 3MNTF award program has the potential for a broad range of impacts on the individual award winners, their departmental colleagues, and their member institutions. These impacts, both positive and negative, are what make the 3MNTF unique among award programs.

Influence on the Institution

Questions that were specifically addressed to EDs, faculty, and administrators indicate that the majority of these respondents (82%) knew that there were 3MNTFs at their current institutions. Five percent of respondents did not know of any 3MNTFs at their institutions, while 11% were unsure. While there is no direct evidence to suggest that knowledge of 3M Fellows at an institution is the same as Fellows having influence at their institutions, the large number of positive responses suggests that these Fellows are a visible part of their institutions.

The institutional impact of 3MNTFs can be difficult to gauge, especially for those who may only be peripherally aware of the program. This may account for the 78 out of 223 respondents (35%) who replied “unsure” when asked, “what impacts have 3M National Teaching Fellows had on your institution.” Of the remaining respondents, 28% replied that 3MNTFs have had a moderate impact on their institutions, 16% responded that they have had a small impact, 13% of respondents replied that they have had a large impact, while 6% said that they had no impact. When we isolated the responses from 3M Fellows, the no impact and small impact percentages remain similar, but a significant number of respondents indicated that fellows had a moderate to large impact on their institutions (Figure 1). How
respondents identified impacts became clearer when we asked them to elaborate on their answers. We provided a text box asking people to elaborate on this question, and of the 139 responses, 20 of them suggested that university teaching was impacted by having 3MNTFs at their institution as these educators are involved in university initiatives around teaching and learning, mentoring other faculty members, and teaching students. Some respondents suggested that the impact of the award is largely dependent on the culture of the institution. In institutions where “research is still the primary driver of careers,” Fellows may be perceived as having less impact. One Fellow suggested that “the impression many of us have is that they are used for optics, to make it look like our large research oriented institution cares about undergraduate teaching, despite contradictory evidence.” Fellows are perceived as having the greatest impact in institutional cultures that celebrate and support teaching as a valuable contribution on par with research.

The survey also asked respondents to differentiate between the impact that 3MNTF winners have on their institution and the impact that the 3MNTF program has on their institutions. When asked “what impacts has the 3M National Teaching Fellowship Program had on your institution,” many EDs, faculty, and administrators (42%) replied that they were unsure. This is perhaps indicative of the difficulty in identifying differences between the impact of individual fellows, and the more general impact of the program. For those who noted a difference, many indicated that the program provides an opportunity to focus on the importance of teaching, and raises the bar in terms of what is considered to be excellence in teaching:

"[It] has raised the stature of teaching on campus, by providing a Gold Standard. This has resulted in greater support and recognition of teaching at all levels. My analogy would be that whenever a Canadian wins a Gold Medal at the Olympics, that sport can expect a surge in grassroots participation and in official government funding.

Others suggested that the program acts as a “possible or conceivable milestone” which educators can “strive to achieve.” It draws attention to “the aspects of teaching excellence to which we wish all teachers to aspire.” For one respondent, the impact of the program is in its creation of teaching fellows:
I don’t see the program itself being a driving force for particular change. However, a 3M Fellow does have doors open a little quicker for new initiatives and the promotion of change of practice. So I would say the program enables the 3M Fellow. . .”

Even institutions that do not currently have 3MNTFs can be impacted by the program through inviting 3M Fellows from other institutions to host workshops or provide talks.

Influence on Centres for Teaching and Learning

Individually, many Fellows contribute to the culture of teaching and learning at their home institutions by contributing to the teaching and learning centres on campus. The 28 EDs who completed the survey indicated an even split between fellows who contributed and those who did not. Only 6 (21%) were unsure about 3M Fellows’ contributions to their centres. From the 11 EDs who provided qualitative clarification to their answers, we found that while some 3MNTFs are involved in “running workshops, and in teaching leadership positions,” and receive “invitations to be on committees,” one indicated that “participation with the centre seems unrelated to the award.” One respondent suggested that it depends on what is meant by ‘contribute’, since 3M Fellows who have taken high-level administrative positions may be in a position to support teaching and learning initiatives in Centres for Teaching and Learning, and institutionally more broadly rather than working directly in Centres for Teaching and Learning.

Influence on Faculty, Administrators, and EDs

When asked to describe “the impact of successful 3M National Teaching Fellowship nominations at your institution,” many faculty suggested that it raises awareness of teaching and learning. One respondent suggested that the profiling of [a] winner raises awareness of excellent leadership in teaching; 3M award winners have an influence on the teaching of their departmental colleagues; winners are profiled during University ceremonies celebrating teaching and research achievements.

Another suggested that successful nominations impact faculty in “the ‘Professor of Teaching’ track, and that successful 3M winners have a better chance at promotion in the traditional scholarly track, especially from Assistant to Associate Professor.”

In contrast, faculty who have not won a 3MNTF had mixed responses when asked to “describe the impact of unsuccessful 3M National Teaching Fellowship nominations at your institution.” While many respondents suggested that they could not discern any institutional impact since this is essentially private information that unsuccessful nominees may choose not to disclose, one respondent suggested that for unsuccessful nominees, putting together the application package is “a huge time suck” which may take time away from other responsibilities. While the time dedicated to putting together an application package can be substantial, one respondent suggested that even unsuccessful nominations can be a boost for the department: “while we may experience initial disappointment there is always a spirit of celebration on having been nominated.” Some respondents also suggested that despite the disappointment, the process of reflection involved in the submission process was beneficial, and often led to a future successful nomination. Whether being nominated but not winning is seen as a positive or a negative impact by nominees may be related to institutional culture. Individuals from institutions which value and celebrate nominees as well as winners may have more positive feelings about their nomination. The relationship between institutional culture and perceptions of unsuccessful nominations may be fruitful ground for future research.
Influence on Individual 3MNTF

The 3MNTF is more than just a recognition of teaching excellence; rather it is the entryway to a national fellowship of individuals deeply committed to promoting excellence in higher education. Of the 225 faculty, administrators, and EDs who responded to this question, 70 were Fellows. The years in which they entered the Fellowship ranged from 1987 to 2015. When asked “how did receiving this award impact you professionally,” most 3MNTFs felt that winning the award has had a positive impact on their professional lives. Confidence was a word that came up repeatedly in their comments; one Fellow said that it “gave me more confidence, opened doors, allowed my opinion and voice to resonate more,” and another that

it gave me confidence to take the necessary risks associated with innovative teaching, and encouraged me to speak both at the institution and nationally about the importance of teaching and learning.

Some 3MNTFs also mentioned that becoming a Fellow assisted in their promotion to full professor. Others noted that it created new career opportunities for them, or validated their current career paths. Six of the Fellows noted that since winning the 3M, there have been increased invitations to give talks, author textbooks, and generally become more involved in “higher level conversations” about teaching. Many 3M Fellows mentioned being called on to participate in more teaching and learning initiatives in their departments and institutionally. While many felt the Fellowship validated them as teachers, many also said that they valued being part of an “equally active and dedicated cohort” who can provide support and advice. For at least one 3MNTF, however, winning was a mixed blessing as he/she recalled experiencing “jealousy, back-biting, vicious personal attacks within the institution; a remarkable acceptance within the region and a wonderful reception within the STLHE itself.” Overwhelmingly, becoming a 3M Fellow was described as an amazing experience which reinforced the value of teaching.

Influence on Students

Students in the classroom reap the benefits of having 3MNTF as instructors for their courses. These students recognize and appreciate the noticeable, although sometimes subtle, differences that 3MNTFs bring to the classroom experience. For those who identified as students, and who indicated that they were aware of the 3MNTF, 38 out of 101 (37%) said that they had been taught by a 3MNTF, 24% said that they had not been taught by a 3MNTF, while the majority, 39%, said that they were unsure. When asked to provide additional details of their experiences, 33 students provided qualitative responses. Of those who had been taught by a 3MNTF, most detected a noticeable difference between 3MNTFs and their other teachers. Many students suggested that 3MNTFs engage in more innovations in the classroom. They also suggested that 3MNTFs are skilled at being able to explain complex ideas simply. One student said that

I have been taught by multiple professors who have won a 3M National Teaching Fellow. These instructors were enthusiastic about engaging their students, had a passion for the material, and took great lengths to teach in a manner that reflected their desire for students to really learn and develop.

Another student suggested that

There is a noticeable degree of difference in faculty members who have a 3M background compared to those that don’t. It would be inaccurate to say they are overall better lecturers (since I believe the quality of education stems from the lecturers’ passion for the subject), as a student the experience was definitely more rich. The subtle details and overall fluidity of the course was apparent.

These differences are perhaps not surprising given that when asked “to describe any impacts of the 3M National Teaching Fellowship regarding your influence on student learning,” many fellows suggested that they did not see any noticeable impact. Rather, they continued to do the things that allowed them to win the award in the first place. As one respondent pointed out,
I got the award because I am a good teacher. I'd do that anyway, with or without the award. The award means that more people than just the students in my class know that I am a good teacher. However, I doubt that students care. I still have to be good in their particular classes. For others, however, winning the award has increased their confidence, which they feel translates into being more effective in the classroom, or that they feel a greater responsibility to live up to the reward:

The validation of my teaching practice meant that I could go forward with greater confidence. What positive feedback regarding classroom results I have had is owing in part to the recognition that comes with a 3M Fellowship.

[I] Feel more accountable to deliver really well-planned classes; mentor students more who are struggling; focus on social justice i.e., are students who are not in the social norm getting their needs met?

Discussion

While many of the respondents were not aware of the award (58%) those who were aware of it, either as recipients, colleagues, EDs, students, or administrators, were often able to identify the various ways that the awards program, and its winners, impact the institutions of which they are part. Since the award recognizes outstanding teaching and leadership in teaching, winning a 3MNTF confers an additional authority on its recipients. This authority can be used by winners to have a greater say in the way that these issues are approached at their institutions. It can also allow them to be a resource for the institution and for their departments on matters related to teaching and learning.

One of the final questions we asked participants was “how can we increase the impact of the 3M National Teaching Fellowship?” What emerged most frequently was a desire to increase the visibility of the fellowship, and to make it as widely known as possible. Many people suggested highlighting the work that Fellows have been doing since receiving the award. Others point to the increased exposure that comes from the Fellowship’s partnership with Maclean’s magazine and suggest doing more to publicly acknowledge Fellows. Some suggestions include “op-eds that rebut the criticisms of governments, business and parents,” and public lectures or workshops with Fellows, especially at institutions that may not currently have Fellows. One Fellow suggested that 3M Fellows “should be the public face of higher education in Canada.”

It is not only faculty, EDs, and administrators who desire an increased public presence of 3M Fellows. A number of students said that they knew very little about the program, and would like to see more information about it distributed to the student population. While many Fellows are reluctant to tell students that they hold a Fellowship, the student responses to this question make it clear that they want to know about their professors’ accomplishments.

This research provides an overview of the impacts of the 3MNTF in relation to the individual Fellows, their departments, and their institutions. More research is needed in terms of the potential impact of 3M Fellows in their communities and in their classrooms. A larger survey of the experiences of students who have been taught by Fellows would also be a productive direction for additional research.

References


Aron, D. C., Aucott, J. N., & Papp, K. K. (2000). Teaching awards and reduced departmental longevity: Kiss of death or kiss Goodbye. What happens to excellent clinical teachers in
a research intensive medical school? *Medical Education Online, 5*(1), 4313. VIEW ITEM


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Faculty Teaching Practices and Perceptions: Comparative Analysis Based on Time Spent Lecturing

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The University of British Columbia-Vancouver (UBC-V) implemented a campus-wide survey of faculty teaching practices and perceptions. All 11 Faculties participated, resulting in a total of 1177 responses for an overall response rate of 24%. We compared response patterns of faculty who reported spending less than 25%, between 26-50%, between 51-75%, and more than 75% of classroom time lecturing. Using this breakdown, we analysed survey responses related to in and out-of-class practices and expectations for students, use of teaching assistant time, participation in professional development opportunities, and perceptions of whether the institution valued teaching. Participants across quadrants reported employing a wide range of teaching methods irrespective of years of experience and class size. Our findings outline the range of teaching practices employed by faculty at a large research-intensive Canadian institution and may provide baseline information for institutions of similar scale and focus.

Over the past decade, there has been considerable interest in understanding the most prevalent instructional practices in higher education, as well as their relative impact on student learning (Ambrose et al., 2010; Bain, 2004; Buskist & Groccia, 2011; Nilson, 2010). It has been reported, for instance, that despite the growing body of research lauding the impact of non-lecture based instructional practices on learning, lecture continues to be the dominant practice in many university classrooms (Freeman et al., 2014; Michael, 2006; Prince, 2004). In 1980, Blackburn, Pellino, Boberg, and O’Connell surveyed faculty from 24 institutions and found 78% of faculty reported lecture as their principal instructional method. This finding was echoed by Thielens (1987) who surveyed over 800 faculty at 80 U.S. institutions, exploring the percent of time spent lecturing in relation to variables such as academic discipline, gender of the instructor, and class size. Overall, faculty reported that 80% of class time was devoted to lecture. Studies by Lammers and Murphy (2002) and Smith, Vinson, Smith, Lewin, and Stetzer (2014), both of which compared survey responses to observations of classroom practice, concluded that both instructor estimates and observed practices were in high agreement and lecture remains the primary method of instruction at the universities studied.

A number of studies have explored why faculty select lecture as the primary mode of instruction (Henderson, Beach, & Finkelstein, 2011; Miller, Martineau, & Clark, 2000), and it has been suggested that it is unlikely a single factor that determines what instructional practice a faculty member chooses to implement (Lammers & Murphy, 2002). Instead, it is believed that there is a complex relationship between instructor factors, discipline factors, and class factors that may lead faculty to choose specific instructional methods (Henderson,
Beach, & Finkelstein, 2011; Miller, Martineau, & Clark, 2000). For instance, Blumberg (2011), Boice (1992), and Kane, Sandretto, and Heath (2002) indicate that many faculty have little or no formal education on instructional practices or methods to prepare them for university teaching and, consequently, rely on what is referred to as an “apprenticeship of observation” during their years as students (Lortie, 1975). As a result, experience as a student may be one of the most influential factors shaping faculty instructional choices (Hiebert & Stigler, 2000), leading faculty to “teach how they were taught, using largely passive lectures” (Blumberg, 2011, p. 27). According to Goffe and Kauper (2014), little personal exposure to non-lecture based instructional methods may result in faculty lacking the confidence to try other instructional practices and a perception of the risk as a barrier to implementation. In addition, faculty beliefs about teaching, such as whether the goal of teaching is knowledge transmission or facilitating learning, likely also influence which practices they choose. Faculty who believe the goal of teaching is knowledge transmission are more likely to lecture and those believing the purpose is facilitating learning are more likely to employ active learning (Kane et al., 2002). Faculty beliefs about the efficacy of instructional methods also influence their decision regarding which teaching practices to employ in the classroom with faculty generally adopting the practices they feel will best help students learn (Ballantyne, Bain, & Packer, 1999). In their 2014 study of 340 economics instructors, Goffe and Kauper found that one-third believed students learned best from lecture.

It has also been hypothesized that certain course characteristics, such as discipline or class size, lead faculty to lecture for efficiency (Goffe & Kauper, 2014). Thielens (1987) found the percent of time spent on lecture was higher in disciplines such as the physical sciences, life sciences, and mathematics. Also, Ballantyne et al. (1999) and Smeby (1996) concluded that academics in technological disciplines spend much of their time on lectures, whereas those in the humanities are more likely to include seminars and tutorials in their teaching practices. In her review of the literature, Newmann (2001) concluded that disciplinary culture and knowledge have a direct impact on the decisions faculty make about teaching practices. In addition, several studies have found a positive relationship between class size and the use of lecture (Lammers & Murphy, 2002; Smith et al., 2014; Thielens, 1987). However, Smith et al. (2014) studied only STEM disciplines and found a wide range of teaching practices were employed to supplement lecture in both large and small enrolment courses.

It is important to note that there is evidence that suggests lecture may be equal or superior to other instructional practices when the objective is learning factual information (Bligh, 2000; Costin, 1972) and that lecture “can be as effective as any other instructional strategy so long as it is appropriately suited to the intended learning outcomes and is pedagogically planned and delivered” (Saroyan & Snell, 1997, p. 102). In addition, Lammers and Murphy (2002) found faculty who lectured more often made more efficient use of classroom time compared to those employing active learning techniques, where 15% of classroom time was spent on non-instructional activities. Furthermore, research has indicated that significant student learning most likely results when faculty employ a variety of instructional practices, rather than relying exclusively on one approach (Bligh, 2000; Costin, 1972).

Regardless of effectiveness, there is a tendency in the literature to classify instructors as relying almost exclusively either on lecture or on active learning (Smith et al., 2014). Many previous studies of instructional practice focus on how broadly or extensively lecture is employed by faculty (Blackburn et al., 1980; Thielens, 1987), without exploring the prevalence of other instructional practices (Lammers & Murphy, 2002). Further, most studies of active learning techniques tend to classify faculty as either employing said techniques or lecturing exclusively (Smith et al., 2014), ignoring the possibility that faculty regularly employ a range of practices. Even the Higher Education Research Institute Faculty Survey (Eagan et al., 2014), which aims to provide institutions with a “comprehensive, research-based picture of key aspects of the faculty experience”, provides only limited insight into how extensively various instructional practices are used. While the survey does ask faculty if they have engaged
in a variety of instructional practices, it does not ask about the amount of time dedicated to each. It is clear, however, the tendency to portray faculty as either lecturing exclusively or not at all paints an inaccurate and overly simplified portrait of teaching at the university level (Smith et al., 2014).

It is worth noting that most existing research on faculty instructional practices focuses on either institutions in the United States (Blackburn et al., 1980; Lammers & Murphy, 2002; Smith et al., 2014; Thielens, 1987), or in STEM fields (Smith et al., 2014), or assesses the efficacy of specific practices (meta-analysis in Freeman et al., 2014; Michael, 2006; Prince, 2004), rather than exploring the broad range of practices employed by faculty in the course of their teaching. Additional research exploring teaching practices across a broad range of disciplines and in institutions beyond the United States could add to our overall understanding of postsecondary teaching and learning. What is more, research seeking to portray a more accurate understanding of the range of teaching practices employed by individual faculty could add meaningful complexity to a currently overly simplified picture of postsecondary teaching.

In this paper, we supplement existing research on teaching practices by exploring data from a broad range of disciplines at a large, research-intensive Canadian institution. We employ a primarily quantitative approach to provide a detailed description of the range of teaching practices employed and the perceptions related to those practices. Specifically, we address the following research questions:

1. Is there a range of instructional practices employed across the university or do specific practices emerge as dominant?
2. What are the implications of minimal and extensive time lecturing on other instructional practices and faculty expectations?
3. Are there differences in uptake of professional development and perceptions of institutional support for teaching among faculty who spend minimal and extensive time lecturing?

We seek to better understand what teaching practices are employed in our context so we might better support faculty by identifying possible areas for professional development. We also discuss whether our findings mirror those from studies conducted in other institutions and contexts and whether instructional practices university-wide mirror those in the already well-documented STEM field.

Methodology

Data regarding faculty teaching practices was collected in the fall of 2014 at the University of British Columbia Vancouver Campus (UBC-V), a large research-intensive institution, which enrols approximately 40,000 undergraduate and 10,000 graduate students. The development of the 2014 UBC Teaching Practices Survey was a collaborative effort between the Science Centre for Learning and Teaching (Skylight) and the Centre for Teaching, Learning and Technology (CTLT). As described in Briseño-Garzón, Han, Birol, Bates, & Whitehead (2016), this survey was mainly intended to gather information to measure the impact of institutional initiatives aimed at improving the effectiveness and efficiency of teaching and learning. Also, the goal of the initial data analysis was to explore the overall teaching climate at UBC in order to inform strategic planning and decision making, both campus-wide and within Faculties.

The final instrument was the result of a comprehensive review, integration, and modification of the Lasting Education Achieved and Demonstrated (LEAD) survey, run on both the Vancouver and Okanagan UBC campuses in 2008, and of related surveys used in various institutions across North America. The survey was modified with input from faculty from across disciplines, representatives from the Provost Office, UBC Associate Deans with teaching and learning responsibilities, and staff members from UBC teaching and learning support centres. Once a final version of the survey was validated by faculty and approved by university leadership, institutional ethics review and approval was sought to conform to research standards of ethics and integrity (BREB # H14-01879). This paper presents a secondary analysis of the original data.
collected under the aforementioned ethics protocol.

The survey instrument consisted of two sections, the first asking about teaching practices employed in the participant’s largest enrolment, lowest level course, and the second asking about perceptions of teaching practices and institutional support for teaching. The instrument contained 30 questions, primarily multiple choice or Likert scales. Three open-ended questions provided participants an opportunity to share insights about the encountered challenges to teaching, factors of improvement, and suggested changes that could have a positive impact on their teaching practices. For a detailed description of the original study, survey deployment strategy, inclusion criteria, and participant recruitment please see Briseño-Garzón et al. (2016). The survey instrument can be accessed by emailing the corresponding author at birol@science.ubc.ca while an overview of the findings of the original study can be found at http://ctlt.ubc.ca/resources/tps-report/.

In addition, the qualitative sections of the survey are extensively analysed and discussed elsewhere (Briseño-Garzón et al., 2016). The present article represents a secondary analysis of the quantitative data originally collected, for which time spent lecturing was used as the main variable of interest to provide further insights.

## Data Analysis

The 2014 UBC-V Teaching Practice Survey collected 1177 valid, consenting participant responses across all 11 Faculties at UBC-V. The institutional response rate was approximately 24%, ranging from 14% to 68% across Faculties. The sample size was confirmed to be representative of the UBC-V population when compared with the data on faculty track and rank from UBC’s Planning and Institutional Research Office (Figure 1).

In response to research literature characterizing faculty as either exclusively lecturing or exclusively relying on active learning approaches, we built on the methodology employed by Smith et al. (2014) who found most faculty employed a variety of instructional practices. For the purpose of the present analysis and in the survey instrument itself, the term ‘lecturing’ is broadly defined and includes other passive learning activities such as watching a video.

The dataset was divided into four segments or quadrants based on participant responses to the question “Please indicate the approximate percentage of instructional time spent by instructor or TA presenting content (which includes lecturing, showing a video or performing a demonstration)”.

![Figure 1](image-url)

*Participant rank and stream (BLACK) compared to UBC Vancouver population, as reported by the Planning and Institutional Research Office as of October 31, 2014 (GREY)*
In this paper, we combined “lecturing, showing a video or performing a demonstration” and referred to them as “lecturing”. The four quadrants were the following:

- Quadrant 1: 0-25% of time spent by instructor or TA on lecturing
- Quadrant 2: 26-50% of time spent by instructor or TA on lecturing
- Quadrant 3: 51-75% of time spent by instructor or TA on lecturing
- Quadrant 4: 76-100% of time spent by instructor or TA on lecturing

Only those participants who consented to participate in the study and reported a total time for all activities equaling 100% are included in this analysis; this equals 891 responses across 11 Faculties.

Descriptive statistics were generated for all multiple choice and Likert-scale questions. Once participants were grouped in quadrants, we conducted a comparative analysis of survey responses (one-way ANOVA followed by Tukey HSD) by quadrant in order to explore the ways in which teaching practices and perceptions vary between participants who spend minimal and extensive time lecturing. Specifically, we examined differences in course characteristics and faculty demographics, both in-class teaching practices and expectations for out-of-class student activities, responsibilities assigned to teaching assistants, participation in professional development opportunities, perceptions of the effectiveness of various teaching practices, and perceptions of institutional support for teaching.

Results and Discussion

After dividing the responses into four quadrants based on the reported percent time spent lecturing (Table 1), it is apparent that considerably more survey participants spend minimal time lecturing (quadrant 1) than those who reported lecturing extensively (quadrant 4). There is also a notable increase in the average class size across quadrants.

Class Size and Course Level

Participants in this study reported a wide range of class sizes in each quadrant as evidenced by the large standard deviations (Table 1). Our analysis indicates a weak positive but significant correlation between class size and percent of time spent lecturing (Pearson’s $r = 0.278$, $p < 0.05$) for the aggregate data (Figure 2a). Lammers and Murphy (2002) found a stronger correlation between class size and the percent of time the instructor was the “only one actively involved” (Pearson’s $r = 0.45$, $p < 0.001$). Smith et al. (2014), whose research was limited to STEM fields, reported a slightly weaker correlation between class size and the percent of time the instructor was the “only one actively involved” (Pearson’s $r = 0.45$, $p < 0.001$).

Table 1

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>Time Lecturing (%)</th>
<th>Number of Participants</th>
<th>Average Number of Students (+/- St. Dev.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0-25</td>
<td>264</td>
<td>62 (+/-71)</td>
</tr>
<tr>
<td>2</td>
<td>26-50</td>
<td>239</td>
<td>78 (+/-81)</td>
</tr>
<tr>
<td>3</td>
<td>51-75</td>
<td>240</td>
<td>107 (+/-86)</td>
</tr>
<tr>
<td>4</td>
<td>76-100</td>
<td>148</td>
<td>132 (+/-101)</td>
</tr>
</tbody>
</table>
size and the percent of time spent presenting (Pearson’s $r = 0.401, p < 0.05$). Analysis of the UBC-V data for Science only indicates an even weaker positive but significant correlation between class size and percent of time spent lecturing (Pearson’s $r = 0.216, p < 0.05$). The difference between these studies and our results might be due to the fact that the Lammers and Murphy study was conducted at a mid-size US institution and Smith et al.’s study was based solely on STEM courses at one small US institution, while the data in our analysis is from a large, research-intensive institution and is institution-wide including multiple disciplines.

The distribution of the course levels across quadrants is shown in Figure 2b. Although the percentage of upper-level courses (400- and 500-level) was slightly higher in quadrant 1 than others, 100-level courses are relatively evenly distributed across quadrants. Since upper-level courses tend to focus on analysis and synthesis of knowledge, this finding is consistent with earlier findings reporting that lecture may be more appropriate in lower level courses where the objective seems to commonly be the learning of factual information (Bligh, 2000; Costin, 1972). We hypothesize the fairly flat distribution of 100-level courses across the quadrants reflects the widespread focus in higher education on the first-year experience.

Faculty Teaching Experience and Stream

Years of teaching experience (Figure 3) reported by participants was equally distributed across quadrants and included representation in all options offered, ranging from less than one to 20 and more years. The distribution of participants across UBC-V’s two tenure streams, one emphasizing research and the other emphasizing teaching, along with contract faculty is presented in Figure 4. We found that all quadrants have roughly the same distribution across the categories provided for years of teaching experience, with faculty having between 15 and 19 years of experience showing the most variation across quadrants and that there was no relationship between years of teaching experience and the use of lecture. However, there was a significant difference in the distribution of research and contract faculty between quadrants 1 & 3 and 1 & 4. As the percent of time spent on lecturing increased (from quadrant 1 to 4), the number of research faculty represented in the quadrant significantly increased while the number of contract faculty significantly decreased. There was no statistical difference in the distribution of teaching faculty across quadrants.
Perceptions of Effectiveness of Active Learning and Lecturing

We asked participants about their perceptions of active learning and lecture for the promotion of student learning. Our survey did not provide a definition of the term “active learning” because of the variety of practices employed in disciplines and concerns a definition would be constraining.

Participants across all quadrants were more likely to agree or strongly agree that “active learning was an effective way to promote student learning” than to agree with the same statement in relation to lecture (Figures 5a and 5b). However, we see opposite response patterns for these two questions. Participants in quadrant 1 are considerably more likely than those in quadrant 4 to strongly agree that “active learning is an effective way to promote student learning” (74% versus 41%) (Figure 5a). While

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1 A significant difference (one-way ANOVA, Tukey HSD, p < 0.05) between quadrants 1 & 3 and 1 & 4 regarding the number of research faculty and contract faculty. No significant difference in the number of teaching faculty across quadrants.
participants in quadrant 4 are considerably more likely than those in quadrant 1 to strongly agree that “lecture is an effective way to promote student learning” (34% versus 8%) (Figure 5b).

It is notable, however, that participant perceptions of the effectiveness of lecture and active learning do not necessarily align with their practices. Despite devoting 75% or more of their classroom time to lecture, 19% of participants in quadrant 4 do not agree with the statement “Lecture is an effective way to promote student learning”. In addition, despite spending minimal time lecturing, 39% of those in quadrant 1 agree and strongly agree with lecture being an effective way to promote student learning. Further, 82% of participants in quadrant 4, despite spending the vast majority of their classroom time lecturing, either agreed or strongly agreed that active learning was effective. This echoes the findings of Goffe and Kauper (2014) who report some faculty choose to lecture despite beliefs that other practices may be more effective. There could be practical reasons for not choosing active learning techniques. In our previous study, the qualitative responses to the question “Briefly describe what you consider to be the biggest challenge to your teaching” revealed workload and lack of time, increasing class sizes, and balancing the delivery of content with the implementation of active learning techniques as the most prevalent challenges faculty face. A combination of these factors could explain why, despite the overwhelming positive perception of the value of active learning, faculty do not broadly implement active learning techniques (Briseño-Garzón, et al., 2016).

In-Class Teaching Practices

Overall, participants reported dedicating an average of 46% (SD +/-28) of classroom time to lecturing. Few participants reported spending more than 90% of their time on lecturing (4%) and only 16 participants (< 2%) reported using lecture exclusively.

Participants were also asked to report percent of time on other in-class activities including class discussion, student-led activities, problem-solving, peer review, and assessments. As expected given the relationship between these variables, the average percent time spent on in-class activities other than lecturing decreased as the percent time spent on lecturing increased (Figure 6). Participants in all four quadrants reported using most of their non-lecture time for “whole class or small group discussion” with
the reported percent of time decreasing proportionally across quadrants 1 to 4. A similar pattern was noted in the other categories, with the exception of “Students completing assessments”, which showed a relatively flat distribution across categories and had an overall average of 5% of time with a standard deviation of 6.3.

To account for the relationship between lecturing and the other variables, we recalculated the average percent time spent on in-class activities outside of lecturing (i.e., 100 minus % time spent on lecturing = remaining time for other in-class activities) (Figure 7). Based on this analysis we find, even though quadrant 1 dedicates approximately 25% more classroom time to discussion, quadrant 4 spends proportionally 6% more of the remaining classroom time on discussion. Further, while the overall percent time spent on assessment is roughly even across quadrants, quadrant 4 spends a considerably larger proportion of non-lecture time on assessments (~28%) compared to quadrant 1 (~7%).

Looking at the distribution of remaining time within a quadrant and across activities, we see that participants in quadrant 1 reported a variety of activities with each practice averaging more than 5% of the remaining time. Consistent with Smith et al.’s (2014) observation of a wide range of teaching practices being employed by faculty, we also see all categories reported in quadrant 4. However, there is a greater variation in the time spent in different categories with a minimal proportion of remaining time spent on the categories characterizing students as knowledge makers (“student led activities”, 6%) and as a source of expertise (“peer review and feedback”, 1%).

![Figure 6](image_url)

**Figure 6**

*Average percent time spent on in-class activities (lecturing not shown)*

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2 Significant difference (one-way ANOVA, Tukey HSD, p < 0.05) between most quadrants for all activities except for peer review and feedback for quadrants 3 & 4, and for assessment for quadrants 1 & 2, 1 & 3, 2 & 3, 3 & 4. Error bars represent standard error of the mean.
Expectations for Students Out-of-Class

Participants were also asked to indicate the activities they expected students to complete outside of class (Figures 8 and 9). There was no significant difference across quadrants in participants reporting the expectation for students to review material with no assessment of understanding before class. However, there was a significant difference (one-way ANOVA, Tukey HSD, $p < 0.05$) between most quadrants regarding expectations for students to review material with assessment before class, except quadrants 1 and 2 and quadrants 1 through 3 (Figure 8). Given the role pre-class assessments play in flipped or just-in-time teaching, this may suggest participants in quadrants 1 through 3 implemented these practices more often than participants in quadrant 4. Interestingly, we see a different pattern in the reported expectations regarding “problem sets, homework or worksheets” that do not contribute to a course grade.

Across the remaining activities listed, we see a clear pattern emerge in the responses for participants within quadrants (Figure 9). Participants in quadrants 1 and 2 were more likely than participants in quadrants 3 and 4 to expect students to complete any of the activities listed, with the most dramatic differences in expectations for “group assignments” (a difference of 44% from quadrant 1 to 4), “reflective writing” (a difference of 43% from quadrant 1 to 4), and “individual projects/work” (a difference of 35% from quadrant 1 to 4) (one-way ANOVA, Tukey HSD, $p < 0.05$). The difference in percent of participants in quadrants 1 and 4, choosing from a variety of out-of-class activities, suggested a clear distinction between the two groups in their expectations for how students will spend their time outside the classroom. Participants in quadrant 1 expected students to engage in a variety of out-of-class activities, whereas participants in quadrant 4 were most likely to expect their students only review materials or solve problem sets. We found these responses consistent with their in-class responses in that participants in quadrant 1 consistently employed more student-centred teaching practices.
Figure 8

Out-of-class activities involving material review and homework

Figure 9

Other out-of-class activities

---

3 Significant differences (one-way ANOVA, Tukey HSD, p < 0.05) were found between quadrants 1 & 4, 2 & 3, 2 & 4 and 3 & 4 for material review with assessment of understanding before class, and between quadrants 1 & 3 for problem sets that contribute to course grade. Error bars represent standard error of the mean.

4 Significant differences (one-way ANOVA, Tukey HSD, p < 0.05) were found between most quadrants except quadrants 3 & 4 for reflective writing, 1 & 2 and 3 & 4 for peer review and feedback, 1 & 2 for individual projects and group assignments, 1 & 2 and 2 & 3 for field work. Error bars represent standard error of the mean.
Responsibilities Assigned to Teaching Assistants

As Table 2 shows, the percent of participants reporting having Teaching Assistants (TAs) ranges from 44% in quadrant 1 to 76% in quadrant 4. This was not surprising given that many Faculties base TA allocation on class size, which increased from quadrant 1 to 4. Participants across the quadrants expected TAs to support a wide range of activities and there was no relationship between the kind of TA support and class size.

Participants who reported having TAs for their courses were also asked to indicate their expectations for TAs (Figure 10). Participants in quadrants 1 and 2 reported expecting their TAs to “help to facilitate instructional activities” significantly more often than participants in quadrants 3 and 4 (one-way ANOVA, Tukey HSD, $p < 0.05$). However, participants in quadrant 2 were most likely to report expecting their TAs to be “responsible for delivering some course instruction” and were more likely to view TAs as sources of expertise and/or faculty in training. Interestingly, participants in quadrant 1 were the least likely to expect TAs to assume responsibilities outside class meetings, to mark homework, mark exams, or provide student support outside scheduled hours. Because TA time is limited, this may be due to the increased expectations during class meetings. In addition, in large enrolment courses, some faculties employ TAs whose only responsibility is marking.

Participants in quadrants 2 through 4 expected their TAs to mark exams and papers and provide support to students beyond office hours significantly more than participants in quadrant 1 (one-way ANOVA, Tukey HSD, $p < 0.05$). This is not surprising considering the activities (in-class and out-of-class, as discussed earlier) that participants in these quadrants chose for their students. Note that participants in quadrant 1 chose consistently more in-class activities (student-led activities, peer review, and feedback) for their students that required them to interact with each other. Although many participants reported seeking feedback from their TAs when making instructional decisions, there was no significant difference across quadrants.

Participation in Professional Development Opportunities

Participants were asked about their participation in the professional development opportunities based on a predefined list (Table 3). Across all quadrants, participants were most likely to attend teaching development events such as workshops and seminars (average of 75% across quadrants). All quadrants reported high participation in these events with the highest participation rate in quadrant 1 (81%) and the lowest in quadrant 4 (70%). Participation in teaching and learning conferences and scholarly

<table>
<thead>
<tr>
<th>Quadrant</th>
<th>Time Lecturing (%)</th>
<th>Teaching Assistants</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0-25</td>
<td>44</td>
</tr>
<tr>
<td>2</td>
<td>26-50</td>
<td>63</td>
</tr>
<tr>
<td>3</td>
<td>51-75</td>
<td>69</td>
</tr>
<tr>
<td>4</td>
<td>76-100</td>
<td>76</td>
</tr>
</tbody>
</table>

Table 2

Teaching assistant allocation

38
Figure 10

*Expectations for Teaching Assistants*\(^5\)

Table 3

*Professional development activities*

<table>
<thead>
<tr>
<th>Professional Development</th>
<th>Quadrant</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching development events (i.e., talks, workshops, seminars) (%)</td>
<td></td>
<td>76</td>
<td>81</td>
<td>73</td>
<td>70</td>
</tr>
<tr>
<td>Teaching and learning conferences (%)</td>
<td></td>
<td>60</td>
<td>49</td>
<td>38</td>
<td>36</td>
</tr>
<tr>
<td>A cohort of scholars focused on teaching and learning (%)</td>
<td></td>
<td>52</td>
<td>50</td>
<td>36</td>
<td>32</td>
</tr>
</tbody>
</table>

\(^5\) Significant difference (one-way ANOVA, Tukey HSD, \(p < 0.05\)) between quadrants 1 & 3, 1 & 4, 2 & 3, and 2 & 4 for helping with facilitation of activities, between quadrants 2 & 4 for delivering some course instruction, between quadrants 1 & 3 for marking, between quadrants 1 & 2, 1 & 3 and 1 & 4 for providing support beyond class. Error bars represent standard error of the mean.
cohorts varied more widely, with quadrant 1 reporting the highest levels of participation and quadrant 4 the lowest in both categories. The participation in a “cohort of scholars focused on teaching and learning” was the least pursued option among the professional development opportunities presented (average of 43% across quadrants).

Perceptions of the Institutional Value and Support for Teaching

While the majority of participants across quadrants agreed with the statement “institutional leadership recognizes the importance of teaching”, there was a distinct difference in the response patterns from participants in quadrants 1 and 2 and those in quadrants 3 and 4 (Figure 11). Participants in quadrant 1 reported overall agreement at 60%, while participants in quadrant 4 reported overall agreement at 94%, resulting in a difference in overall agreement of 34%. It is not possible for us to offer an explanation for this differential with the current data set and its investigation is beyond the scope of this study. However, it is interesting to highlight that two similar questions—“my Faculty recognizes the importance of teaching” and “my Department recognizes the importance of teaching”—did not result in a similar response pattern. The difference in overall agreement between quadrant 1 and quadrant 4 for the Faculty question was only 8% and the difference for the Department question was 4%.

Conclusions

The goal of this study was three-fold. First, we sought to determine whether a range of instructional practices were employed across a large research-intensive Canadian institution or whether specific practices emerge as dominant. Second, we sought to describe the implications of minimal and extensive time lecturing on other instructional practices and faculty expectations. And third, we investigated differences in the uptake of professional development and perceptions of institutional support for teaching among faculty who spend minimal and extensive time lecturing. We used data that was originally collected in an earlier study (Briseño-Garzón, et al., 2016) and analysed it based on “time spent lecturing” as the main variable of interest. Our participants were representative of the institution’s population with respect to stream and rank; however, the methodological choices we employed pose limitations to the extent in which we can go beyond a descriptive approach in the presentation of our findings.
Prior research on teaching practices in higher education (Kane et al., 2002; Richardson, 1996) noted the limitations of surveys in capturing beliefs and perceptions around teaching practices. In our study, some participants reported feeling constrained by having to report specifically and solely on teaching practices on their highest enrolment, lowest level course. They indicated that their practices in higher enrolment courses differed from their lower enrolment courses and that the highest enrolment course was not necessarily reflective of their overall teaching practice. In addition, since we were specifically interested in the institution-wide teaching practices as opposed to establishing a relationship between discipline and preferred instructional practices, we combined responses from all faculties/disciplines into one aggregate data pool. As a result, we were unable to explore the previously reported disciplinary differences in the nature of teaching (e.g., Neumann, 2001; Thielens, 1987) or discipline specific values and cultures (Neumann, 2001).

The data collected also did not allow us to investigate the relationships between individual faculty members’ philosophies around teaching and learning, and teaching practices. These factors may explain the diverse practices that are being employed by our faculty. A further limitation is that the findings in this paper are drawn exclusively from self-reports (i.e., participant responses) rather than triangulating or complementing our data set with other forms of data such as classroom observations. There is also the possibility that participant responses were influenced by their perceptions of the “right” answer and may not accurately reflect their actual perceptions or practices. In this regard it is worth mentioning there was a conscious effort to portray both lecture and active learning in value-neutral terms in the survey as multiple parties involved in the development hold the belief that either practice may be effective in the proper context.

Contrary to earlier research (Lammers & Murphy, 2002; Mulryan-Kyne, 2010; Smith et al., 2014; Thielens, 1987) our findings indicate a very weak correlation between class size and lecturing. Our previous findings suggest that workload may be one of the most likely reasons for faculty to default to lecture as their instructional method. We reported elsewhere (Briseño-Garzón et al., 2016) that in their open responses faculty identified workload and competing demands as most important challenges to their teaching. Recognizing that preparing to teach using alternative pedagogical approaches can be time-consuming, particularly for the first few iterations, faculty may employ lecture due to concerns about the time required to explore and experiment with different pedagogical approaches (Goffe & Kauper, 2014). In fact, our findings indicate that, irrespective of how much time participants spent lecturing (across quadrants), a very high proportion of all participants believe in the effectiveness of active learning to promote student learning.

Our findings show that years of teaching experience is not related to the amount of time faculty choose to lecture and that research faculty are more likely to engage in this teaching practice than their teaching stream and contract colleagues. Interestingly, faculty with less than one year of teaching experience spent considerably more classroom time lecturing than employing active learning approaches. We also see differences in the average amount of time spent lecturing by course level, with a peak in second-year courses. This may be a result of a broad institutional commitment to enriched educational experiences which include small first-year seminar courses with minimal classroom time devoted to lecture (Sens & Fryer, 2012).

Furthermore, our findings also suggest that a wide range of teaching practices are employed in our institution and that a decision to lecture extensively or minimally does not preclude faculty from adopting other pedagogical approaches. This expands on the research of Smith et al., (2014) which focuses on STEM courses in a small US institution. We found significant differences in the practices employed in and out-of-class when those who spend less time lecturing and more time lecturing are compared. Clearly, faculty who spend less time lecturing have more time to engage in other activities that emphasize student engagement.

Our findings also indicate that teaching assistants are expected to support a wide range of
activities irrespective of class size. However, there are significant differences in expectations from TAs depending on the amount of time lecturing. For example, those who lecture less tend to expect their TAs to help with facilitating instructional activities more than their counterparts, while those who lecture more tend to expect their TAs to provide outside of class support with office hours. This requires well-established professional development opportunities and programs for TAs to be able to adopt such diverse needs.

When the types of professional development activities are compared, teaching development events (talks, workshops, and seminars) are more likely to be attended than teaching and learning conferences or joining a cohort of scholars focused on teaching and learning. This is perhaps not surprising considering the time commitment required to be a contributing member of a cohort compared to attending a one-hour presentation.

While it might seem paradoxical, we found that faculty who report spending more time lecturing (quadrants 3 & 4) were considerably more likely to agree that teaching was recognized and valued by the institutional leadership than their colleagues who spent less time lecturing (quadrants 1 & 2). This apparent disconnect could indicate that the ways in which the institution communicates its values indirectly prioritize lecture over active learning practices. Large class sizes, where we see substantially more classroom time devoted to lecture, may be viewed as more economically efficient and, as mentioned earlier, are “rewarded” with additional resources such as TAs. This may suggest that there could be implications for what the institution communicates to faculty and how what is communicated aligns with promotion and tenure processes and policies.

It is important to highlight that our study did not explore student learning directly, and therefore, our findings are not indicative of the effectiveness of any given teaching practice. More research that allows us to better understand the conditions under which lecture is or is not an effective approach to promote student learning could help us support faculty who choose to lecture in a more meaningful way. We strongly believe, nonetheless, that our study contributes to gaining a better understanding of the current teaching climate and culture at large Canadian research-intensive institutions as the first and necessary step to inform decision-making and support planning within the institution that served as the context for this study and beyond.

References


Briseño-Garzón, A., Han, A., Birol, G., Bates, S., & Whitehead L. (2016). Faculty perceptions of challenges and enablers of effective teaching in a large research intensive university:
Preliminary findings. *Collected Essays on Learning and Teaching, 9*, 133-144. VIEW ITEM


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Section II

IMPLEMENTING CHANGE
Blended Synchronous Delivery Mode in Graduate Programs: A Literature Review and its Implementation in the Master Teacher Program

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Dianne Bateman, Ph. D., Champlain College Saint-Lambert
Janie Bédard, M. Sc., Université de Sherbrooke

The aim of this study is to present a narrative literature review of advantages, challenges, and conditions for the success of blended synchronous course delivery mode. For this purpose, we searched the database EditLib and analyzed 16 existing papers from 2001 to 2016. The conditions for success were operationalized in the Master Teacher Program (MTP) and its challenges were addressed in building a Blended Session Protocol. This protocol also combines lived experience. It is now used in the MTP to ensure a standardized and consistent implementation of this course delivery mode into our courses. Reviewing the literature on this delivery mode and presenting an example of its use in the MTP are important issues. From a theoretical point of view, the present study results help build a theoretical basis for future research on this course delivery mode and would enrich existing literature. From a practical point of view, this study provides administrators and higher education faculty members with guidance on how to implement such course delivery mode.

Information and communication technology (ICT) has had a significant impact on teaching and learning in higher education. New opportunities in course delivery formats have emerged, with blended learning modes being one of the most popular (Hill, 2012; Irvine, 2009). A universal definition of blended learning does not exist. Numerous descriptions of a blended learning mode appear in the literature with various ways of considering the degree to which students must attend class in person or online, whether learning tasks will be done in-class or online synchronously or asynchronously, and the degree of autonomy offered to students in choosing how or which format they want to use to learn.

A blended mode essentially combines the benefits of face-to-face interactions, with online flexibility and ubiquity (Lakhal & Khechine, 2016; McGee & Reis, 2012). In this mode, faculty and students work together in mixed delivery formats to accomplish learning outcomes that are pedagogically supported through teaching, learning, and assessment activities, and to offer a meaningful course environment to the students (Lakhal & Khechine, 2016; McGee & Reis, 2012). For Bates (2015), a blended learning mode consists of any mix of technology with face-to-face instruction. Allen and Seaman (2013) are more specific: for them, a blended mode features learning environments in which 30% to 79% of teaching and learning activities are carried out through ICT on the Web. All agree that “blended education goes beyond just combining traditional and online teaching and learning (Benson et al., 2011). It involves a total redesign of traditional courses to include the use of technology for online communication, activities, and delivery” (Kyei-Blankson, Godwyll, & Nur-Awaleh, 2014, p. 244).
Traditionally, in blended course delivery modes, the online component is asynchronous with course content hosted on learning management systems (Francescucci & Foster, 2014). Nowadays, blended modes can take on other forms. Some of them are defined as bridging both asynchronous and synchronous online learning (Power, 2008). Others combine face-to-face students with synchronous online students. Some researchers view this new approach of blending as the “bridge to the future” (Kyei-Blankson & Godwyll, 2010, p. 533). There is an extensive literature that uses other terms to describe this instructional approach. The most common term is blended synchronous mode. A blended synchronous course delivery mode is defined as mixing both asynchronous and synchronous online learning, to which face-to-face learning opportunities are added (Bower, Dalgarno, Kennedy, Lee, & Kenney, 2015). It is about “Learning and teaching where remote students participate in face-to-face classes by means of rich-media synchronous technologies such as video conferencing, web conferencing, or virtual worlds” (Bower et al., 2015, p. 1).

Other terms are also used for more sophisticated designs, for example, synchromodal mode. In these designs, some authors introduce the concept of physical classes as opposed to distance classes and cyber classes. The synchromodal mode refers to classes in which online students and face-to-face students interact with each other during shared synchronous class sessions (Bell, Sawaya, & Cain, 2014). It pertains to a learning environment where "face-to-face and online students are brought together in the same course at the same time. As such, some students experience the course unmediated… and some students experience the course in a mediated format" (Bell, Cain, & Sawaya, 2013, p. 1630). Using this course delivery mode, Bell et al. (2014) presented five delivery patterns they implemented in an Educational Psychology and Educational Technology PhD program, in which they had two types of students: face-to-face students who were expected to attend classes in person, and online students who had full-time job commitments which prevented them from participating in the course in person. The delivery patterns included lecture, linked classrooms, shared portal, personal portals, and small groups. Using the same perspective, Hastie, Hung, Chen and Kinshuk (2010) defined the blended synchronous delivery mode by combining five components: physical classroom, cyber classroom, faculties, students, and several classrooms or participants. In these situations, faculties and students participate in physical classrooms, cyber classrooms, or both.

The above definitions are similar in some ways. They typically provide a mix of face-to-face and online synchronous modes which are often chosen by the faculty to achieve a pedagogical, social, or financial end. However, the variety of blended synchronous course delivery modes can go a step further by allowing students’ choice (Tsuji, Pierre, Van Roon, & Vendetti, 2012). This is what is known as the HyFlex mode or the multi-access mode. The HyFlex mode combines hybrid learning in a flexible way so that students can either attend face-to-face class sessions, participate online (synchronously or asynchronously), or do both according to their learning needs and availability (Abdelmalak, 2014; Kyei-Blankson & Godwyll, 2010; Lakhal, Khechine & Pascot, 2014; Miller, Risser, & Griffiths, 2013). Multi-access modes provide a choice learning mode where students choose how they want to learn. They can choose to participate with a small group via video conferencing, with a face-to-face group on campus, individually by means of desktop web-conferencing, or online asynchronously (Irvine, 2009).

Transferring from a face-to-face to a blended learning synchronous delivery mode presents colleges and universities with many advantages and serious challenges. This decision should be made based on an overview of research results. In order to help such institutions in doing this, the current study aims to present a narrative literature review on blended synchronous course delivery mode and it attempts to illustrate how the findings influenced the design, development, and delivery of the Master Teacher Program (MTP) at the Université de Sherbrooke. More particularly, it deals with the advantages of this course delivery mode, its challenges, and its conditions for success. Then, these challenges were addressed and conditions for success were established in the MTP. Reviewing the literature on this delivery mode and presenting an example of the MTP are
important issues. From a theoretical point of view, the present study results could help build a theoretical basis for future research on this course delivery mode and would enrich existing literature. From a practical point of view, this study provides administrators and higher education faculty members with guidance on how to implement such courses.

Methods

For the purpose of this literature review, we used one of the most common databases in instructional technology: EditLib. To review studies on blended synchronous course delivery mode, we analyzed existing papers from 2001 to 2016 that reported conceptual and empirical research findings in peer-reviewed journals and conference papers. We selected this period because of the rapid evolution of the context of blended courses in higher education. We applied several keywords in abstract in different combinations: blended learning, blended course, blended synchronous learning, blended synchronous course, HyFlex course, higher education, postsecondary education. We selected 16 papers from the ones initially identified, dealing with advantages, challenges, and conditions for success.

Results and Discussion

Benefits of a Blended Synchronous Course Delivery Mode

According to the authors reviewed, blended synchronous course delivery modes have many benefits. These benefits were classified under four sub-themes that emerged and are summarized in the following paragraphs. These sub-themes are flexibility and access, quality of learning experience, enhanced learning outcomes, and institutional benefits (Table 1).

<table>
<thead>
<tr>
<th>Flexibility and access</th>
<th>Quality of learning experience</th>
<th>Enhance learning outcomes</th>
<th>Institutional benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>It provides students with greater educational access as it responds to students' scheduling needs by offering flexibility in course attendance.</td>
<td>It allows faculty to differentiate instruction to meet different student learning preferences, approaches, and strategies.</td>
<td>It may increase the quality of learning for both online students and face-to-face students.</td>
<td>It may represent a solution for higher education institutions with limited classroom space.</td>
</tr>
<tr>
<td>It gives students equal opportunities to interact in real time with other students and with faculty.</td>
<td>It enriches the teaching and learning environment.</td>
<td>It has been found to come with better course and program completion rates.</td>
<td>It is suitable for less structured courses.</td>
</tr>
<tr>
<td>It reduces feelings of isolation of online students.</td>
<td>It enables students to use the technologies they use in their daily lives for learning purposes.</td>
<td>It allows faculty to support students in the same way, regardless of the mode (face-to-face students or online students), in achieving the intended learning outcomes.</td>
<td></td>
</tr>
</tbody>
</table>

Table 1
Benefits of blended synchronous course delivery mode
Flexibility and access

Blended synchronous course delivery mode provides students with greater educational access as it responds to students’ scheduling needs by offering flexibility in course attendance (Abdelmalak, 2014; Bower et al., 2015; Bower, Kenney, Dalgarno, Lee, & Kennedy, 2014; Cunningham, 2014; Francescucci, & Foster, 2014; Miller et al., 2013). This is especially convenient for those who live far away from university campuses (Bower et al., 2014; Bower et al., 2015; Educause, 2010), or have a work schedule and family responsibilities that make it difficult for them to attend weekly face-to-face sessions (Abdelmalak, 2014; Beatty, 2007; Bower et al., 2014; Kyei-Blankson & Godwyll, 2010). Additionally, it gives students equal opportunities to interact in real time with other students and with faculty, regardless of whether the student is enrolled in a face-to-face or online synchronous course session (Bower et al., 2015; Bower et al., 2014; Francescucci, & Foster, 2014; Miller et al., 2013). This allows for immediate feedback and the ability to join online class discussions (Francescucci, & Foster, 2014). Those who attend online sessions can join face-to-face students in real time to experience a faculty’s lesson, ask and answer questions, and add comments to the class interactions. Moreover, online students and face-to-face students may also get together in small group discussions (Bell et al., 2014; Cunningham, 2014) and complete collaborative learning activities together (Bower et al., 2014). Finally, it reduces feelings of isolation of online students and allows them to get to know each other and the face-to-face students much better than if they were attending the course asynchronously (Cunningham, 2014). Moreover, students enrolled in these courses have been reported to experience high levels of social presence, due to real-time communications, which are considered spontaneous and dynamic (Bower et al., 2015; Cunningham, 2014).

Quality of learning experience

Blended synchronous course delivery mode allows faculty to differentiate instruction to meet different student learning preferences, approaches, and strategies (Abdelmalak, 2014; Kyei-Blankson et al., 2014). In addition, the nature of interactions can vary according to student preferences and needs (Miller et al., 2013). Put in this context, Bower et al. (2015) reported that some online students like the fact that they may be able to provide their comments and contribute to class discussion in a discreet way. Accordingly, quiet students can also be heard (Tsuji et al., 2012). Furthermore, it enriches the teaching and learning environment, as artifacts from face-to-face learning activities (such as audio/video recordings) can be used as learning objects by online students and artifacts from online learning activities (such as forums) can be used as learning objects by face-to-face students (Abdelmalak, 2014; Beatty, 2007). A blended synchronous course delivery mode can thus offer faculty and students the best educational experience compared to the traditional face-to-face or online delivery modes (Kyei-Blankson et al., 2014). In fact, “learning seems to be much richer than in either face-to-face teaching or the online learning mode” (Szeto, 2014; p. 70). In addition, it enables students to use the technologies they use in their daily lives for learning purposes (Thompson, 2013), since these technologies are widely used by blended synchronous courses to maintain interactions between students and to foster a social presence (Garrison & Kanuka, 2004; Miller et al., 2013). Indeed, according to Francescucci and Foster (2014), this course delivery mode is suitable for the “digital generation of students who are accustomed to surfing the Internet, texting friends and sharing their lives on social media websites” (p. 36).

Enhance learning outcomes

Blended synchronous course delivery mode may increase the quality of learning for both online students and face-to-face students (Irvine, Code, & Richards, 2013). For instance, it has been reported that online students “will get more out of a course if there is a real-time contact between students” (Cunningham, 2014, p. 34). This course delivery mode promotes student engagement in their learning (Cunningham, 2014) and produces similar if not
more effective outcomes compared to traditional face-to-face courses (Kyei-Blankson & Godwyll, 2010; Kyei-Blankson et al., 2014). Additionally, it has been associated with better course and program completion rates for students who interact synchronously with other students and with faculty as compared to those who rely solely on asynchronous communication (Bower et al., 2014). Finally, it allows faculty to support students in the same way, regardless of the mode (face-to-face students or online students), in achieving the intended learning outcomes (Bower et al., 2014). Faculty can “provide equivalent learning activities in all participation modes” (Beatty, 2010, p. 17). This means that faculty can provide online and face-to-face learners with equivalent teaching and learning activities. This is the principle of equivalency, according to Beatty (2010).

Institutional benefits

Blended synchronous course delivery mode may represent a solution for higher education institutions with limited classroom space (Educause, 2010; Miller et al., 2013). It also has been reported to increase higher education student enrollment and to reduce costs of instruction. Francescucci and Foster (2014) reported that higher education institutions view “blended learning as a way to increase the efficient and effective use of existing human and capital infrastructure... and avoid duplication and unnecessary costs” (p. 36). Additionally, it is suitable for less structured courses, such as those dealing with research in graduate degree studies (Bower et al., 2015). In these cases, it creates an enhanced sense of community between online and face-to-face students (Bower et al., 2014).

Challenges of a Blended Synchronous Course Delivery Mode

The promises of a blended synchronous course delivery mode can only be realized if those in charge of its implementation can overcome important challenges. These challenges were classified under three sub-themes that emerged and are summarized in the following paragraphs. These sub-themes are course design, relationships between online students and face-to-face students, and technologies (Table 2.)

<table>
<thead>
<tr>
<th>Course design</th>
<th>Relationships between Online Students and Face-to-Face students</th>
<th>Technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lack of institutional recognition for the amount of effort to be put into the design of a blended synchronous course.</td>
<td>Management of online students and face-to-face students at the same time.</td>
<td>Students’ level of technological skills.</td>
</tr>
<tr>
<td>A blended learning course design also demands much more physical and social preparation than courses in a single mode.</td>
<td>Feelings of isolation of online students.</td>
<td>High cost of connectivity and technology issues.</td>
</tr>
<tr>
<td></td>
<td>Engaging with other students in blended synchronous courses.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Forming relationships with fellow classmates.</td>
<td></td>
</tr>
</tbody>
</table>
Course design

Lack of institutional recognition for the effort required to design a blended synchronous course may leave faculty feeling unsupported in their efforts to innovate (Bower et al., 2015). While many faculty members have extensive experiences in delivering high-quality instruction in face-to-face learning contexts, their experience in applying their expertise in blended learning environments may be more limited. Extending the faculty’s expertise to include redesigning courses using a blended learning approach demands institutional commitment, time, and resources (Moskal, Dziuben, & Hartman, 2013). There is a misconception that this redesigning is simply a matter of changing the mode of delivery to incorporate technology into instruction. In actuality, expertise is required to (re)design and tailor students’ learning and assessment experiences both inside and outside of the classroom. This adaptation requires faculty to possess expertise in three areas: 1) course design, 2) theoretical knowledge and understanding of effective blended learning design, and (3) practical knowledge required to re-design a course for blended learning delivery. Acquiring expertise across all these areas for quality blended learning requires a major paradigm shift in the way that faculty approach course design.

A blended learning course design also demands much more physical and social preparation than courses in a single mode (i.e., face-to-face or online) such as setting up the rooms (both physical and virtual classes) in order to create a meaningful learning environment (Bower et al., 2014). In fact, faculty may spend a lot of time anticipating interactions and collaboration between the two groups of students (i.e., face-to-face and online students). These interactions and collaboration do not occur spontaneously and must be well planned (Bower et al., 2015). Otherwise, learning via videoconferencing would not be the same as in face-to-face classrooms due to inappropriate instructional planning (Szeto, 2014).

Relationships between online students and face-to-face students

Management of online students and face-to-face students at the same time may be difficult for faculty (Bower et al., 2015; Bower et al., 2014; Francescucci & Foster, 2014; Hastie et al., 2010). Furthermore, the instructor’s pedagogical approach may be compromised. Faculty may slow down their teaching pace or over repeat, which may impact face-to-face student learning (Bower et al., 2015; Bower et al., 2014; Szeto, 2014). The ability of the faculty to gauge students’ understanding of the lesson content is another major challenge of the blended synchronous course delivery mode. In face-to-face classes, faculty always have access to nonverbal attitudes of the students to be able to determine if they understand the topics being taught. In the blended synchronous delivery mode, online students’ attitudes are not always accessible to faculty, especially when the camera is not used. It is then necessary to find other alternatives (Bower et al., 2014; Francescucci & Foster, 2014).

Feelings of isolation of online students may be another important issue. Some students have to attend course sessions online because of their work and their family responsibilities. These students may feel isolated, fail to engage with the course material and drop out of the course because they have little time for their studies (Cunningham, 2014). As well, in some cases, the visual anonymity makes it easier for online students to disengage in class discussions (Francescucci & Foster, 2014). As well, engaging with other students in blended synchronous courses may be difficult for students (Francescucci & Foster, 2014). Online students reported that they found it difficult to concentrate during a blended synchronous course (Francescucci & Foster, 2014). Students identified some issues such as an inability to hear the questions asked by face-to-face students and difficulty in viewing the details of the material shared through the interactive whiteboard (Bower et al., 2014). Some online students might feel less attention is given them and not welcomed in the course (Hastie et al., 2010), or that their comments are not taken into account by face-to-face students. In fact, it is difficult to give
online students free access to speaking rights. They often have to indicate when they want to speak in text as opposed to raising their hands, and sometimes they are limited to only written participation. Communication seems to be smoother between face-to-face students as compared to that between face-to-face students with online students, or between online students (Bower et al., 2014). At the same time, some face-to-face students feel that faculty spend too much time and effort satisfying technical needs of online students (Szeto, 2014). Both students (online and face-to-face) reported sound problems and not having access to some social cues, for instance, body language and nonverbal attitudes of online students (Cunningham, 2014). Finally, forming relationships with fellow classmates might be difficult for students because they do not meet physically every week (Francescucci & Foster, 2014), and therefore fail to build up a social presence that would be helpful for learning (Cunningham, 2014). Therefore, social and emotional connectedness needs to be encouraged and fostered by faculty in such a learning environment (Bower et al., 2015).

Technologies

Students’ level of technological skills can be a challenge in these courses for online synchronous students and face-to-face students. Online students and face-to-face students have to know how the platform works to be able to interact and work together in real time. If some online students lack technological skills, faculty may focus on these students and spend his/her time troubleshooting their technical problems. Technology may also be an issue for face-to-face students. They may feel uncomfortable because they would have to position themselves in front of a camera or to speak into a microphone (Bower et al., 2015; Bower et al., 2014; Cunningham, 2014). In addition, the high cost of connectivity and technology issues may be a barrier for online students in this course delivery mode (Abdelmalak, 2014; Cunningham, 2014; Francescucci & Foster, 2014; Kyei-Blankson et al., 2014). In some cases, the functions within the platform used are not intuitive or user-friendly, which may bother both online and face-to-face students (Francescucci & Foster, 2014). Additionally, some face-to-face students reported that interacting with online students was indirect. Cooperative tasks were difficult to realize in the virtual environment and additional efforts were required to foster group interaction in the instructional process (Szeto, 2014).

Conditions of Success for a Blended Synchronous Course Delivery Mode

For the present study, we also searched for conditions of success and articulation of best and effective practices reported by the authors reviewed. Fourteen recommendations were identified. First, it is helpful to integrate the course delivery mode gradually, especially in higher education institutions where face-to-face instruction dominated for several years (Beatty, 2007, 2010). Also, to seek support from the higher education institution regarding the implementation of this course delivery mode (Bower et al., 2015; Bower et al., 2014; Hastie et al., 2010). It is key to make sound decisions about the technologies and activities to be selected in the blended synchronous course. These decisions are made according to faculty’s teaching preferences, to the technologies available in the higher education institution, and considering students’ characteristics (e.g., age, learning preferences, and Internet access) (Beatty, 2007; Bell et al., 2014). It may be necessary to limit student numbers for faculty to effectively manage and support online students and face-to-face students (Bower et al., 2015; Bower et al., 2014). Further, to employ teaching assistants who can manage technology related problems, respond to online students’ chat comments, and manage other issues (Bell et al., 2013; Bell et al., 2014; Bower et al., 2015; Bower et al., 2014). Also, institutions must use the right equipment to optimize online students’ experiences and to ensure students’ access to learning activities and course material any time (Beatty, 2007;
2010; Bell et al., 2014; Francescucci & Foster, 2014; Hastie et al., 2010).

It is beneficial to test and practice the use of various technological tools, including communication systems, involved in the blended synchronous course before the beginning of the course (Bower et al., 2015; Bower et al., 2014). It is important for faculty to prepare in advance and to have some ease and facility in using these tools, which should be functional and reliable. It is also recommended to invite students for training sessions with the technology tools used (Bell et al., 2013; Bell et al., 2014; Bower et al., 2015; Bower et al., 2014; Francescucci & Foster, 2014). Further, it is important to integrate different teaching and learning strategies to meet different learning preferences, approaches, and strategies (Kyei-Blankson et al., 2014; Novak, Ponting, & Bhattacharya, 2007).

Successful programs instigate back-channel communication between online students and face-to-face students to reduce the burden on faculty and encourage interactions among participants (Bower et al., 2015; Bower et al., 2014). This requires a degree of letting go from the faculty on behalf of the students. Successful programs also record course sessions to permit all students to access class sessions they could not attend or for revision purposes before exams (Bower et al., 2015; Bower et al., 2014). They use asynchronous communication tools to keep students engaged in the course, such as discussion forums (Asterhan & Schwarz, 2010). Further, they rethink the way the roles of faculties and students are conceived. In this course delivery mode, the strategies of teaching and learning should be more student-centered. Therefore, instructors should enhance students’ participation in their learning and support interactions between face-to-face and online students (Asterhan & Schwarz, 2010; Beatty, 2007, 2010; Bower et al., 2015; Bower et al., 2014; Hastie et al., 2010; Szetco, 2014). Educators must position themselves in such a manner to show openness and availability to all the students, whether online or face-to-face (Bower et al., 2014). Moreover, face-to-face students should be encouraged to do the same with online students. Some technological devices could be used to enhance online students’ presence (Bell et al., 2014). Finally, educators should encourage cognitive presence among online and face-to-face students. Cognitive presence, which is a component of a community of inquiry, is strongly associated with deep learning. The synchronous aspect of blended synchronous course delivery mode, if properly implemented, can increase the sense of community, and thereby the cognitive presence of all participants (Bell et al., 2014; Cunningham, 2014; Kyei-Blankson et al., 2014).

Blended Synchronous Delivery Mode in the Master Teacher Program (MTP)

The Master Teacher Program (MTP) of the Université de Sherbrooke is a program designed for teachers in Anglophone CEGEPs in the province of Quebec. It grants a graduate degree at three different levels: a graduate certificate in college teaching (GCCT), a graduate diploma in college teaching (GDCT) or a Master’s in college teaching (MCT). Table 3 depicts the number of required and elective credits in these programs.

Table 3

<table>
<thead>
<tr>
<th>Number of required credits and elective credits in the MTP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Required credits</td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>GCCT</td>
</tr>
<tr>
<td>GDCT</td>
</tr>
<tr>
<td>MCT</td>
</tr>
</tbody>
</table>

1 CEGEP is a French acronym for Collège d’Enseignement Général et Professionnel. It refers to the public post-secondary education collegiate institutions and is exclusive to the higher education system in the province of Quebec.
The MTP targets educational psychology, pedagogy, pedagogical content knowledge, and discipline-based learning with a view to deepening the professional abilities and reflective practices of its teacher participants. The MTP was designed and implemented in 1997 and focused on serving the four major Anglophone CEGEPs in the province of Quebec: Dawson, John Abbott, Vanier, and Champlain (Figure 1). A CEGEP is a required step in Quebec’s educational ladder. Pre-university programs are equivalent to grade 12 and first-year university. Career programs are usually three years in duration and graduate students are ready to enter the labor market in their chosen field.

In an effort to serve Anglophone colleges outside of the Montreal region, a blended synchronous course delivery mode was implemented in 2006 and is still in operation. The MTP uses a synchromodal model of blended learning which requires students who live in the Montreal area to attend face-to-face classes, which are held at the four Montreal colleges, while students living outside the Montreal region attend the classes synchronously online. Actual face-to-face classroom time is reduced and replaced with learning and assessment activities that are done asynchronously and synchronously online between class meetings. The MTP has successfully implemented a blended learning synchronous mode of course delivery. The challenges have been addressed and the advantages enjoyed. Table 4 explains how each condition of success borrowed from the literature is operationalized in the MTP Program. The four Montreal colleges originally served have expanded to 24 colleges throughout Quebec. Figure 2 depicts the regions now reached by the MTP.

In an effort to deal with the technological challenges, the MTP Steering Committee of Université de Sherbrooke constructed the Blended Session Protocol presented in Table 5.

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Figure 1
The CEGEPs of the Montreal region

Figure 2
The regions that are reached outside of Montreal by the MTP
### Table 4

**Conditions for success when using a blended course delivery mode as operationalized in the MTP Program**

<table>
<thead>
<tr>
<th>Conditions for Success</th>
<th>MTP Instructional Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integrate this course delivery mode gradually</td>
<td>The blended learning delivery mode was introduced in 2006 when the program was opened to the Anglophone colleges throughout Quebec. We experimented with various modes of communication and used a variety of tools. It was implemented one course at a time.</td>
</tr>
<tr>
<td>Seek support from the higher education institution</td>
<td>The Anglophone Deans in the four Montreal-starter colleges have supported this innovation since its inception. They have provided funding for course development, technical support, and social support. A special travel budget provides funding for participants from a distance to attend classes face-to-face at three important points in the MTP program. This has increased social presence immeasurably and has also increased commitment to the program.</td>
</tr>
<tr>
<td>Make sound decisions about the technologies and activities to be selected</td>
<td>Through trial and error over the past 10 years we have learned that appropriate sound is probably the most important technical attribute. An investment has been made in technologies.</td>
</tr>
<tr>
<td>Limit student numbers</td>
<td>The ideal class size is 15 – 18. If a course has more than 25 registrants, the class is split and a second teacher is brought in.</td>
</tr>
<tr>
<td>Employ teaching assistants</td>
<td>Technical help is available for all courses.</td>
</tr>
<tr>
<td>Use the right equipment</td>
<td>All technical support personnel are given a set of high-end, carefully chosen microphones and connectors on loan which they transport from college to college as needed.</td>
</tr>
<tr>
<td>Test and practice the use of various technological tools</td>
<td>All technologies are tested before they are used. Before each course begins the instructor meets with the technical support person to review what will be needed to ensure successful learning activities. The Blended Learning Protocol outlines the roles and responsibilities of all concerned: the teacher, the students, and the technical support person.</td>
</tr>
<tr>
<td>Integrate different teaching and learning strategies</td>
<td>All instructors use numerous teaching strategies during face-to-face sessions that include interactive lectures, collaborative learning teams, simulation, and case-based learning.</td>
</tr>
<tr>
<td>Record course sessions</td>
<td>All course sessions are recorded.</td>
</tr>
<tr>
<td>Use asynchronous communication tools</td>
<td>Students have access to WebEx, SKYPE, Discussion Forums, Wikis, Chat, and Email at any time.</td>
</tr>
<tr>
<td>Rethink the way the roles of faculties and students are conceived.</td>
<td>A teaching and learning partnership characterizes the relationship between the faculty and students.</td>
</tr>
<tr>
<td>Position yourself in such a manner to show openness and availability to all the students.</td>
<td>Faculty make themselves available through online office hours and email. During class sessions, an effort is made to stand in a place where the camera captures the teacher’s voice and movements.</td>
</tr>
<tr>
<td>Encourage cognitive and social presence among online and face-to-face students.</td>
<td>When learning teams are formed, students from a distance are distributed throughout the face-to-face learning team as opposed to placing all the students from a distance in the same group which is technically easier but does little to encourage social presence for all class members.</td>
</tr>
</tbody>
</table>
Table 5  
*The Blended Session Protocol*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Instructor</th>
<th>Technical Support Assistant</th>
<th>Faculty Development</th>
<th>Sub-themes of challenges addressed</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Upon course notification</strong></td>
<td><strong>Preparation for the course</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4 weeks in advance</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Sign into course Moodle page</td>
<td>• Visit host college to oversee room selection</td>
<td>• Work with instructor to select room and meet the instructor and the college’s IT department</td>
<td>• Work with the instructor and TechSupport to select the best room(s)</td>
<td>• course design</td>
</tr>
<tr>
<td>• Install webcam and integrated headset</td>
<td>• Complete orientation to WebEx</td>
<td>• Work with instructor to set plan for course</td>
<td>• Reserve room(s)</td>
<td>• technologies</td>
</tr>
<tr>
<td>• Complete orientation to WebEx</td>
<td>• Prepare for first class</td>
<td>• Work with the instructor in planning IT integration during course</td>
<td>• Arrange IT setup with college IT, instructor and TechSupport</td>
<td></td>
</tr>
<tr>
<td>• Prepare for first class</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2 weeks in advance</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Set up Moodle course page</td>
<td>• Provide orientation to WebEx</td>
<td>• Send out welcome letter to participants</td>
<td>• course design</td>
<td></td>
</tr>
<tr>
<td>• Post links to required readings</td>
<td>• Test IT set-up and equipment</td>
<td>• Arrange for visitor access</td>
<td>• technologies</td>
<td></td>
</tr>
<tr>
<td>• Post course resources</td>
<td>• Invite students to Moodle course page</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Invite students to Moodle course page</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>30 minutes before all classes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Find a well-lit, quiet place with either dedicated Wi-Fi or hard-wired connection</td>
<td>• Set up classroom</td>
<td>• Check with instructor and TechSupport for last minute questions</td>
<td>• course design</td>
<td></td>
</tr>
<tr>
<td>• Sign in and test peripherals with IT</td>
<td>• Load documents for display</td>
<td>• Welcome participants</td>
<td>• relationships between face-to-face students and online students</td>
<td></td>
</tr>
<tr>
<td>• Close mic and webcam</td>
<td>• Be available for participant questions</td>
<td>• Ask participants to turn on webcam and mic for testing</td>
<td>• technologies</td>
<td></td>
</tr>
<tr>
<td>• Raise hand to speak</td>
<td>• Display relevant resource</td>
<td>• Give participants rights</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Activate webcam and mic to speak</td>
<td>• Watch for comments and questions in Chat</td>
<td>• Activate recording</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Keep peripherals activated when involved in discussion</td>
<td>• Respond to raised hands</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Use Chat to post comments and ask questions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>During Class</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Respond to IT problems</td>
<td>• Respond to IT (1 hour in advance)</td>
<td>• Watch for comments and questions in Chat</td>
<td>• course design</td>
<td></td>
</tr>
<tr>
<td>• Watch for comments and questions in Chat</td>
<td>• Respond to raised hands</td>
<td>• Set up and maintain breakout rooms, online polling, and online questions</td>
<td>• relationships between face-to-face students and online students</td>
<td></td>
</tr>
<tr>
<td>• Display relevant resource</td>
<td></td>
<td></td>
<td>• technologies</td>
<td></td>
</tr>
<tr>
<td>• Set up and maintain breakout rooms, online polling, and online questions</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>End of Class</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Ask questions to instructor</td>
<td>• Stay online to answer participant questions</td>
<td>• As needed</td>
<td>• course design</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Stay online to answer participant questions</td>
<td></td>
<td>• relationships between face-to-face students and online students</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• technologies</td>
<td></td>
</tr>
</tbody>
</table>
This protocol was designed by the MTP Steering Committee by combining lived experience with a review of the literature on blended learning challenges and solutions. It outlines the role and responsibilities of the participants, instructor, technical support person, and faculty developer.

Conclusion

The aim of this study was to present a narrative literature review on blended synchronous course delivery mode. More particularly, it dealt with its advantages, challenges, and conditions for success. Advantages were then classified into four sub-themes (flexibility and access, quality of learning experience, enhanced learning outcomes, and institutional benefits) and challenges into three sub-themes (course design, relationships between online students and face-to-face students, and technologies). Then, conditions for success were operationalized in the MTP Program and its challenges were addressed in building a Blended Session Protocol. This protocol was designed by the MTP Steering Committee by combining lived experience. It outlines the role and responsibilities of the participants, instructor, technical support person, and faculty developer. This protocol is used in these graduate programs to ensure a standardized and consistent implementation of this course delivery mode into our courses. It may be useful to any faculty member or instructional designer who wishes to implement this course delivery mode into his/her practice.

This paper has only applied the findings from the literature review and our lived experience. However, it has not addressed the impact and effectiveness of the changes made in the MTP. Future research may consider these aspects and interview instructors and students in the MTP on this matter. It may also verify the advantages enjoyed and the real challenges faced in our programs, as perceived by instructors and students.

References


Beatty, B. J. (2007). Hybrid classes with flexible participation options–If you build it, how will they come? In Annual Convention of the Association for Educational Communications and Technology Annual Convention (AECT), 14. VIEW ITEM

Beatty, B. J. (2010). Hybrid courses with flexible participation - The Hyflex design. VIEW ITEM


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learning experiences between face-to-face and online students. *International Journal of Designs for Learning*, 5(1) 68-82. VIEW ITEM


Educause. (2010). 7 Things you should know about the HyFlex course model. VIEW ITEM


Biographies

Sawsen Lakhal is an assistant professor in the Department of Pedagogy at the Université de Sherbrooke. She acquired an MA in Instructional Technology and a PhD in Administration and Evaluation in Education at Université Laval. Her research interests include online learning, blended learning, and acceptance of ICT in teaching and learning. Her research program focuses on persistence in distance higher education programs and courses. She currently serves as an Associate Editor for the Canadian Journal for the Scholarship of Teaching and Learning.

Dianne Bateman is a university and college teacher/researcher/faculty developer who has been the Curriculum Coordinator of the Master Teacher Program since its inception in 1999. She has been involved in designing and teaching blended learning courses since 2008. She has a Masters in Educational Psychology from Teachers College, Columbia University and a PhD in Educational Psychology from McGill University. In 2014 Dianne received the College Sector Award and currently serves as Chair of Publications for STLHE.

Janie Bedard earned her MSc in Psychoeducation at Université de Sherbrooke. She is currently working in the School Board of the Sherbrooke region.
Implementing Competency-based Education

Lynn Curry, CurryCorp, Inc.
Marcia Docherty, Camosun College

The rapid and widespread adoption of competency-based education (CBE) has brought into sharp focus long-standing tensions built into education systems, particularly for graduate and professional schools. We all share the desire to produce graduates equipped to respond capably in a rapidly changing world. However, many of us struggle with the knowledge, skills, and attitudes required to identify, articulate, deliver, document, assess, assure, and adjust those necessary competencies across learning engagements, work-study experiences, and into work careers. CBE forces us to alter familiar pedagogical beliefs, attitudes, and behaviours. The purpose of this essay is to assist faculty, students, administrators, regulators, and employers in considering the strengths and limitations of competence-based education (CBE). We also introduce a range of mitigating strategies to address CBE shortcomings.

Everyone involved in any educational enterprise shares the desire that graduates be equipped to respond capably in a rapidly changing world. Competency-based (or outcomes-based) education (CBE) is an educational model organized to realize these aims by beginning with definitions of desired endpoints. This approach has a 100-year developmental history beginning in the workplace efficiency movement (Taylor, 1911) and moving to education by the 1940’s (Tyler, 1949). Interest waxed and waned cyclically over ensuing years with CBE currently enjoying global support at all educational levels from government and policy organizations such as the US Department of Education (US Department of Education, n.d.), the Conference Board of Canada (2009), and the Organisation for Economic Co-operation and Development (Tremblay, Lalancette, Roseveare, 2012). Although there is a large published literature describing CBE, there is not much evidence of improved learning effectiveness (Carraccio, Wolfsthal, Englander, Ferentz, & Martin, 2002; Malone & Supri, 2012; Morcke, Dornan, & Eika, 2013), and even less about implementing CBE successfully.

The purpose of this essay is to orient participants—be these, faculty, students, administrators, regulators, and employers—around critical concepts required to operationalize competency-based approaches in their spheres of responsibility and, equally important, to mitigate CBE limitations. We make no argument for or against CBE approaches; there are after all many ways to produce capable graduates. We focus on the practicalities of making CBE work. The essay will not dwell on historical development or conceptual evolution. These are worthy topics and have been addressed in the available literature. Furthermore, throughout this essay we purposefully conflate outcomes-based and competency-based education. These educational models differ in details but share a central tenet that the content of the educational experience should be derived from pre-specified exit expectations. Referring to these endpoint expectations as “outcomes” is more common within general and foundational educational levels whereas technical and professional schools have a social contract to define and provide relevant “competencies” related to adequate professional performance. There is extensive literature on both...
outcomes-based and competency-based models, and on their subtle differences (Albanese, Mejicano, Mullan, Kokotailo, & Gruppen, 2008).

Our focus in this essay is the gap between intention to orient curricula towards desired endpoint expectations and making that happen in real time. We address participants seeking an approach to identify, articulate, deliver, document, assess, assure, and adjust necessary competencies across prior learning, alternative learning engagements, work-study experiences, and into work careers.

An essay is not a workbook. We present no detailed operational plans or specific solution steps. That level of detail is ultimately not helpful because specific contexts, constraints, and opportunities play a large role at the level of local innovation and implementation. Our intention is to outline the minimum conceptual set and provide generalized guidance on practical approaches in each of the critical areas. Illustrations will be primarily drawn from higher and professions education only because the need for effective CBE operationalization in these settings is presently accentuated due to accreditation mandates and frank competition for student dollars.

CBE: What is It?

Educational structures characterized as competency- or outcome-based can be identified by various manifestations of functioning end points: educational objectives, outcomes statements, competency frameworks, task analyses, employability skills lists, performance and grading checklists. What is common across these tactics is the focus on endpoint behavioural competence and therefore on assessing direct indications of attained competence throughout the educational experience. This focus contrasts with the still common assumption that competence is related to time in courses or service. Similarly, the CBE approach removes the emphasis on institutional reputation as a proxy for graduate quality. In CBE both assumptions are replaced with documentation of classroom, simulation, and work execution indicators chosen to reflect demands of the next placement or workplace performance.

CBE: Historical development

CBE has its origins in Taylor’s (1911) behaviour focused approach to performance improvement in the workplace. At the same time, educational movements for social efficiency and essentialism were calling for educational practices that were efficient, effective, and standardized (Schilling & Koetting, 2010). Principles from Taylor’s scientific management were applied to compartmentalize, sequence, and streamline classroom learning; competency standards were applied to students, and teacher preparation focused on efficient instructional delivery relevant to those competency standards (Schilling & Koetting, 2010; Tuxworth, 1994). By the late 1960s, the US Office of Education formalized the competency-based approach as a direct measure of student learning (Tuxworth, 1994).

By the early 1970’s similar expectations had migrated to higher education. McClelland (1973) argued that higher education must move beyond institutional reputation as an indicator of graduate competence towards a competency-based approach reflective of workplace needs. This movement is still in place today as supported by organizations such as the Council for Aid to Education (Council for Aid to Education, n.d.) and the Organisation for Economic Co-operation and Development (Tremblay et al., 2012) that, respectively, set national and international standards for higher education outcomes.

While CBE has been used to varying degrees in professional, trade, and military training for decades, the medical discipline has recently espoused CBE at an international level. Heralded as a paradigm shift towards safer and higher quality healthcare (Carraccio et al., 2002; Long, 2000), CBE is now a requirement for graduate medical program accreditation in North America (Accreditation Council for Graduate Medical Education [ACGME], 2016). The medical field defines CBE as:

an approach to preparing physicians for practice that is fundamentally oriented to graduate outcome abilities and organized around competencies derived from an analysis of societal and patient needs. It de-
emphasizes time-based training and promises greater accountability, flexibility, and learner-centredness (Frank et al., 2010, p. 636).

Expectations for CBE

Authors and agencies endorsing CBE have high expectations of efficacy. Real-world relevance, marketability, increased mobility, and intrinsic motivation for students, graduates, and faculty development have all been indicated as objectives for reorganizing educational structures to follow the CBE model. Collaboration across and within different types, contexts, and venues for education should also be easier to initiate and support under CBE structures. Properly organized, CBE could provide a basis for flexible, authentic, learning and assessment activities while de-emphasizing time- and situation-based proxies for learning.

These aspirations are rarely achieved in practice for a range of reasons: the measurement of competence is not well understood (Blömeke, Zlatkin-Troitschanskaja, Kuhn, & Fege, 2013); questionable competence identification validity (Shippmann et al., 2000); definitional weakness in affective domains (Fish & de Cossart, 2006; Taylor, Irvine, Bradbury-Jones, & McKenna, 2010); lack of faculty training (Calhoun, Wrobel, & Finnegan, 2011); and lack of institutional flexibility and accommodation (Iobst et al., 2010). Furthermore, many critics complain that the granularity of CBE entirely misses the complex selection and coordination of competencies required for proficient practice in real-world situations (Fish & de Cossart, 2006; Talbot, 2004). Recent reviews (Touchie & ten Cate, 2016; Morcke et al., 2013) suggest that for many CBE programs and participants there is still a significant gulf between embracing the concept of CBE and achieving functional applications, let alone realizing desired results.

Conceptual Limitations of CBE

CBE limitations are not widely acknowledged nor their ramifications understood. Based as it is in behaviourism, CBE measures only observable results, ignoring the complex connections across thought, performance, and context. CBE assumes that all competencies can be reduced to statements of observed performance (Lum, 1999; Morcke et al., 2013), that there is a single, preferred pathway to competency attainment (Delaney, Carlsen-Sabelli, Shephard, & Ridge, 2011), and that observers or raters are always objective (Govaerts, van der Vleuten, Schuwirth, & Muinjens, 2007). It is further assumed that correct performance is a result of correct thought/knowledge and will unfailingly produce desired results in all situations. Humanistic competencies such as accountability, altruism, curiosity, empathy, and innovation are not easily reduced to functional indicators as required by CBE (Hodges, 2010). Competencies are stated in terms of minimally acceptable performance, which promotes settling for “good enough” in direct contradiction to professional expectations of excellence (Talbot, 2004).

CBE rationales (Cooke, Irby, & O’Brien, 2010) tend to ignore the realities of teaching and learning in favor of accountability and assessment. In increasing competitive educational settings, methods that provide accountability for resources used, and outputs obtained, are appealing in their potential to reduce costs and training time. This improved output function (specified outcomes; cheaper throughput) is achieved through standardization, which does not fit well with the known reality of widely variable learners, teachers, and application settings.
Educational Design, Teaching, and Learning with CBE

The defining strength of CBE is the attention to outcome competencies. From those product competencies, a full range of supporting learning goals must be articulated, ordered, and located within educational programs, individual courses, and sequences of learning experience. When learning goals and outcomes are clear and well organized, a conceptual scaffold is created for the work of teachers and learners (Morcke et al., 2013; Spady, 1994). Such goal-orientation can be used as a rubric to sort, understand and modify how each course or experience connects to a larger program of study, personalized learning needs, and requirements of the next placement or eventual workplace. This connection clarity allows educational program evaluation to examine all the supporting structures of curricula, teaching, learning activity, assessment, and feedback to confirm alignment to desired goals and outcomes.

Commitment to CBE, therefore, means examining in detail how we design, teach, assess, and learn within CBE structured educational programs. A thorough, systematic, sustained, and integrated approach is required to improve learner outcomes by streamlining all pedagogical components within courses and programs toward goals defined by demands of the next placement, linkage to workplace opportunities and requirements for good citizenship.

Design

The initial goal of the educational design process is to identify transformational endpoint competencies that satisfy expectations. Those expectations could be to match pre-specified outcome competencies such as may be supplied by accreditors and professional bodies or to define unique competencies that will distinguish each program of study from competitors.

Identifying, ordering, and empirically validating desired endpoint outcomes with acceptable rigor requires the marshaling of transparent processes, application of explicit techniques, and the full involvement of stakeholders. This process can involve a handful of individuals or a nation-wide community of practice. Outcome definition is a foundational activity that not only informs downstream teaching, learning, and assessment but also details the specifics of program or course outputs (competencies of graduates) thus establishing the reputation of the courses, programs, and institutions involved.

Pragmatic sub-outcomes, transition goals, and stage objectives must then be developed that will flexibly support learners reaching the endpoint goals. Program design techniques should be chosen that suit the situation at hand and that match the development of goals, outcomes, and objectives appropriate to the learners, the school setting, the expectations for the next learner placement, and eventually the target workplace market. This process should be supported by curriculum designers and educational developers who can break down the competencies into their learning components (Brown, 1994).

CBE has its roots in methods for critically examining work practices to improve work efficiency (Taylor, 1911). It follows that opportunities should be taken in all CBE educational design phases to identify and reduce or eliminate ineffective structures, practices, and expectations that may have been historically justified but are now impeding the efficiency of student learning. These structural impediments abound and are entrenched in social and commercial expectations: degree programs have minimum course requirements, and field experiences have time constraints and work obligations. In fully operationalized CBE, students who can demonstrate competencies in much less time than expected should not be paying tuition nor providing unpaid service for the same length of time as others in their cohort who may need more time to demonstrate the required competence. Most higher and professional education structures and work placements are presently ill-equipped to respond to these needs for seamless flexibility.

The CBE design phase requires effective negotiation and management to produce useful results and adequately serve the multiple stakeholders and unaligned purposes. Successful implementation will require design phases that explicitly include
elements of situational analysis, consensus building, common language creation, demarcation of scopes of practice, and responsibility (Hodges, 2012). Designers must also acknowledge the limitations of CBE and plan explicit mitigations.

Regardless of the source of the competence definitions or the general educational plan, each program and educational unit, indeed, each participant must be actively involved in designing how desired competencies will be (or can be) attained within the complex local realities of teaching, learning, and practice.

Teaching

CBE, if well implemented, provides a framework for faculty and students to become true partners in the educational enterprise. CBE design identifies and structures minimally necessary learning outcomes connecting the classroom, lab, and experiential placement to requirements of the next level training and to real-life practice. Teaching with CBE requires understanding this learning structure as well as the knowledge and skill to flexibly adapt it to the needs of each individual learner. Lesson or experience planning in CBE is informed by well-written and well-organized course outcomes and objectives. It also requires a thorough understanding of the competence components to be developed, as well as the instructional activities, pedagogies, and assessments most likely to encourage that development.

When used effectively, CBE works as an advanced organizer and allows teaching (and learning) to focus beyond simple knowledge, skills, and attitude acquisition towards application, transfer, and impact assessment. When used ineffectively, CBE becomes a bureaucratic checklist that limits intellectual flexibility and creativity for both learners and teachers (Morcke et al., 2013) and will be incongruent with accepted teaching perspectives (Pratt, 1998).

Faculty must not only be professionally and personally engaged but also properly prepared and supported throughout a CBE implementation. It is wholly unreasonable to presume that faculty will be able to effectively teach and assess using CBE by simple extrapolation from their previous, likely more didactic, teaching or learning experiences. This is particularly true for sessional faculty and site-based faculty without academic appointments. With the right support, CBE need not mean more faculty work; its incorporation should be motivated by the potential of CBE to improve learning, assessment, courses, and programs.

Faculty may require help moving from teacher-centric to learning-centric practices. Preparation and support must extend faculty capabilities to bring in other pedagogical approaches (pragmatism, interpretivism) as required to moderate CBE limitations. It must also assist faculty to effectively participate in the assessment requirements of CBE, which are qualitatively and quantitatively different than common experience. Assessment concerns in CBE are addressed more fully later in this essay.

Learning

Even though CBE describes what “learning” is to occur versus the more traditional, what “teaching” is to occur, very little attention has been directed towards how to learn efficiently with CBE. This default puts students into a passive learning role and reduces the learning experience to checking off components that will result in a high or passing grade.

The concept of CBE designs pedagogical features to efficiently move learners toward the defined endpoint competencies. This should put learners at the centre of the educational enterprise, not the course structure, not the teaching or service schedules. If CBE is not well implemented, these legacy structures will remain, and constrain many learners. In response, learners must take responsibility to understand and optimize their learning experiences, much as successful students have done historically with other educational paradigms.

As a start, learners must develop an understanding of the strengths and limitations of CBE: why it is being used, and how it is being deployed in their situation. Learners must recognize how the CBE structure, as locally implemented, will affect their development and master a range of
ameliorating strategies to optimize their success both in the current experience, in the next level, and eventually in real work settings. Students must learn how to use CBE to inform and organize studying, to complete activities, and to prepare for, and incorporate, assessments in the classroom, lab, and experiential settings. Ideally, the faculty will see themselves as aligned with the students in achieving these optimized learning strategies. If not, CBE can reduce learners to objects of assessment and accountability.

CBE can outline expected content and competence performance reasonably well, but the structure is challenged to communicate the holistic components of competence that include tacit attributes, attitudes, and complex coordination. As a principal defense, learners should leverage and connect learning opportunities outside the formal defined pedagogical space. Education is vastly aided by a host of informal educators, some of whom are prominent and identifiable in the field placements or workplaces: other professional workers, support and administrative personnel, other learners and clients. Recognizing and engaging these resources is a benefit to students trying to navigate and optimize attainment of both behavioural and tacit competencies. These informal educators will be more diverse than the designated faculty and not likely marked nor acknowledged for their true influence. Their legitimate involvement will contribute to the learner’s developing sense of community, comradery, and trust, all hallmarks of responsibility, a commonly defined outcome competency.

Administering CBE

CBE itemizes and defines learning outcomes to support planning for learning and the structure for learning assessment. These defined outcome competencies also express the standards for instruction, performance, and grade assignment. As such, CBE documents the contract between the educational institution and the student. Failure to provide the stated instruction or comply with the specified standards has resulted in successful legal action by disgruntled students (The Canadian Press, 2012). Therefore, administrators should attend to the development and use of these CBE descriptive documents.

Training for, and joint monitoring of, CBE documentation will be helpful for both administrators and faculty as they may not appreciate the full consequence of not complying with these administrative components. This supportive oversight is challenging whether the administrator is a member of the particular discipline or not and may be perceived as contrary to individual notions of academic freedom. The administrative objective here is to build partnerships that support CBE implementation. That will include faculty and learners as prime stakeholders but also extend more broadly to include the sources of the endpoint competencies, and administrators in the next phase placements all the way to real life work placements.

Some components of CBE are best managed and monitored by administrators directly (liaison with worksites and employers) and others better devolved to faculty teams (innovative personalization in learning and assessment) or external experts (curricular evaluation of fit with program goals and workplace needs). Administrators must also audit their current organizational processes and procedures to continually seek improvement in alignment, efficiency, and effectiveness. We will return to these change-management challenges later in this essay.

Assessment and Mastery Demonstration in CBE

Assessment is the weakest link in CBE structured programs (Govaerts et al., 2007). Hampered by the limitations of the behaviourism at its root, rigidity in progression structures, misplaced faith in the universal fairness of raters, and even minimal similarity across rating situations, getting assessment right in CBE has been widely neglected (Blömeke et al., 2013).

CBE designers and participants must redesign assessment processes to better suit the
Implementing Competency-based Education

variability of learners, teachers, assessors, and settings. Innovation and complex coordination are also needed to obtain adequate measures for the full breadth of competency requirements. At both national and local levels, critical examination is obligatory for current assessment practices, assumptions, intended, and unintended results. Some settings will have access to professional assessment expertise, others are advised to organize consulting or partnership arrangements to ensure that new or tweaked assessments are sufficiently rigorous, reliable, and valid in addition to being practical and useful to learners.

CBE can facilitate this examination of assessments within a course of study or across a program against established taxonomies of learning and next place or workplace requirements. It provides an organized structure of sequenced outcomes that allows for the creation, inspection, and integration of formative and summative assessments to ensure an intentional, integrated assessment design with learning useful feedback as opposed to simple student gating decisions. Programmatic assessment techniques should link and evolve assessments across the learning journey to achieve overarching program goals and outcomes that distinguish graduates as competent (Schuwirth & Van der Vleuten, 2011). The clarity of these linkages facilitates a coordinated and efficient program of study and experience for the learner. Efficacy evaluation of this same linkage information can help justify program resources to internal administrators and external regulatory, accrediting, and advisory bodies.

Experiential placements have always been a central part of professional training and are increasingly utilized elsewhere in educational endeavours to provide context and authenticity for school-based learning. These work-site experiences are often the first occasion that learners are expected to function as part of a workplace team, appropriately contributing their acquired knowledge, skills, and attitudes over sustained, complex interactions in real time. Too often, however, these field involvements are unfocused, the learning outcomes unclear, and the learner’s performance only informally assessed, if at all. Successful CBE implementation must correct these errors and optimize the opportunity for work relevant learning and work contextualized assessment.

Workplace assessments are complex because they must be applied across different contexts and are often administered by site staff, who may or may not have any assessment training or affiliation with the school. Building effective assessments for experiential placement means combining a variety of assessors with a variety of tools from both academic and organizational settings. These field assessment programs must be built to allow student progress to be monitored by faculty, the site, and the student throughout the placement. The goal is to provide maximal corrective information to learners as the experience unfolds as well as to support any pass/fail or graded decision to be made.

Once assessments are in place across a course or program, it is important to continually evaluate the overall assessment design as well as each individual component. Because competence assessment is so central to CBE methods, it is imperative that evidence be constantly acquired and considered about the quality of those assessments individually and collectively. Assessment quality is a requirement for any meaningful course or program evaluation. The central question is: can we prove that the experience/course/program produces graduates with all the requisite competencies?

Learning Taxonomies Useful in CBE

The contribution of learning taxonomies is the assistance they provide in organizing competency assessments to ensure that appropriate levels of complexity have been achieved at each stage (Morcke et al., 2013) and that the evaluation schemes are appropriate for the learning outcomes specified (Kraiger, Ford, & Salas, 1993). Familiarity with learning taxonomies, and agreement on the taxonomies to be employed in local CBE implementation is essential across all participants. Functional taxonomies will help order the sequence of learning objectives towards desired endpoint competencies. Importantly they will remind designers, teachers, and learners of the learning and outcome breadth to be accomplished in any given
sequence, course or program. Subsuming or ignoring the humanistic dimensions of competence is much harder if an effective learning taxonomy is agreed upon. However, not all taxonomies are equally well suited to CBE, notably those including an affective domain.

Taxonomies of learning were initially created by a group of measurement specialists, led by Bloom (Bloom, Englehardt, Furst, Hill, & Krathwohl, 1956) with the objective of creating a framework to categorize test bank items. The original taxonomy was created solely for assessment of the cognitive domain but subsequently expanded to the psychomotor and affective domains (Bloom, 1968). Within each domain, competencies are organized hierarchically from simple and concrete to complex and abstract.

Cognitive domain assessments originally tested knowledge at six nested levels of increasing complexity: knowledge, comprehension, application, analysis, synthesis, and evaluation (Bloom et al., 1956) subsequently revised to remember, understand, apply, analyse, evaluate, and create (Krathwohl, 2002). Cognitive domains are well suited to CBE structures as they atomize knowledge allowing discrete assessments. Standard parameters apply for test validity and reliability.

Equally adaptable to CBE are the psychomotor taxonomies. Bloom organizes psychomotor skills at seven nested difficulty levels: perception, readiness, guided response, habitual response, complex response, adaptation, and origination (Simpson, 1971). The validity of competence decisions based on skill testing can be improved by incorporating a variety of testing situations, contexts, and ranges of complexity (Shavelson, 2013). Building an assessment plan using a variety of approaches over time can confirm that the student is able to perform target skills competently.

Affective competency is difficult to operationalize with CBE. Bloom’s Affective Taxonomy lists attitudes in five nested dimensions: receive, respond, value, organize values, and characterize by value (Krathwohl, Bloom, & Masia, 1964). Attitudes are closer to internal personal dimensions including concepts of identity, personality, values, motivation, responsibility, and professionalism. Evidence of the existence or quality of these concepts is not directly visible and can only be inferred. Although assumed in CBE programs, making a connection between observed behaviour and underlying attitudes is even more fraught with potential observer bias than observing applied knowledge or skill. These biases can be reduced by triangulating observations across many observers, many occasions, and many sites.

Attitudinal assessment sequences should be developed to both observe and appropriately modify attitudes. An underdeveloped method to document growth in appropriate attitudes is through measures based in self-reflection. Regular opportunities for learner self-examination, reflection, reaction documentation, and self-report should be part of assessment designs for CBE. These efforts will be more effective for learning if feedback on the self-reflection can be supplied from within the relevant learning or work context during the timeframe of attachment there. Building an assessment plan using self-reflection must be carefully planned to keep the learner engaged in this challenging and often unfamiliar work.

There are learning taxonomies other than Bloom’s. For example, the Structure of Observed Learning Outcomes (Biggs & Collis, 1982) assesses the quality of learning as unstructured, multi-structured, relational or extended abstract and Fink’s (2003) taxonomy for significant learning blends cognitive and affective domains in a non-hierarchical framework. Bloom’s Taxonomy, however, has been developed to explicitly include all three competence domains: cognitive, psychomotor, and affective. Employing this full range of learning domains is important if CBE implementation aspires to accomplish the complex of outcome competencies needed to function in civil society, to participate in social justice and sustainability, to bring critical thinking to everyday challenges, and yes, to perform well in workplaces.
Change Management Required for Implementing Successful CBE

Successful CBE implementation requires a thorough reconsideration of many central aspects of the traditional education process. Educational design, teaching, learning, and assessment components have already been addressed. The full range of educational support systems must also be realigned. Commitment to CBE means changing the traditional organization of credits, courses, and semesters, which presents the opportunity to redesign the educational structure to better suit learners rather than institutions. At a minimum, ongoing negotiations, data sharing, and organizational adjustments must take place to optimize operations and results across the full range of players in a CBE system, including the faculty (both academic and site), the learners, administrators, other personnel and participants in the training placement sites and employers, accreditors, and regulators. Sustained effort must be invested to initiate, nurture, and deepen these relationships. It is from these partnerships that useful innovation will be suggested, supported, and implemented.

CBE counters the concept that school reputation ensures quality. It requires that faculty make their teaching and assessment explicit to the learner, colleagues, administrators, and others. Each part of the course plan is then subject to scrutiny and external alignment to the program curriculum, which, under CBE structures, is aligned to outcomes valued by next placement managers and eventually employers. These expectations will be new to many participants; successful introduction will require careful management.

Another area requiring proactive change management is the possibility, as CBE is implemented, of re-engineering the current time-based educational paradigms in favour of more flexibility for learners and employers. CBE provides direct measures of attained competence regardless of time spent, location, or method used to acquire the competence thus uncoupling traditional expectations of time in place (lecture, service, course) from mastery or competence. If everyone is simultaneously learning and applying their learning in workplaces, descriptors of full-time versus part-time learners will no longer be meaningful nor useful to learners, teachers, schools or work sites. Flexibility in educational structures requires new concepts and systems for recruitment, admissions, financial aid, learner tracking, monitoring faculty-student interactions, transcripts, and awards processes.

Personalized learning is a step further in implementing CBE, and another change management challenge. Truly individualized learning plans must be routinely designed, adjusted, and delivered to fully realize the potential for learning efficiency within CBE structures. Prior learning assessment recognizes the knowledge and skills already possessed by a learner and structures subsequent learning to minimize the amount of time spent on areas previously mastered. Adaptive, individualized, and flexible learning programs support learners at any stage of development and are essential to attracting mature, mobile learners, particularly those already in or acutely sought by the workplace.

Information access to support learning has and will continue to change massively, presenting more change management issues within CBE. Content is now available on demand anywhere in the world through easily updated open access textbooks, videos, and other electronic educational resources. Real-time, multi-media, multi-perspective data recordings support new ways of learning, monitoring, and demonstrating competence. CBE designers and participants must regularly review and adapt the range of new technologies developed both within schools and by commercial vendors to facilitate teaching, learning, and assessment.

Another area for continued change management in CBE is the growing range of experiential learning, work-integrated learning, co-op education, credits for prior learning, and other real-world experiences. This field orientation is rapidly expanding in higher education due to increasing demands for work-ready graduates with demonstrable endpoint competencies. All these practical experiences must be assessed fairly, and effectively integrated into the academic curriculum. CBE can
provide a scaffold to articulate these alignments, but they must be continually negotiated and adjusted across program specifications, learning sites, teachers, learners, and assessors to follow the evolving competencies needed in the workplace. Monitoring workplace change places CBE participants in a unique position to scrutinize the evolution of competence requirements and thus maintain the relevance of their program offerings. Changing work environments highlight needs for updating knowledge, skills, and attitudes among people already employed in those settings. These data are critical to the maintenance of competence and career advancement programs presenting a dynamic linkage and relevance opportunity for higher education and professional preparation institutions.

One of the biggest challenges in CBE implementation is to manage expectations among senior leaders, both educational and regulatory. Adopting a CBE approach does not happen by fiat. Actualizing the rhetoric of CBE requires a lot of intricate negotiation, management work, and planning, much of which is in new territory for most educational personnel, programs, and institutions. CBE implementation will require on-going innovation, trials, modification, and fine tuning. Because these are human systems, there is no guarantee that locally successful strategies can be exported. There continue to be significant challenges in developing site-specific CBE support systems, in implementing agreements and expectations for service work, in testing out processes, and in the array of other management problems that result from movement towards efficient competency-based learning.

How imminent are these expectations to actively manage change towards successful CBE implementation? As already outlined, medicine has mandated CBE implementation at undergraduate and graduate levels on a global basis. In the US, the Department of Education and related accreditors are slowly aligning their processes and expectations regarding CBE. Fein (2015) reported that 600 US colleges either were actively creating (or in design phases for) new competency-based education programs or already had a CBE program in place. Those numbers are a significant increase over the 52 institutions reporting CBE programs in 2014 (Fein, 2015). As the US Department of Education approves more CBE programs for federal financial aid, these numbers will continue to grow, as will the range of programs offered and the related competitive pressures on institutions, programs, and faculties to participate.

Conclusion

Regardless of conceptual and implementation limitations, CBE is directed towards the widely-shared goal of improving workplace performance by supplying graduates with relevant outcome competencies. Achieving this goal will require the pedagogical enterprise to evolve a knowledge and skill set not commonly part of the faculty or administrative preparation in higher education. CBE implementation will be significantly disruptive to most current educational programs, faculty, site personnel, learners, assessors, and administrators. Recognizing and addressing aversion to this radical departure from current operating procedures must first be resolved before a competency-based paradigm can be authentically realized. This evolution requires attention to improved techniques of self-awareness, personal goal setting, and self-appraisal for teachers, learners, and administrators in relation to demands of the locally deployed CBE structure. Participating in, and reflecting on, results from action research, teaching, and learning portfolios will be helpful as will training and support for time management, priority setting and negotiating performance criteria. Properly orchestrated, these techniques can help participants realize their shared goal to make CBE functional, efficient, and effective for their individual and collective purposes. This essay offers some guideposts for negotiating, supporting, and sustaining CBE so that it works optimally for all participants in the educational enterprise.
References

Accreditation Council for Graduate Medical Education. (2016). *ACGME Common Program Requirements* (Effective July 1, 2016). VIEW ITEM


Council for Aid to Education. (n.d.). CLA+ references. VIEW ITEM


Hodges, B. D. (2010). A Tea-Steeping or i-Doc Model for medical education? *Academic Medicine, 85*(9), S34–S44. VIEW ITEM


US Department of Education (n.d.). Competency-based learning or personalized learning. VIEW ITEM

**Biographies**

Lynn Curry earned a PhD in educational psychology from Stanford University followed by a career in higher and professional education concluding with a Rosenstadt Professorship at the Faculty of Medicine, University of Toronto. Lynn founded a consulting company, CurryCorp Inc. in 1990. The firm works to enhance education, social and health services through research, evaluation, social engineering, and facilitation of organizational change. Lynn’s publications cover a range of topics including change management, continuing professional education, health care, higher education, learning style, measurement, public education and one award winning recipe in Good Housekeeping magazine.

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Curriculum Mapping Across the Disciplines: Differences, Approaches, and Strategies

Fiona Rawle, Tracey Bowen, Barbara Murck, and Rosa Junghwa Hong
University of Toronto Mississauga

Curriculum mapping can be used to document, align, visualize, and assess curricular data, such as learning outcomes, assessment materials, instructional techniques, and student pre- and post-testing scores. A cross-disciplinary Curriculum Mapping Initiative currently underway at the University of Toronto Mississauga aims to: (1) develop guidelines for the curriculum mapping process; (2) develop cross-disciplinary curriculum mapping templates and samples to guide departments through the curriculum mapping process; (3) communicate narratives for how to use curriculum mapping to inform curricular change; (4) develop visualization strategies for curricular data; (5) initiate a plan for dissemination and sustainability; and (6) initiate a plan for informing students about how to use curricular maps in their academic experiences. Through this curriculum mapping initiative, we have discovered that discipline-specific differences exist in approaches to curriculum mapping. The purpose of this paper is to communicate these cross-disciplinary similarities and differences in purpose, process, and utilization of curriculum mapping strategies. We found that different departments had some common ground in the curriculum mapping process, but also key differences. The differences could be categorized according to: purpose for initiating the curriculum mapping process; approach to curriculum mapping; dissemination of completed maps; dealing with pedagogical jargon; and faculty buy-in.

Curriculum mapping is an active process for aligning student learning outcomes and curriculum activities (Kopera-Frye, Mahaffy, & Svare, 2008). Much has been written in the literature regarding the curriculum mapping process, especially in the medical and engineering disciplines (French, Shah, Rankin, Bagati, & Breslow, 2012; Komenda et al., 2015). Curriculum mapping is often undertaken to assist with accreditation procedures (DeLuca & Bellara, 2013; Kelley, McAuley, Wallace, & Frank, 2008; Perlin, 2011), or for formalized curricular review and improvement (Veltri, Webb, Matveev, & Zapatero, 2011). Curriculum mapping can be used to map learning outcomes throughout a single course or across programs, to map course progression, to track both the teaching and assessment of student learning outcomes, or as part of the curricular alignment process (Lam & Tsui, 2013). Curriculum mapping can also be used to identify gaps (Lam & Tsui, 2013), and can lead to increased transparency (Harden, 2001).
The Curriculum Mapping Initiative at the University of Toronto Mississauga

A cross-disciplinary curriculum mapping initiative at the University of Toronto Mississauga is focused on: (1) developing guidelines for the curriculum mapping process; (2) developing cross-disciplinary curriculum mapping templates and samples that can guide other departments through the curriculum mapping process; (3) communicating strategies for how to use curriculum mapping to inform curricular change; (4) developing curricular visualizations; (5) initiating a plan for dissemination and sustainability, with a focus on continuing the curriculum mapping process at the University of Toronto Mississauga, and (6) initiating a plan for informing students about curricular maps, and how they can use the maps throughout their academic experiences. Participating departments (initially Biology, Geography, Sociology, Historical Studies, Language Studies, and Institute of Communication, Culture, Information and Technology) were specifically chosen to represent a cross-disciplinary diversity, as well as a wide range in terms of how much progress had already been made in the curriculum mapping process at the developmental level.

Curriculum Mapping in the Literature

In order to see what different disciplines had previously reported regarding curriculum mapping, we did a thorough literature review. Prior to initiating our literature search, the search strategy and search string were approved by an independent liaison librarian. The search string “curriculum map*” was searched in September 2016 in the following databases: ProQuest Education Journals (limit to scholarly journals), Scopus, ERIC, CBCA Education, PsycINFO, and Web of Science. Removal of duplicates resulted in 597 unique results.

Figure 1

Percentage of Scholarly Publications devoted to curriculum mapping in higher education, sorted by discipline.1

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1 The search string “curriculum map*” was searched in ProQuest Education Journals (limit to scholarly journals), Scopus, ERIC, CBCA Education, PsycINFO, and Web of Science. Removal of duplicates resulted in 597 unique results, and subsequent removal of articles not in the higher education context resulted in 185 discipline-specific references.
Table 1

Curriculum mapping in higher education: publications by discipline in the literature (n = 185).

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Total No.</th>
<th>%</th>
<th>Sample Reference(s)</th>
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<tr>
<td>Medicine</td>
<td>47</td>
<td>25.3</td>
<td>(Balzer et al., 2016; Cottrell, Linger, &amp; Shumway, 2004; Ellaway, Albright, Smothers, Cameron, &amp; Willett, 2014; Harden, 2001; May, 2012; Wardle et al., 2011; Willett, 2008; Wong &amp; Roberts, 2007)</td>
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<tr>
<td>Engineering</td>
<td>24</td>
<td>12.9</td>
<td>(Ahmad, 2015; Cloutier, Hugo, &amp; Sellens, 2012; French et al., 2012; Joenathan, Bunch, &amp; Granieri, 2005; Liu, Chen, Yueh, &amp; Sheen, 2014; Ranade et al., 2011; Saad, 2014)</td>
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<tr>
<td>Pharmacy</td>
<td>14</td>
<td>7.5</td>
<td>(Britton, Letassy, Medina, &amp; Er, 2008; Keijsers et al., 2015; Kelley et al., 2008; Malone, Short, Naidu, White, &amp; Kirkpatrick, 2015; Plaza, Draugalis, Slack, Skrepnek, &amp; Sauer, 2007; Zelenitsky et al., 2014)</td>
</tr>
<tr>
<td>Nursing</td>
<td>11</td>
<td>5.9</td>
<td>(Landry et al., 2011; Miller &amp; Neyer, 2016; Narayanasamy, Jurgens, Narayanasamy, &amp; Guo, 2013)</td>
</tr>
<tr>
<td>Library &amp; Information Literacy</td>
<td>11</td>
<td>5.9</td>
<td>(Archambault &amp; Masunaga, 2015; Buchanan, Webb, Houk, &amp; Tingelstad, 2015; Charles, 2015; Fournier, 2014)</td>
</tr>
<tr>
<td>Information Studies &amp; Information Science</td>
<td>11</td>
<td>5.9</td>
<td>(Karsten &amp; Roth, 2015; McGrath, 2010; Pratt, Keys, &amp; Wirkus, 2014; Velti et al., 2011)</td>
</tr>
<tr>
<td>Business &amp; Accounting</td>
<td>10</td>
<td>5.4</td>
<td>(Wang &amp; Ashcraft, 2012)</td>
</tr>
<tr>
<td>Sciences &amp; STEM</td>
<td>9</td>
<td>4.8</td>
<td>(Johnson, Peters-Burton, &amp; Moore, 2015; Regier, 2015; Reid &amp; Wilkes, 2016)</td>
</tr>
<tr>
<td>Teacher Education</td>
<td>7</td>
<td>3.8</td>
<td>(Baecher, 2012; Rowley &amp; Dunbar-Hall, 2012; Lam &amp; Tsui, 2013)</td>
</tr>
<tr>
<td>Law</td>
<td>7</td>
<td>3.8</td>
<td>(Curtis &amp; Moss, 2010)</td>
</tr>
<tr>
<td>Computer Science</td>
<td>5</td>
<td>2.7</td>
<td>(Gluga, 2010; Harris &amp; Patten, 2015)</td>
</tr>
<tr>
<td>Geography, Environment, Sustainability</td>
<td>5</td>
<td>2.7</td>
<td>(Spronken-Smith et al., 2016)</td>
</tr>
<tr>
<td>Occupational Therapy &amp; Occupational Health</td>
<td>4</td>
<td>2.2</td>
<td>(MacNeil &amp; Hand, 2014; Hege, Nowak, Kolb, Fischer, &amp; Radon, 2010; Merritt, Blake, McIntyre, &amp; Packer, 2012)</td>
</tr>
<tr>
<td>Public Health</td>
<td>4</td>
<td>2.2</td>
<td>(Britten, Wallar, McEwen, &amp; Papadopoulos, 2014; Figueroa, Birch, King, &amp; Cottrell, 2015)</td>
</tr>
<tr>
<td>Social Work</td>
<td>3</td>
<td>1.6</td>
<td>(Mackie &amp; Anderson, 2011; Watts &amp; Hodgson, 2015; Williams &amp; Bolland, 2011)</td>
</tr>
<tr>
<td>Agriculture</td>
<td>3</td>
<td>1.6</td>
<td>(Acuña, Kelder, Lane, Hannan, &amp; Jones, 2013)</td>
</tr>
<tr>
<td>Veterinary</td>
<td>2</td>
<td>1.1</td>
<td>(Bell, Ellaway, &amp; Rhind, 2009)</td>
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<tr>
<td>Psychology</td>
<td>2</td>
<td>1.1</td>
<td>(Stanny, 2015)</td>
</tr>
<tr>
<td>Art &amp; Graphic Design</td>
<td>2</td>
<td>1.1</td>
<td>(Lamb, 2016)</td>
</tr>
<tr>
<td>Health Care Management</td>
<td>2</td>
<td>1.1</td>
<td>(Valerius &amp; Hersh, 2008)</td>
</tr>
<tr>
<td>Chiropractic</td>
<td>1</td>
<td>0.5</td>
<td>(Gorrell, Beirman, &amp; Vemulpad, 2015)</td>
</tr>
<tr>
<td>Dentistry</td>
<td>1</td>
<td>0.5</td>
<td>(Mazurat &amp; Schönwetter, 2008)</td>
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</table>
We manually reviewed all articles and set a restriction to articles dealing with the higher education context, resulting in 185 discipline-specific references for curriculum mapping in higher education. We then categorized these references by discipline, as seen in Figure 1 and Table 1. Medicine and engineering were the dominant disciplines with 25.3% and 12.9% of references respectively. The top six disciplines, based on published references from our literature search, were: Medicine, Engineering, Pharmacy, Nursing, Library & Information Literacy, and Information Studies & Information Science.

The search results showed more publications dealing with professional schools and the sciences, and fewer publications dealing with humanities. Several subjects and disciplines were not found in the literature search, such as language studies and history.

We recognize that this literature search represents only a snapshot, and subsequent web searches showed active curriculum maps in subjects and disciplines not listed in Table 1. We also recognize that much curriculum mapping work is not published in the scholarly literature.

Similarities and Differences in Curriculum Mapping: Approaches between Disciplines

The departments from the University of Toronto Mississauga that are involved in the curriculum mapping initiative represent disciplines from Science, Social Science, and Humanities, as well as interdisciplinary programs. The departments that provided input to this article include Biology, Geography, Language Studies, and the Institute of Communication, Culture, Information and Technology (ICCIT). Throughout this curriculum mapping initiative, we noticed some discipline-specific similarities and differences in the approaches to curriculum mapping. We noted that the similarities and differences could be classified according to several different themes: (1) the purpose and motivation for engaging in curriculum mapping; (2) the process of curriculum mapping; (3) implementation and use of the curriculum maps; (4) terminology & jargon; (5) faculty buy-in and support; and (6) curriculum map visualization and dissemination. We have summarized our key findings in Table 2.

Purpose and Motivation for Engaging in Curriculum Mapping

As the University of Toronto Mississauga recently adopted the Undergraduate Degree Level Expectations (UDLEs) as established by the Ontario Council of Academic Vice-Presidents, departments have been encouraged to describe how they meet these learning expectations, encouraging some departments to initiate curriculum mapping projects. All departments described here have shown an interest in clearly conveying this curricular information and an interest in identifying gaps. It also became clear that different disciplines sometimes had different motivations for participating in the curriculum mapping process. For example, the Department of Geography’s initial motivation was to respond to the requirements of a national-level program accreditation process. Subsequently, motivation included a need to analyze course progression to identify competency gaps, and also to link outcomes with assessment.

For the Department of Biology, for which there is no national-level accreditation, the motivation for initiating the curriculum mapping process was driven by the desire of the faculty to track the development of student science process skills and other transferable skills. Biology also wanted to initiate discussion of threshold concepts: core, foundational, and gateway concepts that need to be understood to allow and support further learning in the discipline, akin to a portal (Meyer & Land, 2005), and can open up novel ways of approaching a subject or thinking about a problem. Biology was also particularly interested in aligning learning outcomes with assessment to gain an understanding of the development of transferable skills and collecting data that would enable evidence-based decision making during curriculum committee meetings.
Table 2

*Highlights of common ground as well as differences found between departments that participated in the curriculum mapping process.*

<table>
<thead>
<tr>
<th>Category</th>
<th>Common Ground</th>
<th>Differences</th>
</tr>
</thead>
</table>
| Purpose and motivation for engaging in curriculum mapping | • to analyze course progression  
• to identify competency gaps  
• to link outcomes with assessment  
• to track the development of transferable skills  
• to examine how courses fit together to create a coherent curriculum  
• to align learning outcome progression with Undergraduate Degree Learning Expectations | Geography/Environment: to respond to national accreditation process  
Biology: facilitate increased use of backwards design; foster a reflective learning community  
Language Studies: align learning outcomes with the Common European Framework of Reference for Languages |
| Curriculum Mapping Process                    | • use faculty interviews in addition to course syllabi  
• track if learning outcomes are taught vs assessed, and at which level (introduced, reinforced, advanced) | Biology: start with a faculty survey to create a “data wishlist”; established a Biology Skill Set and a set of knowledge frameworks that would be mapped in addition to the departmental learning outcomes  
Language Studies: looked at assessments in addition to course syllabi |
| Implementation / Use of the Curriculum Map   | • help faculty see how their courses fit within the large program scheme  
• use the map for future course planning | Biology: use the map to guide evidence-based decision making during curriculum committee meetings; guide the use of backwards design in course design and renewal  
ICCIT: use the map to guide faculty hire decisions  
Language Studies: use the map to re-write all courses’ syllabi to align learning outcomes |
| Terminology / Jargon                          | • pedagogical jargon tends to be a barrier across disciplines | Biology: developed a pedagogical dictionary that contained biology-specific examples. |
| Faculty Buy-In and Support                   | • increase faculty buy-in by showcasing curriculum maps used by other departments | Biology: surveyed all faculty at the initiation of the curriculum mapping process  
ICCIT: high number of sessionals made faculty buy-in challenging |
| Curriculum Map Visualization and Dissemination| • most departments use excel to organize their curricular data |  |
Additionally, several faculty members wanted to use the curriculum mapping process to foster a reflective learning community and initiate a dialogue between faculty of different courses, and faculty with a research vs teaching focus. This has been previously reported in the literature in teacher education (Bartoo, 2005).

Much like Biology, ICCIT needed to examine how the variety of courses fit together to create a coherent curriculum. The challenge with an interdisciplinary unit is to make the overall curriculum seem logical and coherent, thus it was important to see how the courses are connected. This had implications for the range of assessment tools and strategies used across four different programs and the integration of faculty research. The curriculum mapping exercise partly informed the direction for posting for new hires and helped to guide students trying to navigate their way through the multitude of course options and create a cohesive course of study. As with Biology, ICCIT wanted to focus on transferable skills development, link the curriculum map learning outcomes with assessment, align learning outcomes throughout the program, and identify gaps, inconsistencies, and areas for improvement.

In Language Studies, a core set of learning outcomes for both French for francophone courses and French as a second language courses were developed in order to ensure coherent progression between levels and more cohesively scaffolded assessment methods. Based on the Common European Framework of Reference for Languages (Council of Europe, 2002), Canadian Language Benchmarks (The Centre for Canadian Language Benchmarks, 2006), as well as the UDLEs (University of Toronto Mississauga, 2016), a steering committee identified and described more program-specific areas of competencies and “can do” statements for each level of the series - e.g., at the end of this course, you can “interact with other French speakers on topics related to your daily routines”. This work aimed to harmonize FSL series learning outcomes, level of language skills and competencies, and assessment methods. While many reasons are similar to those mentioned in Biology and ICCIT, Language Studies had several additional reasons for engaging in the curriculum mapping process: (1) We wanted to make sure that our FSL series courses achieve similar level of competencies that other Canadian and International frameworks propose; (2) We wanted to guarantee that our students be able to compete in a real world; (3) We wanted to make sure repetitions, inherent to and necessary for language acquisition, are integrated in a cohesively progressive manner so that students do not just repeat the same materials from one level to the next one; (4) We wanted to evaluate logical progression in assessments that correspond accurately with materials taught in classes; (5) We wanted to collectively adopt more communicative and action-based pedagogical approaches; (6) We wanted to propose common grade distribution in all courses; and (7) We wanted to identify areas of improvement.

Curriculum Mapping Process

To initiate the curriculum mapping process, Biology surveyed faculty about what questions they had about the biology curriculum and how they would use the final curriculum map. As a faculty, Biology developed the “Biology Skill Set” that all students should be capable of upon graduation. This skill set as well as twelve departmental learning outcomes were mapped onto the curriculum of all courses. After discussing the results with faculty, questions were asked about knowledge content. Biology then developed six knowledge frameworks that were then mapped across all courses (Evolution, Genetics, Molecular Biology and Biotechnology, Animal Form and Function, Plant Form and Function, and Ecology). This resulted in three different curriculum maps that could be superimposed: a knowledge framework map, a skill set map, and a learning outcome map. Data for the maps was acquired through a review of course syllabi and interviews with course instructors. For each map element, instructors had to identify if it was taught and/or assessed, and at which level (introduced/reinforced/advanced) (as was done by Arafeh, 2016).

The ICCIT curriculum mapping project prompted a whole collection of activities. The first was to establish clear program outcomes and analyze
how those outcomes distinguished one program from another; for example, how the learning outcomes for a communication, culture, and media course define a separate set of skills from a professional writing and communication course. This exercise highlighted the skills that were essential for all programs and then points of distinction. The exercise also highlighted the various career paths that students could take through the different streams of courses - an important factor for this particular interdisciplinary institute. The next step was to develop templates that corresponded to the learning outcomes and gather information. An additional goal of the mapping process was to create a coloured visualization that would highlight overlaps, gaps, and inconsistencies.

For Language Studies, it was decided that a curriculum committee would be formed to work on curriculum harmonization during summer months. The committee researched frameworks that could be used as theoretical underpinnings (e.g., CEFRL, Canadian Language Benchmarks, UDLEs). Collectively, the committee discussed several language teaching approaches and determined the most suitable ones for the particular needs of University of Toronto Mississauga students. Afterward, it collected and studied course syllabi and sample assessments at all year levels. Learning outcomes were categorized by competencies and reformulated in greater detail, and each course’s learning outcomes were linked to implement a logical progression from level to level. The committee also decided on a grade distribution based on four main criteria: oral comprehension, oral production, written comprehension, and written production.

Implementation/Use of the Curriculum map

For Biology, the map is currently used to guide evidence-based decision making during curriculum committee meetings. We also use the map to guide the use of backwards design in course design and renewal. We are exploring ways to communicate this data-rich map to students and to use in advising sessions. We want to help students take responsibility for their own learning (Harden, 2001; Robley, Whittle, & Murdoch-Eaton, 2005).

The first phase of the ICCIT curriculum map helped faculty to better see how their courses fit within the larger program scheme, and as a group, the coloured visualization of the map was useful for future planning as the Institute was relatively new and had undergone early growing pains and transformations. The mapping exercise demonstrated the need for continuous review of how the four programs were evolving and aligning as new hires and new courses were added. The long-term goal was to be able to use the mapping data with students so they could gain a better sense of how the courses fit together to scaffold their learning and achieve the expected outcomes. The intention was for students to gain more autonomy over their own course choices, affecting how they experienced learning within their program.

For Language Studies, findings and recommendations of the curriculum committee were communicated at the program level. Learning outcome tables for the whole program were used to re-write all course syllabi, which clearly underlined learning outcomes and course expectations across all courses. New textbooks in a series were selected to provide guidelines to instructors, and an organization website page was created as a depository of tests and exams which were re-evaluated to match course content and assessment.

Terminology/Jargon

Pedagogical jargon appeared to be a barrier to multiple departments at various stages of the curriculum mapping process. In order to deal with this jargon roadblock, Biology developed a pedagogical dictionary that contained biology examples. It was also clear that across disciplines, differences exist in the definition of assessment and assessment levels/forms. All departments found that naming the different “levels” in terms of introductory, developing/reinforcing, and advanced/competency was very important, but also
challenging. Sometimes this appeared to be contextual in terms of program objectives, faculty expectations, and the assessment tools used.

Faculty Buy-In and Support

Diversity in disciplines is also represented in challenges, namely gaining faculty support and actual implementation at the course level. Geography was able to earn faculty buy-in by showcasing curriculum maps that were being used by other departments. Biology tried to increase faculty buy-in by surveying all faculty at the beginning and asking them what curricular questions they needed to be answered and then making sure to follow up with those answers after the mapping process. For Language Studies, due to existing frameworks and their adoption in many language programs and thanks to experts in education and second language acquisition in the department, a consensus on benefits and needs of curriculum mapping arrived without too much resistance. Complications would instead sometimes arise in the faculty’s willingness to implement new learning outcomes and modify existing course curriculum. For ICCIT, faculty buy-in was an area that was most challenging due to the context (ICCIT includes joint programs and had a high number of sessionals during the initial mapping stage) and time. Collecting data from course syllabi was not enough. The second iteration of the ICCIT curriculum map will involve discussions with each instructor to gain more detailed information, and help them understand how they can use the collected data. Note that one other department had to drop out because of the lack of support from other faculty members.

Curriculum Map Visualization and Dissemination.

Biology explored numerous curriculum map visualization tools prior to collecting and disseminating any curricular data. Due to the complexity of the data set, Biology decided to use excel for all curricular data entry. Visualization of the curricular data consists of screen shots of colour coded Excel worksheets. We are currently developing approaches by which faculty and students will be able to interact directly with the curricular data and run their own queries of the dataset. ICCIT created a large colour coded map using an Excel file that was populated by information collected through a template distributed by email. The online collection of the data was efficient but lacked the kind of rich data that could be supplied through short face-to-face meetings. Language Studies entered their curricular data in table form similar to the CFERL’s self-assessment grid for each level (Council of Europe, 2004), and detailed learning outcomes in an Excel worksheet. Having identified the need to visualize language learning progression in both spiral and scaffolded forms, the Department of Language Studies plans to extend its curriculum mapping process.

Benefits of Curriculum Mapping

All participating departments found that participating in the curriculum mapping process fostered a collaborative approach to discussing teaching and learning throughout the department, and it brought all faculty from both teaching stream and the research stream into the teaching and learning discussion. All departments identified that it helps with selection and planning of new courses, as well as the use of backwards design in course design and renewal. Similar to Biology and ICCIT, Language Studies found that curriculum mapping leads to establishing more coherent progression by bridging gaps between levels and courses. It also allows for repetitions of course content to be done in a more controlled fashion, and that assessment of students’ competencies are aligned to each difficulty level. Also, graduating students can more accurately explain their competencies in professional contexts such as on a resume or during a job interview.
Cross-Disciplinary Collaboration for Curriculum Mapping

We want to conclude by emphasizing that many of the attributes we want our students to master are common across all of our disciplines, and are not discipline specific. For example, students in ICCIT will not need to learn to do t-tests like students in Biology, but we want all students to have a basic level of information literacy and graphical literacy, and a basic understanding of the processes involved in research and inquiry. This brings us back to the UDLEs and the need for cross-disciplinary collaboration to ensure that these learning expectations are met across programs and across the university. The current curriculum mapping initiative is still in its early stages, but we have identified that developing a learning community between interested individuals from different departments facilitates curriculum mapping for all involved and helps to develop a large pool of resources. Also, the importance of starting with a set of learning outcomes and promoting backwards design has stood out as applying across all disciplines. For other institutions wanting to engage in cross-disciplinary curriculum mapping projects, we recommend that a common language be established, and a common set of well-defined metrics be identified (such as taught/assessed; introductory/reinforced/advanced). Collaboration between departments also helps to develop more consistency in the process so that the data may be used more broadly by the institution in terms of meeting UDLEs and addressing graduate attributes required for the new work world both nationally and globally.

References


program. BMC Medical Education, 14(1). VIEW ITEM


The Centre for Canadian Language Benchmarks. (2006). Niveaux de compétences linguistiques canadiens: français langue seconde pour adultes. VIEW ITEM


Reid, J., & Wilkes, J. (2016). Developing and applying quantitative skills maps for STEM curricula, with a focus on different modes of learning. *International Journal of Mathematical Education in Science & Technology, 47*(6), 837–852. VIEW ITEM


University of Toronto Mississauga. (2016). *Guidelines for University of Toronto Mississauga Undergraduate Degree Level Expectations* (2016). VIEW ITEM


Wong, R. Y., & Roberts, J. M. (2007). Real time curriculum map for internal medicine
residency. *BMC Medical Education, 7*(1), 42. VIEW ITEM


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Engaging in Enhancement: Implications of Participatory Approaches in Higher Education Quality Assurance

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Stemming from increased levels of participation and diversity of the student base and from growing scrutiny on the quality of university degrees, governments have begun establishing mechanisms to monitor and support quality in higher education. Faced with administrative quality assurance structures, academics often complain that little is discussed in terms of collaborative effort toward program opportunities, enhancement, and growth and that focus is solely on accountability. This paper examines the viability of participatory approaches, pulled from the field of evaluation, as a way of leading to a more meaningful enhancement-oriented quality assurance process and creating common ground across the differing interests of external and internal stakeholders to quality in higher education.

Higher education across the globe is experiencing a significant change in its student base. Increasing enrolments, greater diversity of the student body, and stronger links between school and workplace are being requested by those enrolling (Biggs & Tang, 2011). As a result, key stakeholders (such as students, parents, society, and governments) in higher education are taking a greater interest in the student experience and the quality of higher education (Dunn, McCarthy, Baker, & Halonen, 2010). With the increased profile of quality assurance, these stakeholders are calling upon specific government agencies and institutions of higher education to manage assurance systems that ensure standards are maintained and are accountable to professional accreditation bodies and public expectations (Kis, 2005; Nicholson, 2011). For many academic programs under review by quality assurance systems, processes related to this type of evaluation are perceived as an administrative hurdle imposed by distant senior administrators for the purposes of accountability (Kis, 2005; Nicholson, 2011). Academics complain that little is discussed in terms of collaborative effort toward program opportunities, enhancement, and growth (Harvey, 1998, 2002; Nicholson, 2011).

Practitioners posit the viability of a system which can both be accountable to external stakeholders while engaging those internal to institutions (e.g., faculty, departmental chairs, and staff) to become invested in the sustained enhancement of their programs (Kis, 2005). Scholarship in the fields of quality assurance and evaluation suggest that a greater emphasis on collective participation in the design, administration, interpretation, and implementation phases of the assurance process could better engage internal stakeholders. Consequently, this could lead to a more meaningful enhancement-oriented process and create common ground across the differing interests of external and internal stakeholders (Cousins & Earl, 1995; Houston & Paewai, 2013; Kleijnen, Dolmans, Willems & Van Hout, 2013; Zukoski & Luluquisen, 2002).

To examine opportunities for an enhancement oriented participatory approach to
quality assurance, this paper has been organised into two major sections. The first defines quality, describes the development of quality assurance frameworks, and discusses the nature of tensions between accountability and enhancement approaches to assurance. The second section presents the principles of participatory evaluation, highlights implications of use for quality assurance in higher education, and examines benefits and challenges of adopting a participatory approach.

Quality Assurance in Higher Education

Defining Quality in Higher Education

As it does in a general context, the meaning of the term quality varies considerably in the higher education context. Based on the influential work of Harvey and Green (1993) who examined the multiple meanings of quality, many scholars have emphasised five principal definitions of quality that are represented in higher education (Cheng 2014; Law, 2010; Nicholson, 2011). 1) Exceptional - Linked to the idea of excellence, quality is operationalised as exceptionally high standards of academic achievement and is realized if the standards are surpassed. 2) Perfection - Focuses on set specifications and standards that it aims to meet. Quality in this sense is summed up by the interrelated ideas of zero defects and getting things right the first time. 3) Quality as fitness for purpose – a functional definition which suggests that quality only carries meaning in relation to the purpose of its product or service. A purpose which is generally characterised by an institutional mission or by customer (student) requirements. 4) Quality as value for money – born out of a drive for efficiency and effectiveness, providers are expected to be accountable to funders (principally government) and customers (students). 5) Quality as transformation – grounded in the notion of “qualitative change” (Harvey & Green, 1993, p. 24). This definition removes emphasis on product and service to consumer, instead seeing quality in education as an ongoing process of transformation of a learner which leads to both enhancement and empowerment (Harvey & Green, 1993).

Amid the various definitions, quality is seen as relative to the user of the term and of the situation in which it is being used (Burrows, Harvey & Green, 1992; Nicholson, 2011). For instance, for students and instructors, a view of quality may focus on the educational process, while for employers and government agencies it may focus more specifically on outputs. Perhaps, as mentioned by Harvey and Green (1993), rather than trying to define quality in a singular capacity the focus should be on defining the criteria used by the variety of stakeholders when judging quality and taking these into account in evaluative processes.

Approaches to Quality Assurance

Resulting from increases in levels of participation and diversity of the student base, coupled with pressures on human and physical resources, notions of quality began increasing in profile in the higher education agenda in the 1980s and 1990s (Biggs & Tang, 2011; Harvey & Green, 1993). Until that time, quality was largely determined by the number of faculty members with terminal degrees, the number of volumes in the library, reputation, size of endowment, etc., which were utilized in ranking systems (such as the Maclean’s University Ranking) to determine institutional excellence (Koslowski, 2006). The increased profile of quality along with stronger links between quality and cost-effectiveness being made by the government, gave new urgency to the analysis of quality in higher education. This urgency led to the expedited establishment of quality assurance agencies which borrowed from existing approaches used in the corporate management arena, such as Total Quality Management and Continuous Quality Improvement (Koslowski, 2006). Embedded into the higher education context, quality assurance became performance oriented. As a result, and fueled by initiatives like the Bologna process in Europe, focus was placed on outcomes-based approaches that emphasized the identification and measurement of competencies that students should gain during their
Participatory Approaches to Quality Assurance

degrees (Nicholson, 2011). Ascribed to this approach, the most commonly accepted definition of quality from the late 1990s aligned with fitness for purpose (Harvey, 1998; Woodhouse, 1999). Nicholson (2011) credits this to the flexible nature of the outlook, as institutions could measure quality in terms of their ability to achieve the institutional objectives and mission.

Since education falls under provincial mandate, Ontario established the Ontario Universities Council on Quality Assurance (OUCQA) in 2010 (OUCQA, 2012). With targeted funding to get the initiative off the ground, the first order of business was to develop a series of Degree Level Expectations (DLEs) to identify the knowledge and skill competencies reflective of progressive levels of intellectual and creative development accomplished by a student at the end of a program. These DLEs were developed to benchmark the Ontario Quality Assurance Framework, all while providing individual programs the ability to differentiate themselves and define unique characteristics (OUCQA, 2012). As such, quality in the Ontario Quality Assurance Framework is predominantly operationalized using a fitness for purpose approach. For example, as quoted in Nicholson (2011), criteria used to evaluate both undergraduate and graduate programs include “consistency of the program with the institution’s mission and academic plans” and “clarity and appropriateness of the program’s requirements and associated learning outcomes in addressing the institution’s own undergraduate and graduate Degree Level Expectations” (Quality Assurance Transition/Implementation Task Force and the Ontario Council of Academic Vice-Presidents’ Executive Committee [QA Task Force], 2010, p. 8).

Tensions between Accountability and Enhancement in Quality Assurance

Given the origins of quality assurance approaches and the complexities of stakeholders involved in higher education, tensions exist between approaches which focus on assurance and accountability and approaches which focus on student learning, growth and transformation, and enhancement of educational processes (Harvey & Williams, 2010; Hodson & Thomas, 2003; Kis, 2005; Law, 2010). Accountability is associated with a verification process which aptly renders account to external groups such as accreditation bodies, government agencies, and the public, while enhancement focuses on internal processes for the purposes of development and improvement. According to Koslowski (2006), the concept of “quality occupies the middle ground between the external and the internal; a philosophy or system that focuses and guides the interaction between the external calls for increased accountability and the internal efforts of an organization that is addressing it” (p. 280).

Numerous scholars claim that accountability and enhancement are incompatible as the openness necessary for educational improvement is not part of the aim of accountability and that any formative benefits are likely to be incidental (Houston & Paewai, 2013; Kis, 2005; Newton, 2000; Nicholson, 2011; Vroeijenstijn, 1995; and Woodhouse, 1999). To examine this tension in greater detail, the characteristics that define accountability and enhancement approaches are summarized in Table 1.
As highlighted by Borden (2010), quality procedures for accountability toward external stakeholders engender a more summative and policy driven (top down) approach using typically standardised measures (traditionally quantitative) constructed for the purposes of strengthening external insight and control, broad comparison across higher education institutions and reporting to the general public. In contrast, quality assurance for internal enhancement involves a formative and faculty-driven (bottom-up) approach using a variety of measures (both quantitative and qualitative) focusing on program-specific activities and outcomes which work toward context specific improvements. This approach “aims at promoting future performance rather than making judgements on past performance” (Kis, 2005, p. 10). In the strictest sense, these approaches serve different purposes. “Since accountability is the main driving force behind quality assurance in higher education, the primary goals of quality assurance processes are to monitor and maintain quality. As a result, quality assurance processes tend to inhibit innovation in teaching and learning rather than advance it” (Nicholson, 2011, p. 8).

The tension between the purposes of, and procedures for, accountability and enhancement in the context of quality assurance in higher education has become problematic on several levels both in research and in practice (Kis, 2005). Areas of concern include: 1) Focus – a singular emphasis on accountability “may damage learning by diverting academic staff’s attention away from the improvement of learning, to compliance with the bureaucratic imperative” (Harvey, 1997 as cited by Kis, 2005, p. 13). 2) Engagement – a need to incite participation and ownership by faculty members over a process that is meaningful, relevant, and useful to academic programs (Cheng, 2014; Kis, 2005; Kleijnen et al., 2013). 3) Decision making – external accountability may impede the ability of institutions to make autonomous decisions about what should be valued and measured in relation to their own missions and identities (Houston & Paewai, 2013). It may be equally ill-suited for external bodies to make decisions regarding program resources and staff development (Kis, 2005). 4) Workload – meeting criteria in an assurance process that serves separate purposes, that in some cases have similar needs, may create an unnecessary workload for information likely to be duplicated (Middlehurst & Woodhouse, 1995). 5) Reporting – reporting under each purpose is quite different and lack of clarity may lead to misinformation. For instance, programs might hide weaknesses from accountability groups that would be important for the goal of improvement (Kis, 2005).

Numerous scholars in the field of quality assurance are critical about current systems which emphasize accountability (Harvey & Newton, 2004, 2007; Houston & Paewai, 2013; Nicholson, 2011). The common argument is that the design of quality assurance frameworks is often divorced from concerns about the improvement of educational processes. In addition, the design of assurance systems often marginalises the significance of context-specific

### Table 1

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Accountability approach</th>
<th>Enhancement approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intent</td>
<td>Summative (judgement)</td>
<td>Formative (improvement)</td>
</tr>
<tr>
<td>Stance</td>
<td>External</td>
<td>Internal</td>
</tr>
<tr>
<td>Predominant ethos</td>
<td>Compliance</td>
<td>Engagement</td>
</tr>
<tr>
<td>Focus</td>
<td>On teaching</td>
<td>On learning</td>
</tr>
<tr>
<td>Emphasis</td>
<td>Documentation</td>
<td>Discussion</td>
</tr>
<tr>
<td>Measures</td>
<td>Standardized (quantitative)</td>
<td>Multiple (qualitative and quantitative)</td>
</tr>
<tr>
<td>Communication of results</td>
<td>Government and public</td>
<td>Internal channels</td>
</tr>
</tbody>
</table>

*Adapted from Ewell (2009) and Swinglehurst, Russell, and Greenhalgh (2008)*
information that is required for judgements of merit and discussions regarding the advancement of practices (Houston & Paewai, 2013). Taking into account the concerns listed above, perhaps there is a way to bridge both approaches and further integrate a focus on enhancement into existing quality assurance processes. Hodson and Thomas (2003) suggest that individual institutions should have the opportunity to fully engage in the design and implementation of the assurance process to ensure investment in both securing standards and enhancement. This type of investment implies that completing a rigorous enhancement-oriented quality assurance process internally may also serve external bodies monitoring quality standards. Or as stated by Houston and Paewai (2013), “information collated for external accountability might not support internal improvement but information gathered for internal improvement could facilitate external accountability” (p. 275). A combination of accountability and enhancement approaches which meets a variety of needs seems to touch on both the fitness for purpose and transformation outlooks on quality. Speaking to the conditions necessary for the latter to succeed, Harvey and Newton (2004) list some “key ingredients” for quality assurance processes (p. 161). These include a shift from teaching to learning; the development of graduate attributes; appropriateness of assessment; systems for rewarding transformative teaching and learning facilitation; emphasis on pedagogy; institutional climate to support responsive collegiality; and linkages between quality improvement and learning.

Houston and Paewai (2013) add that transformation necessitates faculty participation in “systematic, critical enquiry (or research) in the local context, [which] has the potential to legitimate it as an element of academic work intended to address ‘quality’ as an academic staff, academic unit, disciplinary and university-level concern” (p. 278). Others, such as Cheng (2014), Kis (2005), Kleijnen et al. (2013) and Ramsden (2003), support the notion that faculty participation in quality assurance processes is a powerful factor which contributes to engagement, ownership of the process and change in departmental practices related to revision of student learning outcomes, curriculum design, instructional approaches, and assessment of learning.

Implications of a Participatory Approach to Quality Assurance

Defining Participatory Evaluation

In the context of quality assurance and curriculum review, faculty participation is a principal factor associated with successful program enhancement and change (Kis, 2005; Kleijnen et al., 2013; Ramsden, 2003). Stakeholder participation in evaluative processes, or participatory evaluation, is by no means a new area of study. In the field of program evaluation, it has frequently been defined as a collaborative approach to evaluation in which various stakeholders are actively engaged in all phases of the process (Cousins, 1996; Zukoski & Luluquisen, 2002). The participatory approach seeks to share knowledge, develop evaluation skills, and give a voice to all parties and beneficiaries who have a stake in the program. These stakeholders are typically involved in the design of the evaluation, selecting measures, collecting data, interpreting findings, and making and implementing recommendations (Cousins & Earl, 1995; Zukoski & Luluquisen, 2002).

As a form of collaborative social inquiry, participatory evaluation is primarily pragmatic in nature; with a problem-solving and instrumental orientation, its goal is the utility of the knowledge it creates. Additionally, common forms of participatory evaluation often carry political aims to promote fairness among involved individuals that have a stake in the inquiry (Weaver & Cousins, 2004). Cousins and Whitmore (1998) introduced a series of dimensions that are fundamental in characterising different streams of participatory evaluation. Initially, dimensions consisted of control of the evaluation process, depth of participation, and stakeholder selection. In 2007, the latter dimension was replaced with three new dimensions, namely: diversity among stakeholders, power relations among stakeholders, and manageability of evaluation implementation.
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(Weaver & Cousins, 2004). Depending on how a participatory approach is characterised within these dimensions (along a continuum), it may align with one of two distinct streams: Practical Participatory Evaluation (P-PE) or Transformative Participatory Evaluation (T-PE). As the name suggests, the first is concerned with practical problem solving and providing support for organizational decision making and the latter is empowerment oriented and focuses on democratizing social change. Connecting P-PE, for example, to the listed dimensions, Weaver and Cousins (2004) characterise it as control of the evaluation process shared between evaluator and stakeholders, the latter being extensively involved in a variety of tasks and decisions. However, stakeholder diversity is predominantly limited to primary users. Power relations are typically neutral as the interests of the primary users are at the forefront. The limited number of stakeholder groups involved ensures that evaluative processes are easy to manage logistically.

The feasibility of using the process dimensions of a participatory approach in quality assurance is examined in the next part of this section.

Implications for Quality Assurance in Higher Education

Designed principally in the context of evaluations of social programs, the principles and process dimensions of participatory evaluation are equally applicable to the review or academic programs in the context of quality assurance (Martin, Pereyra, Sigh & Stella, 2007; Ondieki & Matonda, 2013; Qin, Fancai & Mei, 2013). According to Cousins (1996): “With its emphasis on collaboration, depth of involvement in all phases of the evaluation and continual interpretation and deliberation of evaluation data,” participatory evaluation has strong potential to bring stakeholders together for the purposes of assessing, reflecting, visioning, and enhancing programs (p. 6). Cousins and Whitmore (1998) add that the core premise of P-PE “is that stakeholder participation in evaluation will enhance evaluation relevance, ownership, and thus utilization” (p. 6).

Using the Institutional Quality Assurance Process (IQAP) established by an Ontario University (University of Ottawa, 2011) as reference, it becomes evident that a participatory approach could be used to “critically analyze all aspects of a program, specifically, the curriculum, student population and faculty resources, as well as all other human, financial and material resources [and provide] an in-depth, forward-looking [analysis] based on significant data and on quality indicators” (p. 34). An examination of how a participatory approach might be characterised in a quality assurance context using the process dimensions, mentioned above, demonstrates feasibility:

1. Control of the evaluation process can be shared between the administrators of the IQAP and the program managers (departmental chairs) and beneficiaries (such as students, instructors, and public) (Ondieki & Matonda, 2013; Qin, et al., 2013).
2. Depth of participation is balanced between the in-depth involvement of a curriculum review committee and the consultative roles of IQAP administrators and program beneficiaries (University of Ottawa, 2011).
3. Diversity among stakeholders can be well represented on the curriculum review committee by virtue of having a broad representation of stakeholders such as full and part-time professors, students and support staff, as well as including other beneficiaries in a consultative role (Wolf, 2007).
4. Power relations among stakeholders are likely to be quite neutral given that all concerned stakeholders are likely to seek “areas that hold promise for enhancement” (University of Ottawa, 2011, p. 38).
5. Manageability of evaluation implementation may be challenging given that the diversity, and nature, of participation could lead to logistical challenges which may impact process timelines (Weaver & Cousins, 2007).
Potential Contributions of a Participatory Approach

Given the feasibility of a participatory approach to quality assurance processes, characteristics of this approach that would contribute most to an enhancement oriented academic program review would largely be four-fold:

1. Relevance to context – a participatory approach emphasizes that evaluation questions and design are locally relevant and meet the needs of accountability groups, program managers (departmental chairs), and beneficiaries (such as students, instructors, and the public). These stakeholders determine the process of evaluation and implementation of findings (Rabinovitz, 2013; Zukoski & Luluquisen, 2002).

2. Engagement of stakeholders – the process sparks creativity and encourages collaborative work among stakeholders, which enables the exchange of ideas and fresh perspectives (Cousins, 1996; Gawler, 2005).

3. Empowerment – stakeholders are empowered by being fully involved in determining the direction and effectiveness of the evaluation, which encourages stakeholder ownership and dedication to conduct, to interpret and implement an informative evaluation (Cousins & Whitmore, 1998; Rabinovitz, 2013; Zukoski & Luluquisen, 2002).

4. Build capacity and sustain enhancement – focus is placed on the construction of knowledge, process, and tools that will allow stakeholders (primarily departmental chairs) to sustain action after the evaluation is completed. This learning equips stakeholders to continue advocacy for change and transformation of their program (Cousins & Whitmore, 1998; Zukoski & Luluquisen, 2002).

Potential Challenges of a Participatory Approach

While a participatory approach to quality assurance can respond to accountability needs and produce findings and learning which can enable sustainable program enhancement, its success hinges on certain conditions. Firstly, the process must be taken seriously. According to Cousins (1996), unless senior administrators of the process consistently support those programs under review (via release time, evaluative expertise, recognition) and promote the participatory nature of the process, the potential of the approach may not be realized. Commitment on behalf of participants is equally key. The involvement of numerous stakeholders (such as instructors, students, support staff, alumni, and employers) in this type of approach takes time, interest, and considerably more planning than traditional compliance-based assurance processes (Cousins & Earl, 1995; Zukoski & Luluquisen, 2002).

A significant concern to consider relates to the misuse of evaluation data. With high levels of stakeholder control in the interpretation and reporting of findings, there is a risk that information may be intentionally or unintentionally altered or misused (Cousins, 2004; Cousins & Whitmore, 1998). For instance, a perceived weakness may be omitted in the report to the detriment of program improvement (Kis, 2005). Other concerns include the misuse of power and influence in the selection of participating stakeholders and lack of training and support regarding participatory approaches and evaluation methodology (Cousins, 1996; Cousins & Whitmore, 1998; Zukoski & Luluquisen, 2002). As recognized by Cousins and Whitmore (1998), only through the deliberate inclusion of mechanisms for ongoing observation and reflection of practice will the potential for participatory evaluation be achieved.
Conclusion

This paper has provided an overview of the principal themes associated with quality assurance in higher education: the multiple definitions of quality in higher education, the development and ongoing debate about the meaning and measures of approaches to quality, and the implications of a participatory approach to assurance processes.

In light of the largely accountability-focused quality assurance frameworks, for instance the one used by Ontario Universities, greater stakeholder participation in the various processes involved in higher education quality assurance would enable greater focus on an agenda of program enhancement all while aligning with institutional missions and the needs and expectations of students and government.

Amid the “lack of clarity about what the purpose of quality assurance should be, about the adequateness of diverse methods and instruments used by quality assurance mechanisms, or concerning the consequences of quality monitoring results” (Kis, 2005, p. 33), greater research is needed to explore ways in which assurance processes can stimulate greater commitment toward quality enhancement (Harvey & Williams, 2010). This said, the “application of methods and measures does not, in and of itself, assure quality (Harvey, 2009). Nor does quality assurance, in and of itself, lead to quality improvement.” (Houston & Paewai, 2013, p. 277).

To make progress, a concerted effort to both situate assurance processes within the context of academic programs and enable a supported participatory approach will greatly contribute to more relevant assurance processes, and by consequence, quality higher education.

References


Harvey, L., & Williams, J. (2010). Fifteen years of quality in higher education. Quality in Higher Education, 16(1), 3-36. VIEW ITEM


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Biography

Jovan Groen is Acting Director of the University of Ottawa’s Centre for University Teaching. Alongside various faculty development projects and teaching in course design, his research interests relate to quality enhancement in higher education and transformative learning.
Broadening Understanding: Students’ Perspectives on Respecting all Sexual Orientations and Gender Identities in University Classrooms

Danielle Pierre
Ontario Undergraduate Student Alliance

Oppression and marginalization of people who identify as LGBTQ+ persist on university campuses despite their right to be free of discrimination under the Ontario Human Rights Code. In an attempt to highlight the real and detrimental impacts of normative heterosexual and cisgender ideologies on Ontarian students the Ontario Undergraduate Student Alliance (OUSA) has committed itself to elevating student voices on this issue. OUSA conducted a mixed-methods, primary research project to provide understanding of the opinions and experiences of LGBTQ+ identifying students. Student responses were collected using an online survey, which yielded 311 valid responses from university students across Ontario. While most results were positive, findings that a fifth of respondents felt uncomfortable in campus life, accompanied by responses implicating instructors as a source of this discomfort, suggest there is an on-going need for educators to work harder to incorporate diverse perspectives about both gender and sexual orientation into university curricula. Content analysis of open-ended survey responses was used to describe the barriers students experienced. Diversity orientation and course content were referenced most often among open-ended responses. Diversity orientation was also most often cited as a barrier and problematic assumptions were identified as barriers more often than course content. Training was most often identified as a solution, suggesting this is a strategy that faculty can adopt to increase their diversity orientation and decrease problematic assumptions. Educators must recognize their responsibility for facilitating safe, empowering classrooms; this research offers seven strategies for accomplishing this goal.
genderfluid, agender, or any other descriptor that indicates that their gender identity does not correspond with their birth-assigned sex (Egale Canada Human Rights Trust [Egale], 2013). Student responses were collected using an online survey, which yielded 311 valid responses from university students across Ontario. The survey asked about LGBTQ+ individuals’ feelings of comfort and inclusion on campus; access to dedicated clubs, events, and safe spaces; classroom experiences; experiences with health services and counselling; and academic and extra-curricular engagement.

While most results were positive, findings that one in five respondents still felt uncomfortable in campus life, accompanied by responses implicating instructors as a source of this discomfort, suggest there is an on-going need for educators to work harder to incorporate diverse perspectives about both gender and sexual orientation into university curricula. Content analysis of select open-ended survey responses was used to systematically identify the barriers sexual and gender minority students experienced. The survey also solicited solutions for overcoming these barriers. In doing so, the instrument and resultant data offer constructive contributions to academic literature and the public policy domain.

A general lack of knowledge, awareness, and acceptance of queer identities among faculty and other students was identified as a significant barrier for respondents. They found their identities were seldom visible among course content, university faculty, or the student body. Heterosexist and cissexist assumptions, and the use of non-inclusive language only aggravated the feelings of isolation that developed from diminished visibility on campus. Respondents suggest that proactive education and training may alleviate some of their concerns. Educators have considerable influence over, and opportunity to create diverse, safe, and empowering classrooms; this research offers seven strategies for accomplishing this goal.

**Literature Review**

Research indicates that negative climates persist on postsecondary campuses. An American survey conducted in 2003 showed large majorities of lesbian, gay, and bisexual undergraduate and graduate students rate their campuses as homophobic and say that they hid their sexual orientations in order to avoid discrimination ( Longerbeam, Johnson, Inkelas, & Lee, 2007). Similarly, in 2013, students at the University of Alberta also reported discomfort with being open about their sexual orientation and/or gender identity on campus (Kinkartz, Wells, & Hillyard, 2013). In the same survey, students who identified with racial, ethnic, cultural, or religious minorities showed even more discomfort being open about their LGBTQ+ identities. As University of Alberta respondents reported prevalent use of homophobic and transphobic language on campus, minority students’ desire to keep aspects of their identities private may be due to fear of assumptions, stereotyping, and falling victim to derogatory comments, sexual harassment, or hate crimes.

Other research has found that transgender students may feel especially marginalized or invisible when little to no effort is made to acknowledge their presence (Beemyn, Curtis, Davis, & Tubbs, 2005). Trans high school students in Ontario report high levels of harassment and violence, as well as feeling unsafe in gender-segregated facilities (Scheim, Bauer, & Pyne, 2014). Left unaddressed, fear of harassment or violence may result in trans people avoiding public spaces; in fact, 19% of respondents to the Trans PULSE survey reported avoiding schools due to fear of being harassed, being read as trans, or being outed (Scheim et al., 2014).

In their campus climate survey, Yost and Gilmore (2011) found that heterosexual and cisgender individuals felt more positively about their campus climate, suggesting that these individuals were less likely to notice and interrogate the ways in which their institution benefitted them at the expense of others. While unintentional these attitudes perpetuate heterosexism and genderism among institutional communities.
Negative perceptions of LGBTQ+ individuals limit the experience of those whose interests and realities do not conform to mainstream cultural norms, a rule that applies inside and outside of university classrooms (DeSurra & Church, 1994; Kinkartz et al., 2013). As such, without basic dedication to, and acknowledgement of equal rights of all, many students will continue to exist within the margins of the classroom (DeSurra & Church, 1994). This is troubling when it is known that sexual minority students are more likely than heterosexual students to experience mental health problems (Bauer, Scheim, Pyne, Travers, & Hammond, 2015; Oswalt & Wyatt, 2011; Przedworski et al., 2015). These problems go beyond often-documented disparities between experiences of depression and anxiety extending to additional disorders including attention deficit, bipolar, bulimia, panic attacks, and obsessive compulsive disorders (Przedworski et al., 2015). Determinants of suicide risk are elevated among trans people and consistently attributed to social exclusion and victimization (Bauer et al., 2015). These are also key contributors to suicide disparities across marginalized populations—namely, gender non-conforming, sexual minority youth (Bauer et al., 2015).

Psychological stresses prevent students from fully engaging in campus events, organizations, and clubs, and impede their overall academic potential (Oswalt & Wyatt, 2011). Recalling findings that trans people report avoiding certain public spaces, one must wonder if trans students avoid specific places on campus. Scheim et al. (2014) found high proportions of Trans PULSE respondents reported avoiding public washrooms (57%), gyms (44%), and social clubs or groups (23%). When LGBTQ+ identifying students experience discrimination, they limit their academic choices and consider leaving their institutions more often than their heterosexual and cisgender counterparts (Oswalt & Wyatt, 2011; Yost & Gilmore, 2011).

Educators have long been found to play an important role in students’ university experience such that students wish for their instructors to take responsibility for fostering nurturing and respectful classroom environments (Lopez & Chism, 1993). Educators can set the tone for their classes by displaying, what students perceive to be, either welcoming attitudes (open discussion and affirmation of gay and lesbian issues or people) or taking negative stances (engagement with homophobic humour and belittling those who raise gay and lesbian issues) (Lopez & Chism, 1993). Avoidant tactics and heterosexist assumptions are problematic when instructors discuss marriage, poverty, power, and other issues in ways that deny the experiences of all but heterosexual individuals (Lopez & Chism, 1993). Kinkartz et al. (2013) note that the more frequently negative language is used in everyday conversation, the less it is considered hurtful. This breeds fear among sexual and gender minorities and allows discriminatory, non-supportive, and unsafe climates to develop on campuses and in classrooms.

Students judge faculty members’ attitudes by the language they use, their responses to dissonant situations, the inclusiveness of their curriculum, and by the ways they respond to students’ work on LGBTQ+ topics (Lopez & Chism, 1993). In this way, marginalization can be explicit or implicit—explicitly marginalizing situations are overt, intentional, and highly threatening for targets, while implicitly marginalizing situations are often unintended (DeSurra & Church, 1994). For those who are discriminated against in the classroom, opportunities to develop a sense of belonging and self-esteem are stifled and ultimately their growth is limited (DeSurra & Church, 1994).

**Methodology**

In November 2014, OUSA conducted a survey of 311 LGBTQ+ identifying students. The questionnaire was developed following a series of informal interviews and focus groups with students and service providers at Queen’s University, McMaster University, Wilfrid Laurier University, the University of Waterloo, and Brock University. While invitations to participate in these interviews and focus groups were extended to all of OUSA’s member student associations, recruitment was only successful at the five institutions listed above. The resultant
survey instrument consisted of 25 questions and was administered online using SurveyGizmo.

Any Ontario university student identifying under the LGBTQ+ umbrella was eligible to participate in the survey. Respondents were recruited using a snowball sampling method and social media, namely Twitter and Facebook, whereby eligible OUSA members were encouraged to bring the survey to the attention of others in their networks. Respondents were limited to one submission using a cookie-based anti-duplication mechanism. This approach was selected both for its convenience and for its ability to reach individuals from marginalized communities who are otherwise difficult to identify. This also meant that universities themselves were not involved in the recruitment or research. In this scenario, there were no institutional research ethics boards to consult. Regardless, all researchers involved—Rose (2015) and myself—completed the TCPS 2 CORE Tutorial to ensure the project was conducted ethically. All respondents participated voluntarily and anonymously.

Eligible participants were screened using a two-step process. First, inclusion criteria were explained in the opening letter of information and potential respondents were asked to indicate whether or not they qualified. Second, respondents who indicated they were both heterosexual and cisgender were disqualified (these records were removed from the dataset prior to data analysis). A mixed-methods approach was taken to collect both qualitative and quantitative data. The survey covered a variety of topics—comfort and inclusion on campus; access to dedicated club, event, and safe spaces; classroom experiences; experiences with health services and counselling; and academic and extra-curricular engagement—most of which will not be discussed here. The open-ended responses provided the most directive information for improving the inclusivity of university classrooms. As such, additional content analysis was conducted specifically for the Empowering Learners, Effecting Change conference.

Data Analysis

Content analysis was used to identify common themes among open-ended survey responses. In total, 76 responses were loaded into NVivo as individual cases. A directed approach was used to count both manifest and latent themes among these cases. I began this process by immersing myself in the data and attempting to organize responses according to a predetermined set of coding categories. These coding categories were determined using grounded theory, that is, the categories were developed and informed by existing research, but also respondents’ own submissions. After the first pass over the raw data, they were re-read and reorganized to further refine the coding categories, ensuring they reflected the latent themes among responses. Some cases were organized under multiple coding categories. Once the text was appropriately organized, the resulting organizational structure was counted and described in numerical (quantitative) and contextual (qualitative) terms. This technique does not test causal relationships between variables, rather it is used because it is the most effective way to identify and present the information present in raw qualitative data and can indicate the proportional weight to place upon the themes and concepts that are revealed (Berg & Lune, 2012).

Coding Theory

As is required to successfully apply grounded theory, existing research was used to determine an early set of coding categories. I consulted sources that specifically outlined challenges to, and benefits of establishing inclusive and diverse classrooms.

Incorrect assumptions about learning behaviours and capacities have been found to contribute to the maintenance of exclusionary classrooms (Garibay, 2015). These assumptions contribute to, and build upon, the daily discrimination LGBTQ+ students experience, particularly, the accumulation of microaggressions. Microaggressions “are the everyday verbal, nonverbal, and environmental slights, snubs, or insults, whether intentional or unintentional, that communicate
hostile, derogatory, or negative messages to target persons based solely upon their marginalized group membership” (Sue et al., 2007 as cited in Garibay, 2015, p. 13). In addition to the experience of routine discrimination, LGBTQ+ identifying students may also feel underrepresented on their campuses due to a lack of visibility among the professoriate and administration (Linely et al., 2016).

Relatedly, representation through visibility extends to curriculum—course content has been identified as potentially exclusionary for non-mainstream students. The consideration to be made is whether the perspectives and scholarship of diverse groups are represented (Garibay, 2015). Pryor’s (2015) student interviewees provide additional context claiming that, in their experience, language courses are inherently gendered thus students are subject to being misgendered and that science, technology, engineering, and math programs are less adept at accommodating transgender people. These interviewees also made enrollment decisions (switching majors and choosing courses) based on assumptions about the open-minded nature of certain course topics (Pryor, 2015).

Faculty members could better support their LGBTQ+ students by confronting normative discourses within their curriculum (Linely et al., 2016; Pryor, 2015). However, to do this faculty must engage in training and educate themselves on the issues and concerns facing LGBTQ+ communities. Educators have a responsibility as scholars to educate themselves on these issues and include pertinent LGBTQ+ material in their courses (Lopez & Chism, 1993). Mohr and Sedlacek (2000) define diversity orientation as “one’s level of interaction with and interest in people from groups (e.g., racial, ethnic, religious, class) other than one’s own,” (p. 71). Working to increase their diversity orientation could help improve instructors’ natural tendencies to include diverse perspectives in their course content, while more readily demonstrating their allyship to marginalized students (Garibay, 2015; Linely et al., 2016). Purposefully using inclusive language has also been identified as a means of establishing more inclusive classrooms (Pryor, 2015). This would manifest in the use of students’ preferred pronouns and names as well as in confronting the use of homophobic (transphobic, sexist, etc.) language (Linely et al., 2016).

Results: Closed-Ended Survey Responses

The original survey analysis included 311 valid responses; 92% were studying full-time, 91% were undergraduate students, and 9% were graduate students (Rose, 2015). As Table 1 and Table 2 demonstrate, there was considerable diversity among respondents’ sexual orientations and gender identities, but greater representation of a multitude of sexual orientations.

<table>
<thead>
<tr>
<th>Table 1</th>
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<tr>
<th>Sexual Orientation</th>
<th>Proportion of Respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homosexual/Gay/Lesbian</td>
<td>51</td>
</tr>
<tr>
<td>Queer</td>
<td>28</td>
</tr>
<tr>
<td>Bisexual</td>
<td>26</td>
</tr>
<tr>
<td>Pansexual</td>
<td>14</td>
</tr>
<tr>
<td>Asexual/Gray Asexual</td>
<td>8</td>
</tr>
<tr>
<td>Demisexual</td>
<td>5</td>
</tr>
<tr>
<td>Bi-curious</td>
<td>4</td>
</tr>
<tr>
<td>Polysexual</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
</tr>
</tbody>
</table>

While most respondents expressed that they felt welcome and comfortable in campus life, a sizeable minority indicated that they did not: roughly 20% of respondents felt excluded and uncomfortable on their campuses (Rose, 2015). Most respondents (38%) reported that they were sometimes made uncomfortable in class regarding their sexual orientation or gender identity by their professors’ comments or assumptions; 25% indicated often or always feeling this way (Rose, 2015). When asked
how often their professor used gender neutral language 15% said never and 35% said rarely (Rose, 2015). Among this half of respondents, 27% identified as non-cisgender and 12% identified as cisgender (Rose, 2015). A mere 1% of respondents reported their learning materials and curricula (outside of gender studies) always included LGBTQ+ figures while just 6% reported learning material and curricula often included these figures (Rose, 2015).

Table 2

<table>
<thead>
<tr>
<th>Gender Identity</th>
<th>Proportion of Respondents (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisgender</td>
<td>78</td>
</tr>
<tr>
<td>Genderqueer</td>
<td>9</td>
</tr>
<tr>
<td>Non-binary</td>
<td>8</td>
</tr>
<tr>
<td>Gender fluid</td>
<td>7</td>
</tr>
<tr>
<td>Trans</td>
<td>6</td>
</tr>
<tr>
<td>Agender</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
</tr>
</tbody>
</table>

Rose’s (2015) initial findings suggested that campus communities could be particularly unwelcoming and exclusionary for students who did not identify as cisgender. Students who did not feel comfortable and included on campus were statistically more likely than those who did feel comfortable to have had professors whose comments made them uncomfortable (Rose, 2015). Compared to cisgender respondents, non-cisgender respondents were less likely to have high feelings of comfort and inclusion, less likely to feel welcome at large university events and activities, and more likely to feel uncomfortable with professors’ comments in class (Rose, 2015). These associations between non-cisgender identity and negative interactions with faculty indicate a need to incorporate diverse perspectives about gender in addition to sexual orientation into university curricula. All students, regardless of sex, sexuality, gender identity, or gender expression are entitled to feel safe, included, and respected inside of the classroom. This post hoc content analysis was conducted in an effort to determine the best ways to apply this principle in practice.

Results: Open-Ended Survey Responses

The framework developed for the content analysis process included six categories: diversity orientation, course content, problematic assumptions, language, training, and representation. Before discussing the relationships between these categories, a summary of the coding frame is required.

Deconstructing Negativity & Acknowledging LGBTQ+ Identities

The problematic assumptions category included any reference to stereotypical, hetero- or cis-normative, hetero- or cis-sexist, or homophobic microaggression. These aggressions were perceived in assumptions, comments, and interactions with instructors or peers. The most common problematic assumption, by far, was the dominance of heterosexuality or cisgender orientations as the default identity. Other forms of casual discrimination included experiences of transphobia, gendering of classrooms and curriculum, adherence to gender stereotypes, and general stigmatization. Referenced only once each in this category: interacting with homophobic staff and students, and the assumption of disadvantage. Respondents wanted faculty members to deconstruct these harmful assumptions. There was a distinct call for instructors to minimize heteronormativity in their classrooms. One respondent described the consequences, saying that they have remained “in the closet” in order to maintain support with applications and project supervision from their professors.

In order to be included in the diversity orientation category, cases must have referred to professors’ and other students’ knowledge and
recognition of LGBTQ+ issues and identities. A general lack of knowledge, awareness, or acceptance of queer identities among faculty and other students was discussed as a barrier, which was exhibited in the use of incorrect gender pronouns, allowance of negative attitudes within the classroom, and perceptions of limited knowledge about the fluidity of sexuality and gender. Respondents wanted their professors and teaching assistants to proactively educate themselves about queer identities, experiences, and appropriate language. The perceived role of instructors was to facilitate safe and informative spaces for class discussion and also act as leaders on these issues, inside and outside of the classroom. One respondent explained:

If the learning starts in the classroom, hopefully it will extend to the greater university community. It’s of utmost importance that professors guide conversations surrounding LGBTQ+ issues in positive, informative, and most importantly, accurate manners. It is also important that students feel comfortable expressing their confusion so that the classroom can become an effective learning space for all students, regardless of identity(s).

Planning Inclusive Course Content

The most infrequently referenced coding category was representation. There were just 17 references to the numerical representation and general visibility of LGBTQ+ identities among faculty and students. The consequences of limited representation were described as feelings of invisibility, isolation, and loneliness. In respondents’ own words, it was problematic having few out faculty members, not seeing themselves in course content, and feeling underrepresented in certain disciplines. Indicative of the references in this category, one student explained that seeing queer and trans people in their everyday life would make them feel more welcome on campus. There were also singular references to the desire to see more safe space indicators and queer guest speakers outside of gender studies.

Cases coded to course content included any mentions of curricular components, such as lecture and unit topics, learning materials, other resources, or syllabi. Lack of representation and references to the accomplishments of queer individuals in course content was described as a barrier almost as frequently as this was described as a positive strategy for increasing inclusivity. Respondents wanted to see more examples and research about queer individuals used in class. While the lack of inclusion was sometimes discipline specific, the potential for increasing representation was not. Two different students explained:

If you’re not in women’s studies, it can feel like queerness is a novel concept. It’s as if we don’t have accomplishments or a history. For example, if we’re talking about WW2 and the concentration camps, I expect a mention of queer folks! In English classes I want to see classic novels (like The Well of Loneliness) used amongst the many pieces of literature that portray heterosexual relationships.

Often in classes profs use only research from hetero couples - last week in class we were discussing risky sex behaviours and condom use. When asked if the studies included gay people, the prof said that all of it was on hetero couples because there is very little research on gay couples. In 5 seconds I did a search and found at least 20 different sources on lesbians and risky sex behaviours alone – which just makes me think she didn’t even look or care to.

Using Inclusive Language, Pronouns, & Names

Explicit references to the use of both problematic and inclusive language were coded under a single category. Commonly referenced was a lack of inclusive language, which led to feelings of exclusion.
Also exclusionary was the misuse of (or no use of) preferred pronouns and names. There was a desire for faculty to educate themselves on appropriate language to reverse this behaviour. The use of inclusive language and gender-neutral language were each explicitly mentioned once. Flippant use of language placed significant personal burden on respondents to repeatedly come out to new instructors, since there was no way to do this administratively.

Training & Independent Learning

The training category contained references to education on non-binary gender identities, sexual orientations, and anti-oppression strategies. Training was very rarely referenced as a barrier; if it was, respondents tended to implicate a lack of training as a barrier for them. Specific topics for trainings were: queer and trans identities, inclusivity, diversity, and anti-oppression. Ultimately, respondents wished to avoid the burden of being their own advocates and the only educational resource on these topics. There was a sense that, as expressed by one respondent, “The administration and faculty should be educating themselves on these things, not having individual queer students educating the university staff one by one, face to face.”

Content Analysis

The above analysis of open-ended survey responses included 76 cases, or records, from the original survey dataset. Cases were selected only if references to classrooms or education manifested in the text. Among these cases, 56 were submitted by self-identified cisgender individuals and 20 were submitted by non-cisgender individuals (i.e. those identifying as trans, gender non-binary, genderqueer, genderfluid, or agender). Table 3 summarizes the results of the coding process showing the total coded references among all cases (a single case could be referenced in multiple categories). Diversity orientation and course content were referenced most often, with 31 and 30 references respectively.

Although diversity orientation is also most often referred to as a barrier, problematic assumptions were referred to as a barrier more often than course content. Training was most often referred to as a solution, suggesting this is a strategy that faculty can adopt to increase their diversity orientation and decrease problematic assumptions.

Overall there were relatively few uses of the words sexual orientation (3) and sexuality (13), but many uses of the word gender (29). This is interesting given that most respondents indicated that their gender corresponded with their birth-assigned sex. Looking at word frequencies in this way revealed considerable (31) uses of stemmed words beginning with “hetero,” suggesting that this dominant sexual identity also has influence regardless of sexual orientation or gender identity.

Further analyses revealed interesting patterns in the text and illustrative relationships between coding categories. Examination of related coding categories revealed that course content and problematic assumptions, and diversity orientation and language were most often coded together. This could suggest that problematic assumptions manifest most frequently in course content, and that a poor diversity orientation manifests in instructors’ language. Cases referring to problematic assumptions were never double-coded under the training category.
further disassociating training from the barriers experienced and emphasizing it as a desirable strategy for better integrating diversity in the classroom.

Table 4 shows the number of coded references proportional to respondents’ gender identities. Non-cisgender individuals (whose birth-assigned sex is different from their gender) referred to barriers more often than cisgender individuals and also more frequently referenced problematic assumptions and language. Cisgender individuals referred to course content more often. When discussing problematic assumptions non-cisgender respondents referred to exclusionary assumptions of both heterosexuality and cisgender identity. They also mentioned experiencing casual transphobic and cissexist discrimination from their professors. In addition to discussing the problematic assumption of their heterosexuality, cisgender respondents referred to feeling excluded from course content by non-inclusive language and stigmatized by homophobia within this coding category. These differences suggest that cisgender individuals have more issues with the representation of their sexuality in the classroom and thus experience DeSurra and Church’s (1994) version of implicit marginalization. There is also the alarming suggestion that non-cisgender individuals experience more overt discrimination as their responses were coded under categories less associated with visibility and more associated with explicit marginalization, a finding that would agree with existing literature (Beemyn et al., 2005; Pryor, 2015; Yost & Gilmore, 2011).

These results support earlier research that calls upon faculty members to take more responsibility for setting a welcoming and inclusive tone for LGBTQ+ students (DeSurra & Church, 1994; Kinkartz et al., 2013; Lopez & Chism, 1993). At the same time, this research elevates students’ voices and shares their perspectives on the state of their classroom environments. As an instructive tool, these findings summarize students’ preferred solutions for increasing their confidence and comfort in class. The potential strategies for incorporating diverse perspectives about sexual orientation and gender identity in the classroom can be summarized as such:

- Use inclusive and gender neutral language—for example avoid using unnecessarily gendered job titles in anecdotes,
- Use students’ preferred pronouns and names,
• Represent queer identities in course content by using examples and research about queer issues and people,
• Deconstruct problematic assumptions and minimize heteronormativity in the classroom,
• Learn about queer identities, experiences, and appropriate language independently,
• Engage in training on: queer and trans identities, inclusivity, diversity, and anti-oppression strategies, and
• Recognize and acknowledge queer identities and experiences openly and without judgement.

Limitations

The most important limitation is that the sample is not representative as a result of using a non-random recruitment method. The target population was difficult to identify and organizational resources were limited; it was not feasible for this study to isolate eligible participants from the broader student population nor was it possible to determine a representative response rate (Rose, 2015). The survey instrument did not ask respondents to report their demographic characteristics beyond sexual orientation, gender identity, and academic status (for example identification of racial, ethnic, cultural, or religious identities was not reported). As a result, I am not able to investigate the intersections between minority statuses along such lines as sexual or gender minority status.

These results are limited by selection bias: it is possible that individuals with the most extreme perspectives (perhaps those most involved with advocacy and activism or those that have had particularly difficult experiences) were more likely to take the survey than those with more neutral, or average, perspectives (Blair, Czaja & Blair, 2014). Additionally, it is likely that most responses come from students within the organization’s membership, thus restricting the sampling frame by geography (Rose, 2015). All of OUSA’s members are located outside of the Toronto area and, at the time the survey was administered, in Southern Ontario. However, while anonymity and security measures make it impossible to verify which institutions respondents attended, some responses indicate that the snowball sampling method was successful in recruiting respondents from non-member schools.

Two more limitations relate to the internal validity of the instrument. Firstly, as with any self-reported data, the quality of responses collected in the survey relies upon the honesty of respondents. Due to the care taken to respond to the survey’s open-ended question, it is reasonable to assume most respondents were truthful and forthcoming in their responses. However, steps were taken to remove duplicated or ineligible records from the dataset prior to analysis (Rose, 2015). Lastly, it could be argued that some survey questions were leading. The open-ended question, upon which this content analysis is based, asked specifically for solutions to problems presupposing that problems existed (Rose, 2015). Despite best efforts to design a neutral and objective survey instrument, the policy-oriented nature of OUSA’s research potentially undermines these efforts, as the intention is to specifically seek improvements on existing conditions (Rose, 2015).

To minimize the effects of any priming or leading questions, less neutrally phrased questions were placed at the end of the questionnaire, as can be seen in the appended questionnaire (Rose, 2015). The inclusion of the questionnaire demonstrates the types of questions respondents were asked as well as the full limits of demographic data collection. Any trends derived from this data require additional research to determine their veracity.

Conclusions

This research is intended to share LGBTQ+ identifying students’ solutions for increasing their confidence and comfort in university classrooms. The solutions offered were derived from a 2014 survey of 311 LGBTQ+ identifying students attending university in Ontario. While most respondents felt welcome and included in campus life, a substantial minority did not. Respondents reported being made
uncomfortable about their sexual orientation or
gender identity because of professors’ comments or
assumptions. A directed content analysis of 76 open-
ended survey responses was used to investigate what
assumptions, interactions, and situations were
making these respondents uncomfortable as well as
their preferred solutions.

This research offers a strong foundation for
future research on LGBTQ+ student experiences.
The results explain students’ perceptions of faculty
members’ roles in facilitating welcoming and
inclusive learning environments and the relationships
between student-faculty interactions and students’
overall feelings of inclusion. The specific impacts of
heteronormativity and cisnormativity on students’
academic experience offer a useful contribution to
literature in both academic and public spheres. The
strategies that students identified for incorporating
diverse perspectives about sexual orientation and
gender identity into their classrooms can be applied
by public policy analysts, university administrators,
and independent faculty members. This research is
merely a basis for beginning discussions about
combating heterosexism and cissexism in university
classrooms, but puts the voices of those who are most
affected at the centre.

References

Bauer, G. R., Scheim, A. I., Pyne, J., Travers, R., &
associated with suicide risk in transgender
persons: a respondent driven sampling study in Ontario, Canada. BMC Public
Health, 15(1), 525. VIEW ITEM

Beemyn, B., Curtis, B., Davis, M., & Tubbs, N. J.
(2005). Transgender issues on college
campuses. New Directions for Student
Services, 111, 49-60. VIEW ITEM

Berg, B. L., & Lune, H. (2012). Qualitative research
methods for the social sciences (8th ed.).
Boston, MA: Pearson.

surveys: A guide to decisions and procedures

Callis, A. S. (2014). Bisexual, pansexual, queer: Non-
binary identities and the sexual
borderlands. Sexualities, 17(1/2), 63-80. VIEW ITEM

Unlocking the classroom closet: Privileging the
marginalized voices of gay/lesbian college
students. Paper presented at the 80th Annual
Meeting of the Speech Communication
Association, New Orleans, LA. VIEW ITEM

Egale Canada Human Rights Trust. (2013). Residence
life: LGBTQ resource guide. Ottawa, ON.
VIEW ITEM

climate for diversity. Los Angeles, CA: UCLA Diversity & Faculty Development.
VIEW ITEM

spaces campus climate survey report: Gauging
the environment for sexual and gender
minorities at the University of Alberta.
Edmonton, AB: Institute for Sexual
Minority Studies and Services. VIEW ITEM

Linley, J. L., Nguyen, D. G., Brazelton, B., Becker,
B., Renn, K., & Woodford, M. (2016).
Faculty as sources of support for LGBTQ
college students. College Teaching, 64(2),
55-63. VIEW ITEM

Longerbeam, S. D., Johnson, D. R., Inkelas, K. K.,
& Lee, Z. S. (2007). Lesbian, gay, and
bisexual college student experiences: An
exploratory study. Journal of College Student
Development, 48(2), 215-230. VIEW ITEM


Rose, Z. J. (2015). *LGBTQ+ student experience survey report: LGBTQ+ students' experiences and attitudes at universities.* Toronto, ON: Ontario Undergraduate Student Alliance. VIEW ITEM


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**Biographies**

Danielle has been working with the Ontario Undergraduate Student Alliance since October 2014. As Research & Policy Analyst, Danielle has authored policy papers about student health and wellness, the needs of mature students, reforms to the tuition framework and student financial assistance system, and sexual violence prevention. She advocates on behalf of OUSA’s members to government and university stakeholders though representation on working groups, committees, and at conferences.
Appendix A - Definitions

Agender: A term used by individuals who have no gender (Richards et al., 2016); this term provides a neutral way of describing one’s gender identity.

Asexual/Gray Asexual: A term used to describe the sexual orientation of individuals “who may not experience sexual attraction or who [have] little or no interest in sexual activity” (Egale, 2013, p. 6).

Bi-curious: Within the context of the gender binary (male-identifying/female-identifying), an individual may choose to use this term to describe their sexual orientation if they tend to be emotionally and sexually attracted to either male-identifying or female-identifying individuals, but have a desire to experiment with those identifying with the opposite (Callis, 2014).

Bisexual: A term used to describe the sexual orientation of individuals who are “attracted emotionally and sexually to both male-identified and female-identified people” (Egale, 2013, p. 6).

Cisgender: “Refers to a person whose gender identity corresponds with their birth-assigned sex (e.g., a cisgender male is someone whose gender identity is man and was assigned male sex at birth)” (Egale, 2013, p. 6).

Cisnormativity: Similar to heteronormativity, this term refers to the biases and ideologies that perceive all individuals as cisgender, privileging their identities and experiences over other variant identities and experiences (Egale, 2013, p. 7).

Demisexual: A term that “refers to an identity on the asexual spectrum in which a person does not typically experience sexual attraction unless accompanied by romantic attraction” (Rubinsky & Cooke-Jackson, 2016, p. 4).

Gay: A term used to describe the sexual orientation of individuals who are “emotionally and sexually attracted to someone of the same sex and/or gender—
gay can include both male-identified individuals and female-identified individuals” (Egale, 2013, p. 6).

Gender non-conforming: An alternate term “used for individuals whose gender expression is different from societal expectations related to gender” (Mottet & Tanis, 2008, p. 6).

Genderfluid: A term used to describe the gender identity of those “who move between genders in a fluid way” (Richards et al., 2016).

Genderqueer: A term used by some individuals who do not identify singularly as male or female and by others who may identify with both male and female genders as well as those who reject the gender binary or gender altogether (Egale, 2013, p. 6-7; Mottet & Tanis, 2008, p. 6). Another umbrella term with similar connotations is gender non-binary (Richards et al., 2016).

Heteronormativity: Refers to cultural or societal bias or ideology that perceives all individuals as being straight (heterosexual) and so privileges their worldview above those in same sex/gender relationships (Egale, 2013).

Lesbian: A term describing the sexual orientation of female-identified individuals who are “emotionally and sexually attracted to female-identified people” (Egale, 2013, p. 6).

Pansexual: A term describing the sexual orientation of those who are emotionally and sexually attracted to more than two genders (Callis, 2014; Egale, 2013).

Queer: A term associated both sexual orientation and gender identity; historically this has been a derogatory term used to insult LGBTQ+ individuals, but has been reclaimed to refer to lesbian, gay, bisexual, and trans people (Egale, 2013; Mottet & Tanis, 2008). “Some use queer as an alternative to gay in an effort to be more inclusive, since the term does not convey a sense of gender” (Mottet & Tanis, 2008).
**Questioning:** A term that describes an individual “who is unsure of their sexual orientation or gender identity” (Egale, 2013, p. 7).

**Transgender:** Shorthand, “Trans.” An umbrella term for individuals whose gender identity, expression, or behaviour does not match their birth-assigned sex, commonly used to refer to transsexual, cross-dressing, androgynous, genderqueer, and/or gender non-conforming identities and experiences (Egale, 2013; Motter & Tanis, 2008; Pryor, 2015).

**Two-spirit:** An English term used in place of the many Indigenous words for Two-spirit; some Indigenous individuals may identify with this term instead of, or in addition to other terms describing their sexual orientation or gender identity (Egale, 2013). Historically, Two-spirit individuals were respected community members given special status for their ability to understand male and female perspectives and worked as visionaries, healers, and medicine people (Egale, 2013).

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**Appendix B – Broadening Understanding: LGBTQ+ Student Experience Survey Instrument**

**Eligibility**
Eligible participants for this survey are Ontario university students who:
• identify as something other than the gender they were assigned at birth, or
• identify as something other than heterosexual, or
• both
1) Based on this, are you an eligible participant?*
( ) I am eligible
( ) I am not eligible (I identify as both cis-gender and heterosexual, or I am not an Ontario university student)

**Basic Information**
2) Are you a currently a part-time or full-time student?
( ) Part-time
( ) Full-time

3) What is your current year of study?
( ) First Year
( ) Second Year
( ) Third Year
( ) Fourth Year
( ) Fifth or more
( ) Graduate Student

4) What is your age?
Please feel free to skip these questions if you wish. Any information you offer is helpful to our analysis.

5) Please write-in or select the sexual orientation(s) that you identify with most.
[ ] or please write in:
[ ] Asexual
[ ] Androgynosexual
[ ] Bisexual
[ ] Bi-curious
[ ] Demisexual
[ ] Heterosexual/Straight
[ ] Homosexual/Gay/Lesbian
[ ] Queer
[ ] Pansexual
[ ] Polysexual

6) Please write-in or select the gender identity(ies) that you identify with most.
[ ] Agender
[ ] Cisgender (you identify with the gender assigned to you at birth)
[ ] Gender-fluid
[ ] Genderqueer
[ ] Non-binary
[ ] Trans
[ ] or please write in:

7) I feel comfortable and included on campus.
( ) Strongly Disagree ( ) Disagree ( ) Agree ( ) Strongly Agree

8) I feel welcome at large university events or activities.
Respecting Sexual Orientations and Gender Identities

( ) Strongly Disagree ( ) Disagree ( ) Agree ( )
Strongly Agree

9) I find it hard to meet and connect with like
minded students on my campus.
( ) Strongly Disagree ( ) Disagree ( ) Agree ( )
Strongly Agree

10) I wish there were more student areas on campus
(such as student lounges or club rooms) that were
permanently designated as safe spaces for LGBTQ+
students.
( ) Strongly Disagree ( ) Disagree ( ) Agree ( )
Strongly Agree

11) I would prefer to use gender neutral washrooms
on campus.
( ) Strongly Disagree ( ) Disagree ( ) Agree ( )
Strongly Agree

12) I wish the university employed more full-time
staff to run LGBTQ+ groups, events, and spaces.
( ) Strongly Disagree ( ) Disagree ( ) Agree ( )
Strongly Agree

13) Professors say or assume things in class that
make me feel excluded or uncomfortable regarding
my sexual orientation or gender identity.
( ) Never ( ) Rarely ( ) Sometimes ( ) Often ( )
Always

14) Materials and curricula (outside of gender
studies courses) include LGBTQ+ people/characters.
( ) Never ( ) Rarely ( ) Sometimes ( ) Often ( )
Always

15) My professors use gender neutral and inclusive
language.
( ) Never ( ) Rarely ( ) Sometimes ( ) Often ( )
Always

16) In my experience, medical providers on campus
(e.g. physicians or nurses) have been professional
and respectful.
( ) True
( ) False

( ) I have never used these services.
[IF FALSE] 17) If you wish, please elaborate:

18) In my experience, medical providers on campus
have had the knowledge necessary to provide me
with good care.
( ) True
( ) False

19) If you wish, please elaborate:

20) In my experience, mental health workers on
campus (i.e. counsellors, therapists) have had the
knowledge necessary to provide me with good care.
( ) True
( ) False

21) If you wish, please elaborate:

22) Does your campus has a pride centre, pride
group, or similar group that provides services,
resources, or peer support for LGBTQ+ students?
( ) Yes
( ) No
( ) I don’t know

23) Are you involved with it as either a member/user
or staff/volunteer?
( ) Yes
( ) No

24) What do you think is the biggest barrier,
disadvantage, or issue facing LGBT or Queer
university students in particular? Feel free to give
examples from your own experiences.

25) What actions can university administrators or
faculty take to improve the university experience for
LGBT or Queer students in particular?
Section III

EMPOWERING LEARNERS
Learning Skills Workshops Supporting First-Year Courses

Sheilagh Grills  
Brandon University

Student Services support, including learning skills assistance, can be integral in empowering learners. First-year students are expected to be self-directed in their learning, yet may have neither been challenged nor experienced negative consequences for a lack of perseverance. Academic skills professionals can be partners with teaching faculty in student success by helping to build transferable learning skills, especially for high-fail introductory courses. In this paper, I report on supplementary workshops developed to target fundamental skills with course-specific examples. This partnership included incentivizing academic support with both carrots and sticks; instructors in introductory biology strongly urged students receiving D grades or below on the first test to approach Student Services for support, while sociology faculty incorporated workshop attendance into the introductory course with participation grades. Following such incentivizing of learning skills, workshop attendance increased by 45%. In both courses, first test scores and high school averages for students attending workshops did not differ from students not attending workshops. However, students who attended learning skills workshops had significantly higher course grades, persistence, sessional grade point averages (GPAs), and cumulative GPAs than students not attending workshops. Controlling for high school average, each learning skills workshop attended was associated with a 0.11 to 0.27 increase in sessional GPA on a 4.3 point scale.

While academic support has a long history within Canadian post-secondary institutions (Gilbert, Chapman, Dietsche, Grayson, & Gardner, 1997), learning skills workshops may be seen as tangential by both faculty and students (Tait & Entwistle, 1996). This paper describes a partnership between Student Services and faculty teaching high-fail introductory courses at a small primarily undergraduate university on the Prairies. Through dialogue with instructors, I used targeted workshops to combine transferable, fundamental skills with course-specific examples. Faculty ‘incentivized’ attendance to encourage students to identify workshops as a series for multiple opportunities for relationship-building and engagement. This cooperative endeavour between faculty and Student Services emphasizes the importance of both partnerships in student success, and assessment measures for academic support services beyond simple utilization data (Keeling, Wall, Underhile, & Dungy, 2008).

First-year students need to be self-directed in their learning, yet Côté and Allahar (2007) argue that direct-entry learners may not have been challenged in high school, or may not have experienced negative consequences for a lack of perseverance. Among those expressing concern, Slavin (2007) argues that a reliance on teaching to standardized testing has decreased thinking skills and emphasized memorization. Changes in the student population include more goal-directed students focused on education as a means to specific careers, shifts in the knowledge economy and more grade-focused students who eschew trial and error learning (Frost & Connolly, 2016). Professional designations have increased, yet some of the highest failure rates occur in pre-professional programs (Kirby, 2007).

Academic support within Student Services is centered on student learning research and approaches to learning and studying (Biggs, 1987). Institutions may embed specialized academic skills staff within faculties or schools, utilize a learning commons...
approach, or have generic learning support within an Academic Skills Centre. Regardless of centralization, learning skills staff can help with the disparity between the target understandings of instructors and the actual understandings reached by students (Entwistle, McCune, & Hounsell, 2002).

Student affairs and services arose from the roots of constructivist learning theory, and while academic support may take many forms, the goal of general learning skills support is increased self-regulation of learning or metacognition. Affective factors such as self-efficacy and motivation both influence and are influenced by self-regulated learning (Egan, 2011). In some cases, students may need to ‘unlearn’ previous surface approaches to learning that may have served them well in high school. Teaching metacognitive knowledge or awareness of perceived knowledge supports students’ learning and helps them develop expertise (van Velzen, 2012). Expert students approach particular learning tasks differently based on task demands. In contrast, first-year students often lack both this self-awareness and the knowledge of fundamental learning strategies.

But it is not only first-year students who may have a less than successful approach to learning. The way in which students process information and their intent in approaching the task is closely related to the quality of outcome in learning. When students perceive material as uninteresting but are anxious and threatened about performance, they are more likely to adopt a surface approach to learning (Marton & Säljö, 1997). A surface approach to learning is more passive and characterized by a reliance on memorization of details, while a deep approach is more holistic and characterized by trying to understand the ideas or meaning of a text. Courses that are less preferred or are perceived to cover an excess of information are associated with surface approaches to learning (Baeten, Kyndt, Struyven, & Dochy, 2010). Students who are driven to avoid failure or are otherwise externally motivated are more likely to adopt a surface approach (Berglas & Jones, 1978; Thomas & Gadbois, 2007). In the face of this description of students, teaching academic skills is like setting up ‘traps of engagement’ or situations where some learning is almost inevitable if students are cognitively present (Cowan, 1998). Effective learning skills workshops involve repeated interactions that help first-year students build connections for retention and success (Grills, 2009). MacNeil, Wood, Zivakova, Glover, and Smith (2014) had success with using Learning Task Inventories for specific units in Organic Chemistry to encourage metacognitive skills, but still had the recurring issue of students’ underutilization of resources.

### Incentivizing Academic Support

In a large-scale study of Australian students, Paloyo, Rogan, and Siminski (2016) explored an inducement effect on academic support, in this case, Peer Assisted Study Sessions (PASS). Students in 14 introductory courses were randomly assigned to control and incentivized groups. While all students had access to academic supports for the class, those in the incentivized group were entered into a lottery for gift cards if they attended the PASS sessions. The incentive was contingent only on attendance rather than student performance outcome, “thus it is not likely that the lottery can increase, say, student motivation (and hence, student outcomes) unless it was through increased PASS attendance” (p. 17). Students in the incentivized group were less likely to attend zero sessions and more likely to attend eight or more sessions, even though the threshold for entry into the lottery was five sessions. In one term the value of the gift cards available was considerably larger than another term, yet the attendance was similar at approximately 19% higher for the incentivized group. It is important to note, however, that this inducement effect was centered on students from lower socioeconomic background areas. Paloyo et al. (2016) concluded that one hour of academic support improved course grades for the overall group by 0.065 standard deviations or 1.26 marks on a 100-point scale, which was not significant due to large variation.
The Study

Generic academic skills workshops address fundamental transferable learning and success skills for entering and returning students such as organization, time management, note-taking in lectures, reading textbooks effectively, summarizing and elaboration skills, test preparation, exam strategies and memory skills. These sessions are typically optional and non-credit bearing. The targeted workshops described in this paper are directed at high-fail entry level courses required to proceed in further studies within the discipline. Such gate-keeper courses are often perceived by students to have more demands and a higher workload, and thus are more likely to have students using a surface approach to learning.

Targeted workshops adapt the transferable skills from the generic workshops using course-specific materials. In cooperation with teaching faculty, I developed course-specific materials based on a task analysis of the demands of the course, question styles used by instructors for evaluation, ideal response samples, and recommended study strategies. For example, the generic workshop on multiple-choice strategies was adapted to use only potential test questions on material covered in the targeted course while the general note-taking workshop demonstrated active listening, recording, and connecting ideas from course lecture slides. Similarly, the generic memory strategies workshop presented the same transferable skills of encoding through summarizing, reorganizing, and rehearsing material, but all mnemonic examples were taken from lectures or textbooks used in the targeted course.

In preliminary offerings, these workshops targeted pre-professional programs including courses in Human Anatomy & Physiology, Biology, Sociology, Psychology, World History, and Music History. In the 2013-2014 academic year, learning skills workshops serviced 504 students in an institution with 2740 undergraduate learners (18%). The following year faculty and Student Services partnered to try and be more directive in getting students to workshops. In introductory biology, instructors strongly urged students receiving D grades or below on the first test to approach Student Services for support. Students in the introductory sociology courses received 5% participation marks for attending at least four learning skills workshops throughout the semester. For the 2014-15 year, total workshop attendance increased to 714 participants with a population of 2671 undergraduates (27%). Information was collected in accordance with TCPS2 (Canadian Institutes of Health Research, Natural Sciences and Engineering Research Council of Canada, & Social Sciences and Humanities Research Council of Canada, 2014, p. 18) guidelines for program evaluation activities used for improvement purposes (Article 2.5).

Results: Introductory Biology

First-year biology is a gate-keeper course for further studies in biology, as well as pre-professional programs in nursing, medicine, dentistry, and medical technologies. In the second term of 2013, the instructor for the preparatory or remedial biology class that marginal students must complete before their first attempt at introductory biology, invited me into the class. Working with the instructor, we demonstrated how to prepare study questions from the text, how to take more effective notes, and organization strategies for memory. This was the preliminary work for the targeted workshops the next academic year. In the first term of 2014, instructors informed the class that those receiving a D grade (50-59%) or less on the first test would be referred to Student Services for support and intervention. Faculty released the list of students who were unsuccessful on the first unit test and Student Services sent an electronic communication to each member of this cohort. The personalized message included information on available supports including the targeted learning skills workshops.

Of the 118 students on this list, 70 did not use learning skills while 48 attended at least one workshop. The average first unit test mark for students receiving a D or less was 45.57% (SD =
Attrition was examined both in terms of fall-to-fall rates and by academic performance as measured by grade point average for leavers (Figure 1). Not only were there lower attrition rates for workshop participants, but leavers who attended workshops had a higher cumulative GPA (2.33 and 2.31 compared to 1.91 for non-attenders) and so were more likely to have left for personal reasons rather than have been removed for poor academic performance.

However, the three attendance groups had unequal participants ($n = 70, 24$ and $24$ respectively), and there were comparatively more students with unknown high school grades in the group who chose not to attend academic support sessions. Unknown high school averages are more typical for learners who completed a General Education Development (GED) test or were admitted as mature students.

The comparison between groups of students who attend academic support sessions and those who do not are impacted by self-selection bias, in which pre-entry characteristics such as prior academic performance and motivation factors may figure. Yet de Boer, Donker, and van der Werf (2014) found no difference in learning interventions where “students or classes were randomly assigned to the experimental and control groups and those without random assignment” (p. 529). They suggest that this is because the experimental and control groups in their meta-analysis were matched on pre-test differences.

With this in mind, I used high school grades to match the larger group of students who did not...
attend workshops with those who did attend learning skills, and randomly selected for two groups of 48 students. Persistence measures on these two groups showed that more students who attended at least one learning skills workshop continued into the next year of studies (81%) than those not using this form of academic support (58%), \( \chi^2(1, N = 96) = 5.978, p = 0.014 \). In terms of academic performance, those who did not attend workshops had a lower sessional or yearly grade point average on a 4.3 scale (\( M = 1.76, SD = 0.92 \)) than those who did make use of this service (\( M = 2.18, SD = 0.86 \)), \( t(94) = 2.338, p = 0.022 \). Students who did not attend workshops also had a significantly lower cumulative grade point average after two years of study (\( M = 1.93, SD = 0.93 \)) than those who did use learning skills support (\( M = 2.32, SD = 0.80 \)), \( t(94) = 2.192, p = 0.031 \).

Regression analysis of sessional GPA using the matched groups indicated that the addition of learning skills attendance into the model was a small but significant increase in the variability accounted for by high school average alone (Table 1). When prior academic performance as measured by high school average is held constant, for every one learning skills workshop attended, we can expect a 0.11 increase in the sessional GPA (on a 4.3 scale).

### Results: Introductory Sociology

First-year sociology is preparation for continuing work within sociology as well as pre-professional programs in social work, nursing, and justice studies. Class participants were offered the carrot incentive of a 5% participation grade if they attended four or more workshops during the term. With the cooperation of two instructors, I examined workshop attendance for a total of 191 students with 59% of the cohort attending at least one session. There was no relationship between workshop attendance and either first test scores (\( r = -0.061, p > 0.05 \)) or high school average (\( r = 0.051, p > 0.05 \)).

There were no significant differences in prior academic performance as measured by high school average percentages for students not attending workshops (\( M = 78.34, SD = 8.86, n = 67 \)), those attending “some” workshops as defined by one to three sessions (\( M = 81.32, SD = 7.19, n = 31 \)), and those attending “most” workshops as defined by at least four of five sessions required to get the participation bonus (\( M = 79.58, SD = 8.74, n = 68 \)), \( F(2,163) = 1.32, p > 0.05 \). Workshop attendance significantly predicted final course grade in introductory sociology (\( t(161) = 7.015, p < 0.001 \)).

### Table 1

Regression table for sessional GPA in introductory biology

<table>
<thead>
<tr>
<th>Step</th>
<th>B†</th>
<th>SE-B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-3.181</td>
<td>0.927</td>
<td>0.519**</td>
</tr>
<tr>
<td>High-school average</td>
<td>0.064</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-3.040</td>
<td>0.910</td>
<td></td>
</tr>
<tr>
<td>High-school average</td>
<td>0.061</td>
<td>0.010</td>
<td>0.492**</td>
</tr>
<tr>
<td>Learning skills workshops</td>
<td>0.110</td>
<td>0.051</td>
<td>0.197*</td>
</tr>
</tbody>
</table>

\( R^2 = 0.269 \) for Step 1, \( \Delta R^2 = 0.038 \) for Step 2 (\( p < 0.05 \)). * \( p < 0.05 \), ** \( p < 0.001 \), students with unknown high school averages removed from analysis \( n = 86 \). †B = unstandardized coefficient; SE-B = standard error of the unstandardized coefficient; β = standardized coefficient.
Table 2
Regression table for course grade in introductory sociology

<table>
<thead>
<tr>
<th>Step</th>
<th>B</th>
<th>SE- B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-2.151</td>
<td>0.815</td>
<td></td>
</tr>
<tr>
<td>Test One scores</td>
<td>0.075</td>
<td>0.015</td>
<td>0.352**</td>
</tr>
<tr>
<td>High-school average</td>
<td>0.048</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-2.418</td>
<td>0.717</td>
<td></td>
</tr>
<tr>
<td>Test One scores</td>
<td>0.083</td>
<td>0.013</td>
<td>0.392**</td>
</tr>
<tr>
<td>High-school average</td>
<td>0.042</td>
<td>0.010</td>
<td>0.272**</td>
</tr>
<tr>
<td>Learning skills workshops</td>
<td>0.265</td>
<td>0.038</td>
<td>0.406**</td>
</tr>
</tbody>
</table>

\[ R^2 = 0.304 \] for Step 1, \[ \Delta R^2 = 0.163 \] for Step 2 (\( p < 0.001 \)), ** \( p < 0.001 \), students with unknown high school averages removed from the analysis, \( n = 165 \). \( \hat{B} \) = unstandardized coefficient; SE-\( \hat{B} \) = standard error of the unstandardized coefficient; \( \hat{\beta} \) = standardized coefficient.

Figure 2
Academic performance in introductory sociology by workshop attendance.1

1Introductory sociology course grade was significantly higher for workshop attendees, \( p < 0.001 \), Sessional GPA was significantly higher for workshop attendees, \( p < 0.001 \), and Cumulative GPA was significantly higher for workshop attendees, \( p < 0.01 \). Grades are on a scale of 0 - 4.3.
Students who did not attend learning skills workshops ended the course with a significantly lower course grade than those who attended most workshops, \( \text{Mann Whitney } U = 1492.50, z = -0.5725, p < 0.001, r = -0.46 \) (medium effect size; nonparametric measure was used as the variance of the groups was not homogeneous). When high school average and test one scores are held constant, for every one learning skills workshop attended, we can expect a 0.27 increase in course grade on a 4.3 point scale (Table 2).

There was significant variability in both the sessional GPA for students not attending workshops (\( M = 2.37, SD = 1.14, F (2, 188) = 4.692, p = 0.01 \)), and in the cumulative GPA of non-attenders (\( M = 2.38, SD = 1.10, F (2, 188) = 4.205, p = 0.02 \)). Therefore, I compared the academic performance of students not attending workshops (\( n = 79 \)) and those attending ‘most’ workshops (four or five sessions, \( n = 79 \)) non-parametrically.

The sessional GPA for students not attending workshops (\( Mdn = 2.66, SE = 0.13 \)) was significantly lower than for students attending most learning skills workshops (\( Mdn = 3.06, SE = 0.10 \)), \( \text{Mann Whitney } U = 2113, z = -3.50, p < 0.001 \) (Figure 2). Attendance at learning skills workshops significantly predicted grade point average for the year on a 4.3 scale (\( t (163) = 4.24, p < 0.001 \)). When high school average is held constant, for every one learning skill workshop attended, we can expect a 0.15 increase in sessional GPA.

Finally, the cumulative GPA for students not attending workshops (\( Mdn = 2.67, SE = 0.12 \)) was significantly lower than for students attending most learning skills workshops (\( Mdn = 2.97 SE = 0.09, U = 2221, z = -3.13, p < 0.01 \)). Cumulative GPA was also predicted by workshop attendance (\( \beta = 0.246, t (163) = 3.85, p < 0.001 \)). When high school average is held constant, every two learning skills workshops attended was associated with a 0.248 increase in cumulative GPA on a 4.3 point scale.

Discussion

Much of Student Services work is done behind the scenes in post-secondary institutions. The work of student affairs professionals is central to retention and engagement but may be viewed as lacking robust assessment measures. My aim in this study was to advance our understandings of the relative contributions of prior academic performance and learning skills support in attempting to frame our impact measures. While grades are often viewed as outcome measures for students’ cognitive effectiveness, they can also be tools for addressing institutional effectiveness (Keeling et al., 2008). High school average and first test results give an indication of students’ work prior to accessing learning support from Student Services.

In this study, all students were encouraged but not required to attend learning skills workshops which were redesigned to reflect specific course materials, design, and evaluation. Faculty described academic support services in their first-year classes, and directed students to workshops either proactively with bonus participation marks in the case of sociology, or more reactively after an unsuccessful first test in the case of biology. Workshop attendance was higher (59% of the class) with the positive reinforcement of bonus marks, while 41% of the biology class followed the instructor directive. It would be interesting to compare these participation rates with previous years without faculty actively encouraging attendance; however, this was not possible in this study due to lack of access to prior course records.

Across two very different introductory courses, learning skills workshop attendance was a significant predictor of student success. Students who attended learning skills workshops targeted for gate-keeper introductory courses ended the class with higher final grades, had higher sessional grade point averages, and higher cumulative GPAs. When high school average was held constant, every learning skills
workshop attended was associated with a 0.11 to 0.27 increase in sessional grade point average. In future work, measuring academic performance with course grades on a percentage scale would provide more precision than using grade point averages.

For both courses, there was no relationship between first test scores and workshop attendance. Nor could workshop attendance be predicted by prior academic performance as measured by high school grades. It was not the case that marginal students were more likely to seek support, nor were scholarship contenders more likely to embrace the bonus mark incentive. Prior academic performance was inadequate to explain students’ subsequent decisions to make use of the optional but incentivized learning skills workshops. As the workshops became viewed as a series – the Success Series – rather than isolated single issue ‘repair sessions’, they became part of the campus culture and were less likely to be viewed in remedial or punitive terms. Perhaps a survey of the entire targeted class or a review of campus-wide questionnaires (e.g., National Survey of Student Engagement) would be informative to further explore issues in the students’ decision matrix.

The fall to fall attrition rate for introductory biology students decreased from 42.9% for students not attending workshops after a poor performance on the first test, to 20.8% for students attending one workshop, down to 12.5% for students attending multiple workshops. Additionally, workshop participants who did not return to studies had a higher cumulative grade point average than non-participants, suggesting they were less likely to have been forced to leave by the institution due to poor academic performance. For future research, I would suggest workshop participants be interviewed to provide more qualitative information about reasons for leaving.

As more than thirty years of research has shown us, students enter post-secondary studies with a variety of inputs or attributes, which when combined with institutional experiences produce learning and/or leaving (Pascarella & Terenzini, 2005). Astin’s career (1996) has focused on the importance of student involvement in predicting retention and success, while others emphasize early contact and building connections (Tinto, 1993), or more simply, engagement (Kuh et al., 2005).

It is problematic to draw conclusions about students’ motivations and attendance at learning skills workshops when working from quasi-experimental studies in naturalistic settings with interlaced influences. However, students who attend multiple workshops gain more of a personal understanding of available resources than do learners who read about the Academic Skills Centre in orientation brochures. Knowing about academic support may help to reframe past performance in terms of controllable, unstable reasons which can be changed for the future (Weiner, 1986). Learning skills workshops incorporate active learning about specific tasks in the targeted course, with prompt feedback. Faculty express their high expectations of students when encouraging workshop participation in order to be more successful in their courses. The student-workshop leader contact is less formal than classroom experiences yet still regularized through weekly available sessions. Thus, the learning skills workshops encourage students to devote time and energy to purposive educational activities and follow the basic principles for good practice in undergraduate education (Chickering & Gamson, 1987).

The cooperation and dialogue between faculty and Student Services discussed in this paper is but one way of directly involving teaching staff in student affairs programs and services. Levitz and Noel (1989) wrote almost thirty years ago, “a caring attitude of faculty and staff is the most potent retention force on campus” (p. 66). Learning skills workshops supporting first-year courses are an effective partnership of concerned professionals working together for increased students’ success.

References


Slavin, A. (2007, September 10). Has Ontario taught its high-school students not to think? University Affairs. VIEW ITEM


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I would like to thank the faculty who collaborated on the targeted learning skills workshops described in this paper, and the enthusiastic students who participated in them.

Biography

Sheilagh Grills is a Learning Skills Specialist in Student Services at Brandon University. As a member of the Academic Skills Centre team, she helps students become more efficient learners through individual appointments and workshops. She also developed and teaches the transition to university success course Fundamentals of Inquiry.
Enquiry-Based Learning Online: Course Development and Student Experience of a First-Year Enquiry-Based Learning Seminar

Jacqueline Murray, University of Guelph
Nathan John Lachowsky, University of Victoria
Natalie Green, University of Guelph

Online courses are increasing in popularity while universities are using first-year seminars to address the challenges of large impersonal classes, lack of student engagement, and increased skills development. Could the learning experience and benefits of an in-person first-year seminar be achieved through an online distance education (DE) format? How would students’ experience benefit from an online DE first-year seminar? At the University of Guelph, an online interdisciplinary first-year seminar was developed and offered four times. This essay includes reflections from the faculty instructor and educational developer who co-designed the course, results from pre- and post-course surveys completed by students, and interviews conducted with students.

Across North America and beyond, universities are implementing various innovations to enhance student engagement and student learning. Various programs and pedagogies have been identified as high-impact educational practices, including first-year seminars, learning communities, collaboration, research, and experiential learning, among others (Kuh, 2008). One high-impact pedagogy that is particularly well suited to meet these learning goals and to foster student engagement is closed-loop reiterative enquiry-based learning (EBL). This pedagogy was originally articulated in medical education by Barrows (1986), who analyzed variations of problem-based learning to identify which best addressed students’ learning. In particular, Barrows wanted a pedagogy that would achieve learning goals such as structuring knowledge, problem-solving, self-directed learning, and enhanced motivation for learning, goals that were met by closed-loop reiterative problem-based learning. In order to avoid confusion with other pedagogies that in some way incorporate the use of problems or cases, Summerlee & Murray (2010) proposed further clarification, suggesting this specific pedagogy would be better termed closed-loop reiterative enquiry-based learning.

At the University of Guelph, EBL pedagogy has been used in various courses and topics, particularly in interdisciplinary first-year seminars, and has demonstrated significant results for student learning (Murray & Summerlee, 2007; Summerlee & Murray, 2010). The current study examines the process of developing and offering a first-year, enquiry-based seminar online. The experience of the instructor, instructional designer, and one of the students has been discussed previously (Murray, Giesbrecht, & Mosonyi, 2013). Here we will reflect upon the course development and report on the
research, over four cohorts of students (62 completed the course), to assess student engagement and learning outcomes. Thus, it will be possible to reflect upon the relative merits of EBL and online applications of EBL.

Closed-Loop Reiterative Enquiry-Based Learning

Closed-loop reiterative enquiry-based learning is rooted in constructivist learning theory and problem-based learning methods (Barrows, 1986; Hmelo-Silver, 2004; Kemp, 2011; Savery & Duffy, 2001). It is designed for students to develop skills and gain an integrated and sophisticated approach to understanding complex issues (Duch, Allen, & White, 1998; Murray & Summerlee, 2007). Enquiry places the emphasis of the learning process on investigation rather than finding information or answers. This reinforces the pedagogical intention to be process focused rather than content focused. Of critical significance, EBL slows the thinking process so students experience deep learning and deep understanding of the issues they are studying.

Enquiry-based learning is a student-driven pedagogy that provides learners with the opportunity to examine real-world, authentic problems, and engage in research and co-investigation to create knowledge. Students examine scenarios which are deliberately complex, even internally contradictory, contain limited information, and require further explanation and exploration. This creates the cognitive dissonance necessary for deep learning (Weimer, 2014). Scenarios cannot be understood upon superficial reading but need careful analysis through the three fundamental EBL steps. Students ask “What do we know?” and when everything is identified they move on to their burning question, “What don’t we know?” It is important that the facilitator(s) do not provide answers to these questions so that students are empowered to take control of their own learning rather than relying on the teacher to provide answers. In the final step, students identify “What we need to find out,” the learning issues they need to research. Each member of the group takes a learning issue to research individually and then presents the relevant and important information to help illuminate the problem and adds to the group’s understanding of the scenario. Research is presented to the group which then analyzes the scenario in light of this new information. At this point, the case may be explicated, or new learning issues may emerge, in which case the process begins anew. At every step, the group engages in group processing, in which each student and facilitator provide one piece of constructive feedback on recent contributions for every group member and themselves. This can take significant time, but, given the importance of group processing to student learning and the subordinate role of content over process, it is well worth it. Students receive continuous feedback and learn to give and receive constructive criticism without defensiveness. This process allows students to develop a realistic understanding of their own strengths and areas for improvement. In EBL, the cognitive load of working through complex problems is distributed among group members and, as research is conducted and discussion unfolds, members benefit from the group’s collective expertise (Hmelo-Silver & DeSimone, 2013). Moreover, through its various steps and processes, EBL addresses Chickering and Gamson’s (1987) criteria for good practice in undergraduate education, as well as Fink’s (2003) articulation of significant learning.

Enquiry-Based Learning Online

There are various examples of courses using problem-based learning (broadly defined) online, many of which report mixed reviews. Some courses introduced pedagogical flexibility or innovations to the process, or omitted or modified crucial steps, for example, in response to student discomfort with an unfamiliar pedagogy (Donnelly, 2004). Others struggled with the challenges of developing true online learning communities and collaborative rather than individual learning (Kear, 2010). Even courses that were deeply committed to the principles of closed-loop reiterative problem-based learning, as articulated by Barrows
and which were considered highly successful, nevertheless, omitted group processing in favour of generalized discussion (Kenny, 2006).

One of the central pedagogical features of EBL is that it is characterized by small groups that engage in regular, intense interaction at every stage of the process (except individual research). This intensity accounts for the significant social and academic outcomes, in terms of student engagement and learning (Summerlee & Murray, 2010). The challenge in developing the online course was how to capture the interactivity, collaboration, and learning experienced in classroom-based EBL courses. Our goal was to ensure that students could flourish in their individual learning communities and exercise their collective autonomy while being faithful to an unfamiliar medium, an unfamiliar pedagogy, and an unfamiliar degree of self-direction. These were some of the questions that underscored the development of the online seminar, UNIV*1150 “The Politics, Science, and Culture of Hunger.”

A number of classroom-based examples of EBL seminars provided the background and foundation to develop the online seminar. The instructor was experienced and had facilitated many EBL seminars at the first-year level, and this online course was similarly offered exclusively to first-year students. One particular benefit of the instructor working closely with the instructional designer was the ability to outline not only what happens at each stage of learning, but also what was the intent, and what the various responses from students might be.

Online EBL requires a different pedagogical approach than most online courses because the learning is driven by a process of enquiry and the students decide what, when, and how they learn (Savin-Badin, 2007). The pedagogy is process-oriented rather than content-oriented. Consequently, the course design centred on process-related supports and tools to foster student-facilitator, student-student, and student-content interactions, rather than the typical content-based, modularized approach to online courses (Anderson, 2008).

It was important to balance the pedagogical imperatives and learning outcomes of closed-loop reiterative EBL, as facilitated in-class, with the unique differences and affordances of an online learning environment. Similar to any in-class to online course conversion, adapting EBL online required redefining the learning design rather than repackaging in-class practices and posting them into a learning management system. Consequently, moving EBL online required considerable planning before implementation. As part of good instructional design practice, the design needed to look at the learning goals and outcomes, the assessment, and how these constructively aligned (Blumberg, 2009). Further, the success of EBL online necessitated a course framework that supported the enquiry process as well as the social dimension of learning (Kahn & O’Rourke, 2004). As a result, the course design for UNIV*1150 structured the stages of enquiry and collaboration through pedagogical supports and online technologies.

In an in-class EBL course, interactions are time-based and generally occur within the constraints of the institution’s course scheduling. However, UNIV*1150 was conducted in an asynchronous online environment. Consequently, the course design was structured to provide group members with continual opportunities for interaction. Students were able to contribute research and post messages to their group at any time that was personally convenient. The facilitator was able to check on individual and collective progress to ensure the group worked in a timely manner. Group interactions evolved continuously, over a few days, which afforded students flexibility and autonomy in their self-directed learning. This also provided students with time to reflect on their own contributions and those of their peers, and to engage in deeper conversations, as well as to exercise individual self-governance, something that has been linked to success in online collaborative learning communities (Kenny, 2006; Lin & Vassar, 2009).

Like all enquiry-based learning courses, EBL online was not content-based, thus, clear student expectations needed to be made explicit from the outset. The learning environment was organized into sections that outlined the course syllabus, evaluation criteria, schedule, and course information, expectations, and a variety of supports around EBL and course technologies. The section about EBL outlined the learning process, providing students with
written instructions that were supplemented by a multimedia object that provided a step-by-step guide through the EBL process. A video of students working through an in-class EBL scenario provided a model to help online learners visualize the process (Kahn & O’Rourke, 2004). To foster successful collaboration and shared understanding, learning groups were also provided with materials that discussed working in groups, setting ground rules, and creating action plans (Goldring & Wood, 2009).

The primary mode of assessment in the course focused on the analysis of the cases. These helped the students develop competency in areas such as identifying and analyzing complex questions and critically evaluating information from multiple sources. Students were assessed on the quality and regularity of their participation, the quality of their analysis and research contributions, and the effectiveness of their presentations. As with in-class EBL, this assessment was based on peer and self-evaluation in the form of regular group processing. This was formalized at mid-semester and the end of the semester by lengthier written assessments using rubrics. Students had two opportunities for formal written assignments, which were graded by the facilitator. First, at mid-semester, students critically reflected on issues raised in the course and how their personal understanding of world hunger had evolved. Second, at the end of the semester, students individually analyzed a final case assignment that allowed them to deploy the skills they had developed over the course.

Online courses at the University of Guelph are facilitated through the Desire2Learn Brightspace learning management system. Within this environment, a course website served as an interactive hub to connect students through discussion forums and to link them to external tools that supported the enquiry-based analysis and research process. Because the course required high levels of interaction and collaborative writing, the SECTIONS model (Bates, 2015; Bates & Poole, 2003) was used to assess which tools would ensure students’ ability to share and edit ideas quickly while promoting the development of a learning community (Palloff & Pratt, 2005).

**Wikis: Brainstorming and Presentations**

In the classroom, EBL relies on educational technologies such as chart paper or a whiteboard, which learning groups use to visualize and guide their thought processes (Hmelo-Silver, 2004). In UNIV*1150, a wiki was integrated to support active brainstorming and collaboration. Wikis facilitate the production of collaborative texts and let group members add content and edit what has already been published, without requiring all members to be online simultaneously. Collaboration in EBL often requires prompt feedback, so a wiki allows concurrent editing and the tracking of individual contributions, while still operating in the context of an asynchronous course.

Each learning group had its own private wiki site to ensure groups had the flexibility to evolve the environment as they wished, without outside observers. The framework for the wiki supported pivotal points in the collaboration process and helped to encourage group members to be actively involved (Hmelo-Silver, 2004).

For each case, the navigation consisted of individual web pages for analysis, research, and presentation, pre-populated with headings and guidance. This structure provided groups with scaffolding to promote self-directed learning, as well as a starting point until they were able to self-organize...
and acquire confidence in constructing and modifying their contributions (Vygostky, 1978; West & West, 2009).

As students worked through the cases, the processes used to understand the scenarios were frequently the key learning outcome. For other cases, the outputs were more concrete such as a project proposal to an organization. In both types of cases, the artefacts illustrated how individual contributions and collaborative synthesis worked together. These were archived so that students could iteratively engage in reflection and peer and self-assessment.

Collaborative work on the wiki site aimed not only to help students develop research, writing, and editing skills, but also skills in information and digital literacy. Because the environment was open to all group members, each student’s contributions were subject to scrutiny, constructive criticism, and peer editing. This can be a challenging experience for students, however, they learned to negotiate control over this shared workspace and to build trust and mutual confidence that the outcomes of their collective contributions would result in a deeper level of learning and a stronger final product (Gokhale, 1995; West & West, 2009).

Discussion Forums: Community Building and Interactivity

Discussion forums served to accommodate normal course communication and allowed learning groups a private place in which to present and elaborate on ideas asynchronously. Discussion forums were used in a variety of ways, from those designed to foster social interaction to those focussed on the EBL process and case analysis.

The development of a learning community is indispensable to the EBL pedagogy. A learning community can be defined as a community that “consists of learners who support and assist each other, make decisions synergistically, and communicate with peers on topics beyond those assigned” (Boettcher & Conrad, 2004, p. 120). Through their interactions, members of the community construct knowledge as they internalize what they are learning from each other (Vygotsky, 1978). In online EBL, the transformation of groups into true learning communities encourages the development of knowledge, competencies, and mutual respect.

A successful collaborative environment is contingent upon the creation of a learning community and therefore community-building opportunities were integrated into the course from the start (Palloff & Pratt, 2005). In UNIV*1150, an introductory activity framed by guiding questions provided each learning group with an opportunity for social interaction. Additional forums encouraged students to share interesting information and resources with their peers and to connect socially on topics beyond the purview of the course. This process was also intended to reduce social isolation, impersonality, and social loafing by facilitating interaction between group members and enhancing their online social engagement (Kear, 2010; Swan, 2002). Through open discussion, students develop confidence in communicating online and with navigating the online environment. The goal was to develop a strong sense of community within each learning group, not only to develop the group but also each individual member (Palloff & Pratt, 2005).

A considerable amount of discussion and collaboration occurred in the case discussion forums. Forums were structured to model the EBL process and the stages of collaboration. A learning group would request the facilitator to open a discussion forum dedicated to the scenario. As groups engaged in various stages of the case, they accessed forums that contained exhibits or resources or further information, which they discussed in-depth and integrated with their research posted on the wiki. They also used forums to conduct group processing. Discussions supported the consolidation of learning during the analysis of a scenario and at the end of a case and provided groups with the opportunity to reflect on what they had learned and how effectively they had collaborated. These discussions promoted the transfer of learning to subsequent cases (Hmelo-Silver, 2004).
Peer and Self-Assessment

Regular group processing is crucial to the success of EBL. It provides students with practice in giving and receiving constructive feedback fairly and without defensiveness. Students come to a deeper understanding of their own strengths and areas for improvement and how they function as a member of a team. Regular group processing in the forums prepared students for the more in-depth and formal written peer- and self-assessment exercises. The Peer Evaluation, Assessment and Review (PEAR) tool, developed at the University of Guelph, was selected to support this process. Using a Likert-scale and open-ended questions, organized under four rubrics reflecting different areas of activity and skill development, students reflected on their own participation and that of each member of the learning group, including the facilitator. The open-ended questions required students to address the strengths and areas of improvement under each rubric, avoiding formulaic compliments. The assessments were not anonymous, which ensured mutual accountability and ultimately reinforced trust among group members. Once the assessment period ended, students could access their assessments to reflect upon their performance and address the areas suggested for improvement.

Having developed an online course design that suited the pedagogy, it was imperative that we engage in research into the outcomes of this experiment.

Research Methods

This study used a mixed method approach, combining quantitative and qualitative methods, to assess student experience and outcomes. Participants were first-year students enrolled in the course in one of four offerings (2011-2014); we invited all students to complete quantitative questionnaires anonymously, online, at the beginning and end of the semester. At the end of the semester, we invited participants to complete a qualitative semi-structured individual interview or participate in a focus group. The second author, who had no connection to or instructional responsibilities for the course, recruited the participants and conducted the interviews and focus groups. The focus groups were mixed across instructional sections. Written informed consent was secured from each participant prior to both the quantitative and qualitative portions of the study. We did not provide honoraria or reimbursement for participation. The University of Guelph Research Ethics Board approved the study protocol (REB#11MR017).

Three quantitative questionnaires asked students to reflect upon their experiences with technology, learning skills, and research resource use. In the first year the course was offered, only the research resources questionnaire was administered because ethics approval was still pending for the other two questionnaires. The questionnaires took approximately 15 minutes to complete and were a mix of closed-option yes/no and Likert-type scale questions. The data were collected electronically, imported into Stata/SE 13.1 software, and coded for the time of the survey (pre/post, indicating the beginning and end of the semester) and year (2011, 2012, 2013, and 2014). Descriptive statistics were prepared as counts (n) and proportions (%) or means (for Likert-scale questions). We used multilevel mixed-effects linear regression, with instructional year included as a grouping variable, to account for the fact that students completed both pre- and post-course surveys within the same year (p < 0.05 was considered a statistically significant difference).

The qualitative individual interviews and focus groups were conducted in a small room on campus using the same semi-structured question guide, which asked students to reflect upon the experiences in the course, how it differed from other courses, what and how they learned, the group-learning approach (enquiry-based learning), the interdisciplinary nature of the class, the online format, and the impact the course may have had on extra-curricular activities and their future plans. The sessions were audio-recorded, transcribed verbatim, and anonymized. We analyzed the transcripts using an iterative approach, reading and re-reading the transcripts and selecting exemplar quotations, which
Research Results

Quantitative Results

Students completed a total of 106 questionnaires, 64 at the pre-course time point and 42 at the post-course time point. There was no statistically significant difference in the number of surveys completed by time point and year \( (p = 0.277) \). A total of 12 students participated in the qualitative arm of the study: three completed individual interviews and two focus groups were held, one with five participants, the other with four participants.

Among the significant outcomes, the questionnaires revealed that the majority of students (57.1%) spent 1-2 hours per day on the course, with another third indicating they spent 3-4 hours per day. This is a significant time commitment for first-year students to give to an elective course. One student reported, “I got so engaged in it that I would spend a couple of hours a day on this course alone,” suggesting that there was sufficient interest inherent to the course that it should garner such a significant investment of time. Only one-quarter of students had previously taken an online course. Although two-thirds of the students said that they would take an online course in the future, over three-quarters (76.2%) said they would take this exact course again.

The majority of students reported that the various technological components of the course were easy to use. Only one-third of students consulted the technology help desk during the semester (Figure 1). While over one-third of students indicated that technological glitches hindered their learning, nearly two-thirds reported that the course increased their ability to use technology.

In terms of the PEAR tool, the wiki tool, and the discussion forums, the majority of students agreed that the instructions were clear, that these tools were easy to use, and that they were useful to their learning. That is not to say that some students did not experience technology anxiety or other challenges. One student explained:

I had a lot of frustration at some points, just because of the age we’re at, we were raised with computers. I just kind of expected to walk in and get it and that everything would be there. Eventually, once we actually paid attention to what everything was supposed to do, and once I actually took the time to read all of the posts about that, then everything made so much more sense and it ended up being like a really good course. I feel like I learned a lot.

Figure 1

Student assessments of technology-related experiences (percentage of received responses)
This student reveals student expectations that technology be readily accessible and impatience when confronted with unfamiliar or complex systems. Once students read the directions about the structure and learning technology, which had been very carefully planned in advance, it became clear and worked well. It is also significant, given EBL’s goal to slow down the thinking process, that the student recognized that the way to master navigation was to read the directions and follow them, rather than to approach it randomly and impulsively.

Students reported their level of comfort with various technologies on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree) at the beginning and end of the semester. After taking the course students reported statistically significant increases in their comfort using the Chat tool, adding pages to a Wiki, and embedding images and videos into a Wiki page (all $p < 0.01$). As one student summarized the technological experience, “because [the course] was online it forced me to really get to know my computer, which was a very important thing. And I also had people there to help me with my computer, which was good.”

Students rated their learning skills on a five-point Likert scale (from 1 = not at all to 5 = a very considerable amount) at the beginning and end of the semester. Three statistically significant changes were found (Figure 2). Students reported a decrease in library usage ($p = 0.007$). This is not to say students stopped going to the library, especially at the beginning of the semester. One student noted that “two of us went to the Research Help in the library in the first week and [learned that] this is what we need to do and this is what I can do.”

The decrease can likely be attributed to two factors. First, the very nature of an online course will reinforce electronic, Internet-based research; what is truly important is that the electronic sources that students consult become increasingly authoritative and reliable. Second, the mode of research presentations was also online and the wiki encouraged a variety of modes of presentation that moved beyond a conventional essay or classroom presentation. Thus, students encouraged each other to pursue research outside traditional library resources. For example, one student said, “I was told to use more ways of research and I was told to even try YouTube and I had never thought of that before, but after that you start using videos and stuff.” In the process, many students came to see research as in-depth, engaging, enjoyable, and encouraging of intellectual engagement. Thus, while library usage, understood to be actual visits to the library building, may have decreased, attentiveness to

![Figure 2](image-url)

Figure 2
Changes in students’ self-assessed learning skills on a scale of 1-5
the quality and quantity of research were clearly heightened and students appreciated that their research skills would subsequently prove useful.

The questionnaires reveal a drop in students approaching off-campus experts \((p = 0.045)\). There is little qualitative discussion to account for such a drop. Indeed, the anecdotal evidence of the facilitator would counter this perception. There was a high level of approaching experts who could provide specialized advice on issues. This included scientists developing innovations to alleviate hunger, officials at the IMF and the World Bank, interaction with the Executive Director of Meal Exchange, the President of Campbell’s Soup, and a building contractor. In other words, there was considerable interaction with a variety of experts. The question remains, why was this not the students’ perception? Did they have a different understanding of what constitutes an expert?

Finally, students reported an increase in their ability to analyze complex issues \((p = 0.012)\). Indeed, “problem-solving,” which came to be shorthand for the analysis of issues, was identified as an important transferable skill students would bring to further studies. This is an expected outcome of the process of EBL, which slows down the thinking process and heightens students’ consciousness of critical thinking and analysis. As one respondent astutely summarized:

I think in like normal academia we just rush through those steps. So it was really interesting for the course to slow down the mental processes and really break everything down because I think we do that subconsciously but we do it really quickly. It was interesting to slow down and see the processes, see the steps that we go through [in analyzing].

Thus, the acquisition of analytical skills was one of those most explicitly understood and appreciated by the students.

The final quantitative questionnaire asked students to rate their frequency of using various types of research resources on a five-point Likert scale (from 1 = never to 5 = always) at both the beginning and end of the semester. The three most popular resources pre-seminar were the Internet, journal articles, and course guides. After the course, the Internet and journal articles remained the top two most frequently used resources, but government reports and statistics were the next most frequently consulted. Students reported that they used library search engines least frequently. One statistically significant change was the students reported decreased reliance on the professor \((p = 0.008)\). One student noted, “if we want more content, we make more content. We have the control.” Given that one of the goals of EBL is to help students become independent and autonomous learners, this is an excellent observation.

Qualitative Results

The analysis of the qualitative information focused on four major themes: 1) the EBL format, 2) critical thinking and analysis, 3) collaborative learning and teamwork, and 4) research. Students perceived the value of the EBL process and applied it in other contexts. One reported, “I was telling my roommates how to use the ‘what we know, what we don’t know and learning issues.’ I was like, ‘Guys, seriously. This course I am taking helps you break down everything’.” The excitement and appreciation for this mode of learning are reflected in the words of another student, “I used it to write an essay for a different class and my friends thought I was crazy because I was so happy. I was ‘Look at this! Look at this outline! I am so set!’ and I have never written a better essay.” The EBL course also helped students develop resilience when confronted with a difficult problem. One student revealed that “I learned that sometimes you have to do stuff you don’t want to do, and you don’t understand how to do it, and you have to learn to work through that.”

A number of students agreed that slowing down the thinking process enhanced their analysis. One reflected that “I think when you have something that’s really big [and] you have to figure out what the actual problems are . . . you take it slow and figure it all out.” This was a skill that some students applied in other courses. “I’ve started just analyzing things in my other courses without even thinking about it, [and] probably think a lot more critically in my other courses.”
Students discussed how they worked as a collaborative team, and the importance of this opportunity to develop group skills. Group processing is central to developing group cohesion and collaboration. One student noted:

I thought that was one of the best things about that course, that there was the constant group processing. I remember one of my reviews was saying that they would like me to develop and provide examples of how they can improve personally, so through that they want to learn themselves and they want me to learn as well.

Others reflected on the team that developed in the semester and where it might go in the future. “We were talking about how we make a great team and how we would like to continue for organizations in the school, how we could come together in future years. That was really nice, to develop that teamwork.” Another commented on future plans:

I am so excited, I just have so many things that I want to do for next year! And I know that I can handle it and it’s because of this course and knowing all my strengths as a leader, or just as a team member. It’s really really affected how I am going to get involved next year with the university.

Thus, the EBL experience helped students develop the skills of collaborative learning and envision themselves as members of a team in various settings, including voluntary and extracurricular activities.

Finally, in terms of research skills, one student exclaimed, “I learned so much in this course, about the content as well as research. I was terrified of researching and this helped me so much. I can go back and I can say in this case I learned this and it’s really nice that you actually know that you are learning something. You actually learned it, not just memorized it.” Students also developed an appreciation for, even enjoyment of, the research process. One student observed that “if you are interested [in your learning issues] and if you are passionate about it, you can spend five hours researching it and not feel like it was five hours.” In EBL students are encouraged to enquire deeply into a topic rather than accept the information in the first source they encounter. This, too, was appreciated by students. “There are so many questions going inside of your head when you are doing research and you are slowly trying to just research one thing at a time and from that it leads to another question when you can just write them all down and make logical sense.”

Conclusion

The experience of UNIV*1150 demonstrates how to deliver closed-loop reiterative enquiry-based learning in an online environment. Careful collaboration between the instructor and instructional designer resulted in a course informed by pedagogy, using good course design practices, and appropriately selected technologies that reinforced each step of the EBL process. Enquiry-based learning requires deep, close, and high-functioning learning communities of students. The trust that develops among a group, as a result of continuous assessment in group processing, leads to cohesive learning communities and supports student learning. This is in distinction to online courses that struggle with social loafing, disengagement, and miscommunication. Research on four cohorts of students reveals that they have developed significant critical, analytical, and presentation skills along with greater ease and fluency in using technologies. A major goal of EBL is to empower students to take control of their own learning and become more autonomous and less reliant of faculty and authority figures. Importantly, our results reveal that students were conscious of how they grew and developed as learners.

The outcomes of this course should encourage the development of other online EBL courses. With instructor and instructional designer working as an integrated team, it is possible to develop a course that implements learning technology and does not compromise, but indeed enhances, the essential elements of enquiry-based learning.

References

practice of online learning (2nd ed.) (pp. 45-74). Edmonton, AB: Athabasca University Press.


Fink, L. D. (2003). What is "significant learning"? University of Oklahoma. VIEW ITEM


Association of American Colleges and Universities. VIEW ITEM


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**Biographies**

Jacqueline Murray is Professor of History at the University of Guelph where she also served as Dean of Arts (2001-2006) and as Director of the First-Year Seminar Program (2011-2016). She earned a BA from the University of British Columbia, and an MA and PhD in Medieval Studies from the University of Toronto. Jacqueline is engaged in the Scholarship of Teaching and Learning, focusing on the impact of first-year seminars and the transformative power of enquiry-based learning. She has published articles in the *Canadian Journal of Higher Education*, the *Canadian Journal of the Scholarship of Teaching and Learning*, and *Collected Essays on Learning and Teaching*. Her teaching has been recognized by a number of awards including a 3M National Teaching Fellowship (2014).
Nathan Lachowsky is an Assistant Professor in the School of Public Health and Social Policy at the University of Victoria. He earned a BSc and PhD from the University of Guelph. He was awarded a Teaching and Career Development Fellowship to design and offer an enquiry-based learning seminar in the First-Year Seminar Program. Nathan is engaged in the Scholarship of Teaching and Learning, focusing on rigorous evidence-based research on the impact of pedagogy and practice. He is an instructor of both classroom-based and distance education courses, and has a particular interest in technology-enhanced learning.

Natalie Green is the Manager of Distance Education in the office of Open Learning and Educational Support at the University of Guelph. She earned a Master’s degree in Educational Technology from the University of British Columbia, a Certificate in New Media from Sheridan College, and an Honours Bachelor of Arts degree in Art History and Fine Art from the University of Guelph. Natalie leads a team of instructional designers to design and develop online undergraduate, graduate, and non-degree courses and programs and provides leadership to a broad cross-functional team responsible for the delivery of distance education offerings.
The Development and Delivery of a Multidisciplinary Research Course for First-Year International Science Students

Priyanka Lekhi, Meghan Allen, Fok-Shuen Leung, Brett Gilley, Georg Rieger, and Joanne A. Fox
University of British Columbia

Students who engage in undergraduate research experiences acquire many benefits, including an understanding of how scientific knowledge is constructed, recognition that knowledge can be complex and uncertain, and the habit of viewing knowledge critically. This paper describes a first-year two-course sequence that provides multidisciplinary opportunities for international science students to engage in the research process and present at a student-led research conference. We describe course goals and structure, and discuss whether the goals were attained using instructor reflections, student performance, and student survey data. We also evaluate the impact of changes to the curriculum between Year 1 and Year 2. In both years, we found that students engaged meaningfully with the research process and began to understand how scientific knowledge is created. We also found that a modular model with front-end support worked better for instructors as compared to a continuous individualized project mentorship model. This modular approach involved structured pre- and post-class assignments within discipline-specific themes containing examples of the research process embedded into the discipline. These discipline-specific modules were followed by modules covering broader research process themes. We encourage instructors who are thinking of delivering a similar research-based course for first-year students to provide support via example research questions and other example templates for student submissions.

It is important for undergraduate science students to develop an understanding of how scientific knowledge is constructed, to begin viewing science as complex and vulnerable to criticism, and to start seeing themselves as potential contributors (Fox et al., 2014; Magolda, 2006; Wieman, 2012). This set of goals is epistemic in nature (i.e. related to views of knowledge) (Hofer & Pintrich, 1997). On a course level, active learning techniques and undergraduate research opportunities are effective ways to achieve these goals (Healey & Jenkins, 2009; Schalk, McGinnis, Harring, Hendrickson, & Smith, 2009; Thiry, Laursen, & Hunter, 2011; Watkins & Mazur, 2013).

Student benefits from undergraduate research experiences are well-documented (Adams et al., 2006; Healey, 2005; Seymour, Hunter, Laursen, & Deantoni, 2004) and include understanding the nature and development of scientific knowledge, recognizing that knowledge is complex and can be uncertain, and viewing knowledge critically (Healey, Jenkins, & Lea, 2014; Magolda, 2006; Seymour et al., 2004). Undergraduate research projects are one way to give students the experience of knowledge...
construction and the realization that they are themselves a source of knowledge (Thiry et al., 2011). First-year university students tend to view knowledge as certain, finite and explicit, and look towards external authorities, such as instructors, as holders of knowledge (Abd-El-Khalick, 2006; Hofer, 2004; Schommer, 1993; Tsai, 1999). These views are inconsistent with the epistemic goals of undergraduate science education. In order to correct students’ naïve views of knowledge over their undergraduate degrees, it is important to engage them in the research process from their first year (Healey et al., 2014). Further, Rodenbusch, Hernandez, Simmons, and Dolan (2016) recently found that first-year science, technology, engineering, or math (STEM) students who participate in a one-year research experience are more likely to graduate with a STEM degree than their peers who did not have a one-year research experience. This paper describes a two-course sequence that provides opportunities for first-year science students to engage in research and present at a student-led research conference.

We designed a multidisciplinary research experience in a two-course sequence for first-year science students as part of an enriched first-year program. The overall goal is to engage students in research, and through that process, foster sophisticated epistemic views of scientific knowledge — namely, that it is created, not handed down; that it is complex and uncertain, not simple and certain; and that it is something students are capable of contributing to, not the property of an external authority (Magolda, 2006). Drawing on the notion of Community of Practice (Lave & Wenger, 1991), this course sequence engages a cohort of students and their faculty mentors in an authentic first-year research experience. Students collaborate on projects under the guidance of a faculty mentor, with the aim of adopting an apprenticeship model where the faculty mentor encourages every student in the program, as apprentice scholars, to adopt multidisciplinary lenses as they pursue a project of their own interest (Rogoff, 1990).

The course sequence has been offered twice, and although the overall goal of the course remained consistent over the two offerings, the curriculum changed significantly from Year 1 to Year 2. These changes were mainly driven by instructor reflections and student comments and were intended to address challenges faced in Year 1.

In this paper, we address two questions: 1) to what extent were the course goals achieved and 2) what impact did the curriculum changes have? Before addressing these two questions, we outline the goals for the course and describe the course context and curriculum for Year 1 and 2.

Course Goals and Learning Outcomes

An interdisciplinary team of instructors from the Faculties of Arts, Education, and Science at the University of British Columbia developed the course-level goals for this sequence of first-year research project courses. The first course in this sequence (VANT 148) was designed to provide students with opportunities to:

- extend discipline specific classroom learning;
- transition to University and undertake apprentice scholarship;
- engage in multidisciplinary ways of knowing;
- apply course concepts through project-based learning, including the creation of learning artifacts for both peers and the wider UBC community;
- acquire and improve English for Academic Purposes;
- work with a faculty mentor; and
- be motivated and inspired to pursue courses of their interest in their 2nd year.

The second course in this sequence (VANT 149) included a student-led academic conference experience and was designed to provide students with opportunities to:

- participate in multidisciplinary discussions with their peers (both within and outside their selected discipline) on current theories and issues;
- extend their classroom learning by formulating and proposing a collaborative, novice research project under the guidance of
their faculty mentors;
• do research and present to their peers as apprentice scholars at the capstone conference;
• acquire professional skills, including event planning, networking, leadership, and teamwork; and
• further develop their English for Academic Purposes.

The overall goal for this two-course sequence was to engage students in research and foster sophisticated epistemic views. This goal was broken down into four main student learning outcomes (Table 1).

Course Context and Curriculum

Students in Vantage One Science are all first-year science students, English language learners, and are typically from outside of Canada and the United States. The Vantage One program is taught in small class sizes, with tutorial sections of 15-26 students and lecture sections with typically fewer than 75 students. Students in the program are all enrolled in the same core courses and have some choice of electives. The core of the Vantage One program includes embedded Academic English courses. The instructors who teach in the program have multiple opportunities to work with colleagues across disciplines. The Vantage One program is a first-year program at the University of British Columbia, a large research-intensive university.

As shown in Figure 1, the VANT 148/149 course sequence takes place over three terms. It is taught by a team of five instructors from Chemistry, Computer Science, Earth Sciences, Mathematics, and Physics. In terms 1 and 2, students describe and explore the elements involved in the research process, understand key similarities and differences in research across disciplines, and extend discipline-specific concepts (VANT 148). In term 3, students apply the elements involved in research to carry out a research project and present their findings at a student-led academic research conference (VANT 149).

Table 1

<table>
<thead>
<tr>
<th>VANT 148 and VANT 149 Student Learning Outcomes</th>
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</thead>
<tbody>
<tr>
<td><strong>Learning Outcome 1</strong></td>
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<tr>
<td><strong>Learning Outcome 2</strong></td>
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<tr>
<td><strong>Learning Outcome 3</strong></td>
</tr>
<tr>
<td><strong>Learning Outcome 4</strong></td>
</tr>
</tbody>
</table>
VANT 148

VANT 148 is the first course of the two-course sequence. It takes place over two terms (8 months) and consists of activities that prepare students to carry out their research project in VANT 149. The last assignment in VANT 148 is for students to submit a research proposal. Although the student learning outcomes for VANT 148 remained consistent, the curriculum in Year 1 and Year 2 differed considerably. These changes were mainly driven by instructor reflections and were intended to address challenges faced in Year 1.

Year 1 (Pilot Year)

The curriculum approach in Year 1 was to discuss broad research themes, embed examples of discipline-specific research, and rely on continuous, individualized faculty mentorship to support students. This modelled a traditional academic research experience in which a small number of students work closely with a single supervisor. We also used an experiential pedagogical approach in which students were assigned to make a meaningful measurement to answer a simple question in the second week of the term. Their measurement served as a concrete example for them to revisit throughout the term.

The course structure included bi-weekly, 1.5-hour lectures with the whole cohort (approximately 100 students). In term 1, the lectures revolved around generating a research question. Within each lecture, research questions from different disciplines were discussed. For example, the Chemistry-themed lecture included examples of questions such as, “How can we speed up the degradation of polymers?” and “How can we make a drug more bioavailable?” In addition, each lecture included personal research stories. In term 2, the bi-weekly lectures revolved around the research process. Topics in term 2 included “the importance of consulting literature in research” and “how to read a research article”. The team of instructors delivered the bi-weekly lectures in rotation, but all instructors were present and participated in all lectures.

In addition to the bi-weekly lectures, students also attended weekly one-hour seminars of 15-26 students in term 1 and small group meetings of 2-4 students in term 2. The seminars and meetings were all led by an instructor.

In term 1, students evaluated their initial measurement assignment in relation to the seminar's topic. For example, during the seminar on “Judging your results: are they statistically meaningful?”, students were asked to refine their measurement for repeatability and determine an average and standard deviation. Table 2 shows an example of the topics discussed in the weekly seminar. In term 2, students
Table 2

Example of topics covered in the weekly seminars in term 1 of Year 1

<table>
<thead>
<tr>
<th>Week</th>
<th>Weekly Meeting Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>NO MEETING</td>
</tr>
<tr>
<td>2</td>
<td>Introductions, what is research? Assignment #1</td>
</tr>
<tr>
<td>3</td>
<td>Keeping a journal or logbook</td>
</tr>
<tr>
<td>4</td>
<td>Developing a research question and identifying the relevance of a research project</td>
</tr>
<tr>
<td>5</td>
<td>Designing a procedure and collecting data and observations</td>
</tr>
<tr>
<td>6</td>
<td>Finding literature to support your research and theorizing your research</td>
</tr>
<tr>
<td>7</td>
<td>Judging your results: are they statistically meaningful?</td>
</tr>
<tr>
<td>8</td>
<td>Identifying limitations of a research project</td>
</tr>
<tr>
<td>9</td>
<td>Illustrating your results</td>
</tr>
<tr>
<td>10</td>
<td>Peer review process: giving and receiving feedback</td>
</tr>
<tr>
<td>11</td>
<td>Project feedback exchange</td>
</tr>
<tr>
<td>12</td>
<td>Presentation skills</td>
</tr>
<tr>
<td>13</td>
<td>Presentations</td>
</tr>
</tbody>
</table>

summarized pre-selected entry-level research articles so that they could practice reading scientific literature. In preparation for their research in term 3, students also identified their research question, completed a literature review for their research question, and followed a template to write a research proposal. All assignments were completed in pairs and consisted of two drafts. During the group meetings, the instructor led discussions on how to improve first drafts. The assignments are summarized in Table 3.

Year 2

The same instructor team from Year 1 taught in Year 2. In Year 2, there was less reliance on faculty to provide continuous and individualized support for student project development, and more front-end support. Similar content was presented, but in term 1 it was delivered in discipline-specific modules with examples of the research process embedded into each discipline. This was followed in term 2 by modules on broader themes, including Data Collection, Literature Review, and Writing a Research Proposal. Each three-week module included a pre-assignment, a lecture with the entire cohort led by one or two instructors, a post-assignment, and office hours (Table 3). The post-assignment in each module included a research-related task. For example, students were given data from a particular discipline and asked to represent the results in a meaningful way. Figure 2 provides an overview of the Chemistry module as an example. Instructors developed and delivered the module that related to their own
Table 3

Summary of Assignments in VANT 148 and VANT 149 for Year 1 and Year 2

<table>
<thead>
<tr>
<th>Assignment List</th>
<th>Year 1 (Pilot Year)</th>
<th>Year 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>VANT 148</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Term 1</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• A one-page report summarizing a measurement (individual)</td>
<td></td>
<td>• Computer Science module: pre- and post-class assignment (individual)</td>
</tr>
<tr>
<td>• Note-taking during large lectures (individual)</td>
<td></td>
<td>• Earth Sciences module: pre- and post-class assignment (individual)</td>
</tr>
<tr>
<td>• Report on a 2nd measurement - Draft 1 (pairs)</td>
<td></td>
<td>• Math module: pre- and post-class assignment (individual)</td>
</tr>
<tr>
<td>• Report on a 2nd measurement - Final draft (pairs)</td>
<td></td>
<td>• Data Collection module: pre-class assignment (individual) and report on a measurement (pairs)</td>
</tr>
<tr>
<td><strong>VANT 148</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Term 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Read and summarize two provided research articles (individual)</td>
<td></td>
<td>• Physics module: pre- and post-class assignment (individual)</td>
</tr>
<tr>
<td>• Topic Proposal for VANT 149 project (pairs)</td>
<td></td>
<td>• Chemistry module: pre- and post-class assignment (individual)</td>
</tr>
<tr>
<td>• Read and summarize one research article related to your project (individual)</td>
<td></td>
<td>• Literature Review module: Submit a research question for VANT 149 and find one article related to proposed research question (individual)</td>
</tr>
<tr>
<td>• Write a literature review containing three research articles for your VANT 149 project (pairs)</td>
<td></td>
<td>• Research proposal module: Drafts 1 and 2 of a research proposal (pairs)</td>
</tr>
<tr>
<td>• Research proposal - Draft 1 (pairs)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Research proposal - Draft 2 (pairs)</td>
<td></td>
<td></td>
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<tr>
<td><strong>VANT 149</strong></td>
<td></td>
<td></td>
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<tr>
<td>• A short paragraph summarizing research plan and progress update</td>
<td></td>
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<tr>
<td>• Submission of preliminary data</td>
<td></td>
<td></td>
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<tr>
<td>• A short paragraph describing data interpretation</td>
<td></td>
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<tr>
<td>• Research report - Draft 1</td>
<td></td>
<td></td>
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<tr>
<td>• Research report - Final draft</td>
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<tr>
<td>• Presentation materials (either slides or poster)</td>
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<tr>
<td>• Conference presentation</td>
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<tr>
<td>• Peer evaluation of presentations</td>
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</tbody>
</table>
discipline and contributed to at least one of the broader research process modules. During the last module, students wrote a research proposal for the project that they would complete in VANT 149.

**VANT 149**

The curriculum for VANT 149 was centered on individualized faculty mentorship in both Year 1 and Year 2. Students worked in pairs to conduct the research that they proposed in term 2 and to write a report on their project with the help of a template. Each pair was matched with one instructor mentor, who provided feedback and graded the project. Throughout the course, students met with their mentor in groups of two to four to discuss their data, the interpretation of the data, and drafts of the report, as shown in Table 3.

Academic English faculty members provided students with a series of presentation skills workshops. At the end of the term, students presented their work to their peers via an oral or poster presentation at a two-day, student-led academic conference. The training in presentation skills and the experience of giving a conference presentation is particularly useful for international students who generally, have not had the opportunity in high school. While low-stakes in terms of assessment, the student conference offered students a highly impactful and authentic opportunity. More than 150 students from two faculties attended the conference in Year 1 and more than 250 students from four faculties attended the conference in Year 2. Students were required to attend other presentations, ask questions, and write reflections.
Course Evaluation

Methods

The course was evaluated to determine how well the course goals were achieved, and whether the curriculum changes between Years 1 and 2 had an impact. We examined student survey data, instructor observations and reflections, and student performance. Student survey data was collected at the end of VANT 148 in both Year 1 and Year 2. The survey consisted of Likert-scale items which asked students to rank their satisfaction with course activities, as well as open-ended questions which asked students to describe their views on VANT 148 and research in general. In Year 1, 57 of the 88 students (65%) responded to the survey and in Year 2, 65 of the 82 students (79%) responded to the survey. The surveys were administered in class, and only students who attended that class participated in the survey. Two instructors coded responses to the open-ended questions into common themes. Instructor observations and reflections were collected during weekly meetings for both Year 1 and Year 2 as well as at end-of-term planning meetings. Student performance was assessed by the VANT 149 project reports, presentations, and quality of participation in the student conference.

To What Extent Were Course Goals and Student Learning Outcomes Achieved?

The overall goal of the course sequence is to engage students in research and foster sophisticated epistemic views. As shown in Table 1, we broke this goal down into four student learning outcomes: (a) describe and apply the elements of research, (b) understand key disciplinary differences and overlap in research, (c) extend discipline-specific concepts, and (d) carry out a research project and presentation.

Based on the quality of students’ assignments, presentations at the student-led conference, and participation in the conference, the instructors assessed that students engaged meaningfully with the research process and began to understand how scientific knowledge is created. For example, students were able to use their data and literature to discuss with peers in other faculties how they knew what they knew about their research. Student responses to the open-ended survey questions in both Year 1 and Year 2 indicate a sophisticated view of knowledge construction. When students were asked to describe what is involved in doing scientific research, they provided high-level descriptions such as portrayals of collaborations, using curiosity and literature to frame research questions, and using literature and statistics to explain and evaluate results. For example, one student wrote: “thinking of a research question, looking for sources, making plans, and group work”. Another student answered, “passion, curiosity, collecting data and analyzing it, a lot of reading.” It is difficult to observe from student performance whether the course fostered other sophisticated epistemic views such as seeing knowledge as complex and uncertain or seeing oneself as capable of contributing to knowledge.

Although the overall goal seems to have been achieved, students had challenges meeting two of the four learning outcomes. The quality of students’ research questions and written reports indicate that students had difficulty applying elements involved in the research process – most notably, filtering information and finding literature to support their research. Students also had difficulty extending discipline-specific concepts; many research projects were flawed in content and would not be considered publishable. On the other hand, most students’ reports contained the main elements that characterize authentic research papers: a research question; motivation and context; a discussion of literature; a description of the experiment or other methods; a discussion of results; and a brief conclusion. These instructor observations were consistent with student survey results. In Year 1, students reported that they found it most difficult to come up with a research question and find and read literature. In Year 2, students reported that they found it most difficult to come up with a research question and engage with assignments that extended what they learned in their discipline-specific courses.
What Impact did the Curriculum Change Have?

There were three main differences in the curriculum between Year 1 and Year 2 for VANT 148. The first difference was that in Year 1 students were not given a significant amount of up-front support. Instead, we relied on individualized faculty mentorship as in a traditional academic research experience. Instructors spent hours providing support throughout the course to small groups of students. In Year 2, there was much more front-end support and less individualized support. The second difference was the overall structure of the course. In Year 1, we used research themes as the common thread in VANT 148 with embedded discipline-specific examples. In Year 2, we used a modular approach, with a combination of five discipline-specific modules with embedded research themes, and three research-themed modules. The third difference was an adjustment of the instructors’ expectations for how the students would engage with current literature and demonstrate originality in their research. In Year 1, we expected our students to be able to conduct novel, but small, research projects. We soon realized that it is unrealistic to expect a cohort of first-year students to conduct novel research. We adjusted our expectations for Year 2 and instead expected our students to be able to conduct research projects that are new to them, but not necessarily novel.

Impact on Students

In both offerings, the quality of the research projects and reports submitted for VANT 149 were consistent. The curriculum changes in VANT 148 did not have a significant impact on student performance. In both years, VANT 148 was able to prepare students to a similar degree for VANT 149. This is supported by the survey data from the end of VANT 148. Students were asked how their confidence in undertaking research changed. In 2014, 84% of students reported that their self-confidence increased a little or a lot; in 2015, 70% of students reported that their self-confidence increased a little or a lot.

In Year 1, 64% of students reported that they found working with an instructor mentor in small groups of two to four to be the most helpful activity. This may be because students tend to compartmentalize their learning (Edmondson & Novak, 1993), but mentorship interactions facilitate connections between course content and student projects. In Year 2, when there were fewer opportunities for small group mentorship, students reported in the surveys that they wished they had more such opportunities. Based on this feedback, we are exploring a hybrid approach for Year 3. We plan to continue using the modular approach with front-end support via example research questions and templates, but also include small group mentorship opportunities early in VANT 148.

Impact on Instructors

The most significant effect between the two curricula is in instructor satisfaction and workload. In Year 1, instructors did not anticipate how challenging the research process would be for this population of first-year international students. As a result, we did not offer much guidance or support at the start of the course but responded to student needs by providing a great deal of individualized feedback and direction through mentorship in term 2. In Year 2, we reformatted the course to offer more of that support up front. For example, in Year 1, instructors spent hours guiding students to develop a suitable research question. At the end of this process, the research questions were nevertheless mainly instructor generated. In Year 2, we provided potential research questions during the discipline-specific modules which students could build upon for their research projects. We also learned to include clear examples of how research is conducted. During the bi-weekly lectures in Year 1, students were given examples of research questions but little detail on how research is executed. In Year 2, the instructors assigned scaffolded, mini-research tasks in each module as examples of the research process. Finally, we found that students had difficulty formatting their
Instructor Reflections on Curriculum Changes

Though there were benefits to both approaches, the instructors determined that the approach in Year 2 was better. The themed bi-weekly lecture series and term 1 seminars in Year 1 lacked context and were too abstract. Students were not able to apply concepts discussed in class to their own research projects. This is supported by survey data: 61% of students in Year 1 reported that the least helpful activity was the biweekly lectures. Even after a seminar discussion on how to determine if results were statistically meaningful, students were not able to recognize that they should repeat their measurements and analyze the standard deviation of their results. All instructors were involved with every activity in Year 1. By the end of term 2, instructors felt overworked in relation to other courses with similar credit counts. The modular approach in Year 2 was much more manageable. There were more assignments, which helped keep students engaged. Instructors were in charge only of the module that related to their own discipline and one other module. Each module also demonstrated research tools and examples in the context of a specific disciplinary topic. Students found this more accessible, as evidenced by more students applying those tools when they worked on their own projects.

The instructors also adjusted expectations by de-emphasizing engagement with the research literature and removing the requirement of originality. Instructors recognized how difficult it is for first-year students to engage with current literature when they do not yet have enough content knowledge. This difficulty is exacerbated by a lack of familiarity with the academic English used in most papers. In Year 2, there was still an expectation for students to use current literature, but secondary and tertiary sources were explicitly allowed. The requirement to use more than three sources was also lifted. By adjusting expectations, instructors were able to spend less time supporting students in understanding research articles and more time on other elements of the research process. Removing the expectation of originality reflected that first-year students can still learn a lot about research if they undergo a project in which the question is new to them, rather than to the field (Thiry, Weston, Laursen, & Hunter, 2012).

Summary and Lessons Learned

A multidisciplinary course in which first-year students engage in research and present their research to peers is valuable. Based on the quality of student performance and student survey responses, the instructors conclude that students did indeed engage meaningfully with the research process and began to understand how scientific knowledge is created.

In term 1 and term 2 of our three-term course sequence, students describe and explore the elements involved in the research process, are given opportunities to observe key similarities and differences in research across disciplines, and extend discipline-specific concepts (VANT 148). In term 3, students apply the elements involved in research to carry out research under the guidance of a faculty member and present their findings to their peers (VANT 149). Two different curricula were used in Year 1 and Year 2 in VANT 148 to achieve the same outcomes and prepare students for VANT 149. In Year 1, faculty delivered course content and provided individualized mentorship with little front-end support. In Year 2, the course content was reorganized into discipline-specific modules and students were provided with more front-end support in addition to faculty mentorship. Both curricula seemed to support students’ preparation for VANT 149, but instructors found that the structure in Year 2 allowed for a more even and manageable workload. On the other hand, students prefer more small-group time with an instructor in VANT 148. We plan to keep the modular structure with front-end support in the future, but also to provide more opportunities for small group interactions.

We encourage instructors thinking of delivering a similar research-based course for first-year...
students to provide front-end support via example problems and solutions. We also suggest de-emphasizing literature review (but still include some engagement with literature), removing any expectations of original research for first-year students, and incorporating small group mentorship opportunities early in the course sequence.

References


Hofer, B. K. (2004). Exploring the dimensions of personal epistemology in differing classroom contexts: Student interpretations during the first year of college. Contemporary Educational Psychology, 29(2), 129–163. VIEW ITEM


offers opportunities similar to the undergraduate research experience. *Journal of Microbiology & Biology Education, 10*(1), 32–42. VIEW ITEM


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The present study investigated the time usage and levels of perceived stress, academic workload, and recreation time for 177 students at the University of Windsor before, during, and after Fall Reading Week (FRW). Over a three-week span (at various times of the day), students received a message to their smartphone to complete a 20-second survey that collected information related to their present activity and perceived levels of stress, academic workload, and recreation. Results showed that student stress following the break was higher: (a) with more stress (but less workload) before FRW, (b) more stress experienced during FRW, (c) more workload following FRW, and (d) more time in recreation during FRW. Implications for student counselling are outlined, encouraging students to seek a balance in their time usage and management. Several future directions are discussed.

Much controversy surrounds the implementation of a Fall Reading Week (FRW; Irish, 2013) – a week-long hiatus from academic classes and midterm examinations roughly halfway through an academic semester. Some institutions are slow to adopt it while others have considered abandoning the idea; at the University of Windsor, for example, students actively advocated for a FRW (Waddell, 2013). Since FRW conveniently coincides with the Canadian Thanksgiving holiday, students enjoy the opportunity to spend time with family and friends, to travel, or to catch up on accumulated scholastic responsibilities (Hendry, 2014). Indeed, apart from the benefits related to student mental wellness, many even use the break to finance their education. Thus, the week offers a welcome opportunity for first-year students to treat homesickness and recover from the stressful weeks of university transition in the comfort of their home with family and friends (Irish, 2013). The present study tracked student time usage during FRW in order to predict students’ stress and workload levels upon their return.

A common argument for the establishment of FRW stems from increased concern about student mental health. A majority of students entering university are young and vulnerable, particularly in their first year (Irish, 2013). Whereas suicide is the third leading cause of death among those aged 18-24 years (Calloway, Kelly, & Ward-Smith, 2012), this age group is also highly susceptible to the onset of various mental health issues and substance abuse (Adlaf, Gliksman, Demers, & Newton-Taylor, 2001). In their report, the National Alliance on Mental Illness (Gruttadaro & Crudo, 2012) indicated that a majority of university withdrawals cited mental health problems among the main reasons for leaving university. Admittedly, the university setting remains a highly competitive and stressful environment (Booth, Sharma, & Leader, 2016). Added to those risk factors, many students (new to campus life) find themselves in transition. During their initial years at university, they may have their first encounter with drugs and alcohol, romantic relationships, and perhaps the death of a close family member (Schaeffer & Robert, 2013). These
experiences (in and of themselves) can prove highly challenging and mentally demanding. Many first-year students experience isolation and homesickness – potentially remedied by a much-needed mid-semester break. As Hendry (2014) noted, a break often means spending valuable time with supportive friends and family.

Alternatively, some research suggests that FRW is not especially beneficial to students, whose stress may not be linked to their studies. Declines in mental well-being may also be attributed to abusive relationships, bullying, and a family history of psychiatric disorders (Centers for Disease Control and Prevention, 2016; Schaeffer & Robert, 2013). For these reasons, a fall or winter reading week would be unlikely to lower the risks associated with impaired mental health. In fact, a week without classes (outside one’s familiar routine) may actually be harmful, since a busy schedule can serve as a distraction from personal problems and the removal of a student’s support network on campus may even put them at risk. In addition, some argue a week-long break is unfair since tuition is not suitably deducted to accommodate the reduced class time (Schaeffer & Robert, 2013); essentially, students are especially displeased with paying for a forced vacation. Likewise, granting students a full week from academic responsibilities – or at least their scheduled classes – would cut the semester short, proving detrimental when the semester only spans three to four months. Interestingly, the same argument is not made in response to Winter Reading Week (Hendry, 2014). Schaeffer and Robert (2013) underscored this point by stating that some students find it preposterous to assume the second semester was more stressful than the first, struggling to appreciate why the timeline in the Winter semester remains needlessly longer than in the Fall.

The present study focused on student time usage before, during, and after FRW, while assessing perceived student stress, academic workload, and recreation. Although a relatively new topic of study, we were guided by prior studies on student time management and stress, as they impact academic performance. In an earlier investigation, Tice and Baumeister (1997) conducted two longitudinal studies measuring stress levels and academic achievement among students who procrastinated versus those who did not. Although procrastinators were less stressed at the beginning of the semester, those stress levels increased over time and eventually surpassed the stress of non-procrastinators. Furthermore, procrastinators received lower grades in comparison to non-procrastinators. More recently, Kennedy and Tuckman (2013) explored the influence of academic and social values, procrastination, and perceived school belongingness on academic performance. Results showed that procrastination positively affected students’ social life during their first year of university, but negatively affected students’ academic performance; worse too, procrastination was positively correlated with levels of student stress.

Moreover, Häfner, Oberst, and Stock (2014) conducted an experimental intervention to examine the effectiveness of short-term treatments to combat procrastination. They found that programs focusing on self-regulatory skills – even if applied for a short period of time – could significantly change students’ study habits. Similarly, by measuring the success of the program aimed at limiting procrastination, Häfner, Stock, and Oberst (2015) compared stress levels between students in the control group to those who received the intervention. As expected, stress levels (and the likelihood to procrastinate) dropped measurably among the latter group.

Present Study

The present study investigated the importance of effective student time usage across the FRW. With this knowledge, we offer strategies for effective time usage with the goal of improving students’ academic outcomes. For first-year students with broad expectations for their university experience, these findings may provide encouragement and reassurance to attendants at student-focused workshops, as relayed by peers, counsellors, or first-year instructors. By acquiring new strategies for effective time usage during FRW, students have the potential to transform into more productive, efficient individuals better equipped to cope with stressful life events that occur both during and following their academic
careers. Given the equivocal viewpoints on the utility of FRW, we advance two competing hypotheses in our prediction of student stress levels following the break. Based on Hendry (2014), who identified key student stressors throughout an academic year (e.g., term paper volume and exam stress) and foresees several benefits of a mid-semester break, we hypothesized that students who spend more time recreating and less time devoted to academic workload should return to school with lower stress. Alternatively, based on Schaeffer and Robert (2013), who argued that a mid-semester break would be disruptive to student routines and even restrict access to their support network during the hiatus, we hypothesized that students who spend less time recreating and more time devoted to academic workload should return to school with lower stress.

Method

Participants

Approximately 2350 undergraduate students (across all years and faculties) at the University of Windsor received an electronic invitation to their university email from the Registrar’s Office to participate in the study for entry into a draw for one of five $100 gift cards to the university bookstore; the initial sample who agreed to participate included 177 undergraduates (144 or 81% female). There were 45 (25%) from the first year, 26 (15%) from the second year, 54 (31%) from the third year, and 51 (29%) from the fourth year. Students were registered in seven faculties and majors but were concentrated chiefly within Social Sciences (41%), Sciences (22%), Arts and Humanities (15%), and Nursing (7%). Most students were Caucasian (66%), followed by Asian (11%), Arab (6%), African (5%), and Other (11%). Sample attrition in student responses occurred as the study progressed: before reading week ($N_{before} = 167$), during reading week ($N_{during} = 136$), and after reading week ($N_{after} = 117$).

Procedure

After completion of the demographics measures (gender, age, marital status), participants were told they could earn a ballot at each opportunity they completed a 20-second survey on their smartphone app (Metric Wire, www.metricwire.com), inviting them to describe their current activity, and indicate using a pulldown menu their perceived ratings (on a 5-point Likert scale, from 1 = “not at all” to 5 = “to a great extent”) of their current level of school workload, stress, and recreation. Students’ smartphones were contacted three random times daily (mornings: 9am-12pm; afternoons: 12pm-3pm; and evenings: 6pm-9pm), beginning the Monday of the week prior to the start of FRW, and continuing until the Sunday of the week following FRW (a continuous 21-day period).

Results

Data from each of the three weeks (before, during, and after FRW) were compared so as to assess the overall level of workload, stress, and recreation in the respective time periods. This was calculated (for example) based on an average for all instances of stress ratings submitted during FRW. Before evaluating the hypotheses, we first considered the presence of differential reports by sex, but found none ($p > .05$) when evaluating age, and each of the workload, stress, and recreation summary variables. We did uncover a significant correlation between student age and stress levels after FRW, $r(126) = -.227, p = .010$; when further divided by year in school, both first- and fourth-year students ($M_s = 4.21$ and $4.12$ respectively) reported significantly less stress following FRW compared to both second and third year students ($M_s = 5.39$ and $5.41$ respectively); $F(3, 123) = 4.87, p = 0.003, R^2 = 0.11$.

Examination of the correlation matrix of workload, stress, and recreation for each of the three periods (before, during, and after FRW; see Table 1) showed several significant relations. Follow-up regressions showed that workload predicted stress
levels at each unique time-period (workload before FRW predicted stress before FRW), but even across time periods so that workload before FRW predicted stress during FRW but not stress after FRW. Recreation levels were largely random and could not be predicted by stress or workload, with the exception of a modest positive relation between stress-during and recreation-during FRW ($r = 0.21$); and between stress after FRW and recreation during FRW ($r = 0.22$). It is noteworthy too that within any summary variable (stress, for instance), predictions were significant and moderate-to-strong over time. That is, stress before FRW predicted both stress during and stress after FRW; and stress during FRW predicted stress after FRW. This pattern was similarly observed for both the workload and recreation variables.

To evaluate changes in workload, recreation, and stress over the 3-week period, a series of repeated measures analyses of variance (RANOVAs) were conducted, starting presently with the three workload variables. Using a Greenhouse-Geisser correction for sphericity ($\chi^2 (2) = 30.13, p < 0.001$), results showed a significant omnibus test, $F (2, 187) = 7.30, p = 0.002$. Follow-up paired $t$-tests showed a significant decrease in workload from before FRW ($M = 5.47, SD = 1.94$) to during FRW ($M = 4.90, SD = 2.02$), $t (135) = -4.08, p < 0.001, R^2 = 0.11$; no change from before FRW to after FRW ($M = 5.33, SD = 2.04, p = 0.375$), but a significant increase from during FRW to after FRW, $t (123) = 2.10, p = 0.038, R^2 = 0.03$; generally, participants’ workload dropped during FRW and then returned to their pre-FRW levels after FRW.

### Table 1

**Means, Standard Deviations, and Correlation Matrix of Workload, Stress, and Recreation over Time**

<table>
<thead>
<tr>
<th></th>
<th>Before Reading Week</th>
<th>During Reading Week</th>
<th>After Reading Week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>W-1</td>
<td>S-1</td>
<td>R-1</td>
</tr>
<tr>
<td>Workload</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stress</td>
<td>0.54*</td>
<td>1.0</td>
<td></td>
</tr>
<tr>
<td>Recreation</td>
<td>0.07</td>
<td>-0.3</td>
<td>1.0</td>
</tr>
</tbody>
</table>

1. Before Reading Week ($N=164$)

2. During Reading Week ($N=136$)

3. After Reading Week ($N=117$)

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Standard Deviation</th>
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</thead>
<tbody>
<tr>
<td>Workload</td>
<td>5.47</td>
<td>2.02</td>
</tr>
<tr>
<td>Stress</td>
<td>4.62</td>
<td>1.77</td>
</tr>
<tr>
<td>Recreation</td>
<td>3.38</td>
<td>1.74</td>
</tr>
</tbody>
</table>

* $p < 0.05$
Additionally, a RANOVA of the three stress variables, using a Greenhouse-Geisser correction for sphericity ($\chi^2 (2) = 11.76, p = 0.003$), showed a significant omnibus test, $F(2, 205) = 7.20, p = 0.001, R^2 = 0.06$. Follow-up paired t-tests showed a marginal decrease in stress from before FRW ($M = 4.47, SD = 1.62$) to during FRW ($M = 4.18, SD = 1.70$), $t(135) = -1.94, p = 0.055, R^2 = 0.03$; no change from before FRW to after FRW ($M = 4.05, SD = 1.53$), $t(124) = 0.094, p > 0.055$, but a significant decrease from during FRW to after FRW ($M = 3.84, SD = 1.47$), $t(136) = 3.48, p = 0.001, R^2 = 0.08$; a significant decrease from before FRW to after FRW ($M = 3.01, SD = 1.53$), $t(116) = -2.09, p = 0.039, R^2 = 0.04$; but a significant decrease from during FRW to after FRW, $t(124) = -5.45, p < 0.001, R^2 = 0.19$; once again, participants’ recreation levels dropped during FRW and then returned to their pre-FRW levels after FRW.

To evaluate our competing hypotheses and predict student stress levels following FRW based on how time was spent before and during FRW, we employed a multiple linear regression with stepwise variable entry (see Table 2); the final model explained 49% of the variance, $F(5, 110) = 21.01, p < 0.001$; based on the following five predictors: stress-during, workload-after, workload-before, stress-before ($\beta = 0.207, p = 0.021$), and recreation-during FRW ($\beta = 0.156, p = 0.030$). In other words, student stress following reading week was higher: with more stress but less workload prior to reading week, more stress and more recreation time during reading week, and more workload following FRW. As such, these results support the second (and not the first) hypothesis that greater recreation and less workload prior to FRW augment student stress levels following the FRW.

### Table 2

**Regression Analysis Predicting Student Stress Following Reading Week**

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Model-1</th>
<th>Model-2</th>
<th>Model-3</th>
<th>Model-4</th>
<th>Model-5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stress-BRW†‡</td>
<td>B (SE) $\beta^*$</td>
<td>B (SE) $\beta$</td>
<td>B (SE) $\beta$</td>
<td>B (SE) $\beta$</td>
<td>B (SE) $\beta$</td>
</tr>
<tr>
<td>Work-ARW</td>
<td>0.63 (0.09) 0.55**</td>
<td>0.50 (0.09) 0.40**</td>
<td>0.32 (0.08) 0.34**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Work-BRW</td>
<td>0.54 (0.10) 0.47**</td>
<td>0.38 (0.08) 0.41**</td>
<td></td>
<td>-0.24 (0.08) -0.24**</td>
<td></td>
</tr>
<tr>
<td>Stress-BRW</td>
<td>0.47 (0.10) 0.41**</td>
<td>0.41 (0.08) 0.44**</td>
<td>-0.34 (0.09) -0.34**</td>
<td>0.25 (0.11) 0.21*</td>
<td></td>
</tr>
<tr>
<td>Rec-DRW</td>
<td>0.46 (0.10) 0.40**</td>
<td>0.37 (0.08) 0.39**</td>
<td>-0.33 (0.09) -0.33**</td>
<td>0.25 (0.11) 0.21*</td>
<td>0.18 (0.08) 0.16*</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.303</td>
<td>0.398</td>
<td>0.441</td>
<td>0.466</td>
<td>0.488</td>
</tr>
<tr>
<td>$F (\Delta R^2)$</td>
<td>49.65 (0.303)</td>
<td>17.70 (0.094)</td>
<td>8.58 (0.043)</td>
<td>5.30 (0.025)</td>
<td>4.82 (0.022)</td>
</tr>
</tbody>
</table>

* $p < 0.05$; ** $p < 0.001$

†B denotes raw regression coefficients; $\beta$ denotes standardized regression coefficients.

‡BRW = ‘before Reading Week’; DRW = ‘during Reading Week’; ARW = ‘after Reading Week’
Discussion

The present study is unique in its mission to track (in real time) the activity, stress, and workload levels of students before, during, and after FRW. By assessing these key variables at three random times of day across 21 consecutive days, these results shed essential light on the question of student time management and usage before, during, and after a seven-day latency within the academic semester. Results showed that students’ perceived stress after FRW was significantly predicted based on how students spent their time before and during FRW. Specifically (and with little surprise), those students who spent their time engaged in schoolwork before and during FRW reported less stress (and academic workload) following the break. Conversely, their stress increased with more time spent recreating during the FRW.

As previously noted, there remains much debate surrounding the practical utility of the FRW; yet the break during the winter semester curiously receives far less scrutiny. More so, there is a tradition surrounding the mid-semester break perpetuated through popular culture. That is, in keeping with long-held traditions, one may uncover from the past a sound and viable argument for the establishment of Winter Reading Week as an agricultural practice (with the further need of additional hands during planting season). Today however, the Winter Reading Week, arguably a staple amid academic entitlements, risks leaving students the impression that the second semester may be more difficult and deserving of a break. Consequently, universities that lack a FRW may leave students with the belief that their personal stress, struggles, and adjustments are neither relevant nor validated by institutional administration officials.

We should caution the reader on the limits we encountered when analyzing the current sample. Our participants represented unquestionably a sample of convenience, constituting a small proportion of students at a particular Canadian university who elected to participate for entry in a bookstore draw. Confidence in the findings would be augmented certainly by casting a wider net across both the university and college sectors at various institutions across Canada or even the United States. Likewise, this study would benefit from additional qualitative measures to drill down deeper into the students’ explanations concerning their time usage at various points in the academic semester.

That aside, the present results offer worthwhile implications for how college and university counsellors and administrators may best advise their students on effective time usage and management. For instance, student advisory sessions could educate students as to the ramifications of procrastination, on the one hand, and the dedicated attendance to personal mental health issues, such as community and family affiliation, on the other hand. By this, students should see the benefits of taking much needed personal time to recuperate from stressful academic demands as weighed against academic deadlines plus responsibilities at both home and work.

Future Research

Future studies could make use of a larger and more diverse sample to not only increase the statistical power in their analyses but to permit the breakdown and comparison of students from, for instance, unique and diverse faculties. It is arguable that different faculties may either implicitly or explicitly emphasize their own set of study and coping skills; moreover, one may expect students to better manage FRW over time so that strategies that proved less than useful one semester are not repeated in future breaks. By this token, this may invite researchers to pursue a two-pronged approach using this methodology wherein time usage is tracked at both Reading Weeks, adding further controls to the research questions. We might hypothesize that students (chiefly first-year) may learn to use the Winter Reading Week more effectively given their experience (and aftermath) following Fall Reading Week.

Similarly, researchers may opt to include standard personality measures within the initial screening and demographic questionnaires to identify a prototype of student likely to select a particular style of time usage (like recreation) during FRW. One may expect variations in responses along the Big-Five
personality dimensions – including openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism – as measured by the Ten-Item Personality Inventory (Gosling, Rentfrow, & Swann, 2003). Likewise, conducting a screening for students’ coping strategies (Brief-COPE; Carver, 1997) may offer new insights into student stress management. Furthermore, the collection of students’ GPA (at both the start and conclusion of the study) would allow for further and more relevant hypothesis testing concerning the short- and long-term impact of mid-semester time usage on scholastic achievement. Presumably, students who excel academically have acquired a more adaptive technique for spending FRW than those at or below the course average. We would further expect high-achieving students to be among those who find a balance between academic tasks and recreation during FRW.

Given our present observations of differences in perceived stress across academic years, a further inquiry into student time usage during FRW could include a sample of graduate students to determine whether more experienced students have acquired a better skillset to master FRW. We expect that graduate students would have reached a higher level of ability – including time management skills, effective coping strategies, and the ability to be self-started as well as to set and follow one’s own deadlines. A vital question as yet unstated concerns how faculty spend their FRW; indeed, they too may benefit from the FRW by taking the opportunity to recharge, fine-tune lectures and prepare tests and assignments, and even reflect thoughtfully on other academic commitments such as supervisory relationships, committee work, and research. Further study could develop greater controls to identify possible experimental artefacts. For instance, although we held the number of daily student notifications to three times per day, others may vary the number to fewer (e.g., one) or several more (e.g., eight); or further extend the assessment scope from our three-week period to more or less. We caution though that the mere act of repeatedly assessing student time usage may inadvertently influence it through constant reminders. It remains to be seen whether multiple smartphone pings may increase study behaviour or incite instead an early exit from the study.

The question remains how educators and administrators alike can offer students better coping and study skills during the semester (particularly during FRW), and how they can encourage help-seeking among students. Whereas some universities offer study-skill training, students are generally hesitant to seek out support due to a perceived stigma (Calloway et al., 2012). Coupled with our suggestions, it may be relevant to re-assess a collected student sample after it has been exposed to any intervention – stressing the importance of finding a balance between recreating and studying – via a necessary follow-up to track any changes to time usage.

References


Carver, C. S. (1997). You want to measure coping but your protocol’s too long: Consider the Brief COPE. *International Journal of Behavioral Medicine, 4*(1), 92-100. VIEW ITEM
Centers for Disease Control and Prevention. (2016, August 15). Suicide: Risk and protective factors. VIEW ITEM


Hendry, M. (2014, October 24). Where, oh where is our Fall Reading Week. *The Queen’s Journal*. VIEW ITEM


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**Biographies**

Ken Cramer, University of Windsor, is a full professor in the Department of Psychology.

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One Week, Many Ripples: Measuring the Impacts of the Fall Reading Week on Student Stress

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More and more Canadian post-secondary institutions are introducing a fall break into their term calendars. In 2015, a full week fall break was introduced at our university in order to enhance academic performance and improve mental health amongst students. Our interdisciplinary team surveyed undergraduate students at our university about their experience of the fall break, collected standardized measures of experienced stressors and perceptions of stress before and after the break, and hosted several focus groups to develop a detailed narrative of students’ experience. Stress can also be assessed through non-invasive hormone measures. We collected saliva samples to profile metabolic hormones, cortisol, and dehydroepiandrosterone (DHEA), from first-year male engineering students in order to document possible changes in their stress levels before and after the week-long break. This group was compared to male engineering students at a similar university that does not hold a fall break. Students exhibited a lower ratio of cortisol to DHEA after a fall break than those that did not experience a break. Our survey results indicate that the majority of students thought the fall break was a positive experience. However, self-reports of stress show a more complex picture, with many students reporting increased perceived stress after the break. Additionally, a portion of students reported that the fall break was a negative experience. To the best of our knowledge, our study is the first of its kind to use a mixed-methods approach to examine the impacts of a fall break.

The mental health and wellness of university and college students has received recent attention as popular media reports and empirical research indicates increased rates of stress and mental illness in this group (Booth, Sharma, & Leader, 2015; Chiose, 2016; Lunau, 2012). Indeed, post-secondary students have long reported higher levels of stress than the general population (Adlaf, Glicksman, Demers, & Newton-Taylor, 2001). In 2013, a large-scale survey assessed well-being across 30 post-secondary institutions in Canada (American College Health Association, 2013). A total of 89.3% of respondents felt overwhelmed, 86.9% felt exhausted, and 56.5% felt immense anxiety. A majority of students (56.6%) reported academic issues as traumatic or very difficult to handle. A larger follow-up survey in 2016 captured similar responses from 43,000 students in 41 Canadian institutions (Canadian Association of College and University Student Services, 2016). These survey data support previous trends indicating that the mental health of our students is in crisis. Anxiety and depression were reported to be the most common mental illnesses experienced by students. Moreover, 13% of survey respondents had considered suicide within the last 12 months: a 3.5% increase from 2013 (Canadian Association of College and University Student Services, 2016). Although alarming, these data are not surprising. Post-
secondary students are part of a special cohort, since onset of mental illness commonly occurs between the ages of fifteen and twenty-four (Eisenberg, Gollust, Golberstein, & Hefner, 2007; Rao, Hammen, & Daley, 1999), and the stressors affecting their mental health may be different than those impacting their non-student counterparts or others in a different life-stage.

According to current estimates, nearly 2 million students are registered at post-secondary institutions across Canada (Statistics Canada, 2016; Universities Canada, 2016). Colleges and universities are now paying special attention to the mental well-being of their students. Multiple initiatives aim to educate students and facilitate discussion about emotional and physical health (e.g., COPE, http://copex.weebly.com; Healthy Minds at UBC, http://blogs.ubc.ca/healthyminds; More Feets on the Ground, https://brock.morefeetsontheground.ca), and to train staff and faculty to meet the needs of students (e.g., Green Folder, http://www.queensu.ca/studentwellness/mental-health). Governments and student organizations are also developing programs to support mental health (e.g., Bartlett, 2014; Centre for Innovation in Campus Mental Health, http://campusmentalhealth.ca/projects/; http://www.good2talk.ca).

Following a year in which several students died by suicide, Queen’s University developed a task force to discuss student mental health. The introduction of a fall break was a major recommendation from the group (Clapham, Jahchan, Medves, Tierney, & Walker, 2012). Other universities held related discussions, leading to the consensus that a mid-semester break in both fall and winter would support student mental health and increase well-being (e.g., Cramer & Pschibul, 2017; McMaster Daily News, 2015). Accordingly, the trend of holding a mid-semester fall break is growing: upon a recent review of the websites of 70 Canadian universities, 49 indicated that some form of a multi-day break is scheduled for the 2016 fall term.

Given the wide-scale adoption of fall breaks as a means to reduce student stress, it is critical to investigate whether this intervention improves students' mental health. There is some work investigating this: students at Brock University self-reported decreased stress due to a fall break (Pilato, 2014) and researchers at the University of Windsor using smartphone notifications to track how students spent their time found that post-break stress correlated with pre-break stress, workload, and recreational activities (Cramer & Pschibul, 2017). However, to date, research on the fall break has not been published for a broad audience.

Through a multi-institutional collaboration, our research team aims to address a gap in the literature regarding the impact of a fall break on university students. During the fall of 2015 and around the time of our university’s fall reading week (October 12th -15th), we launched the first phase of our project at our university. We collected saliva samples from students immediately before and after their fall break in order to document possible changes in their stress hormones. We also collected saliva samples at the same time points from students attending a university that did not have a fall break. In addition, we collected self-reports of stress through student surveys and focus groups, and we tracked students’ time management over the fall break using real-time measures. This study is the first of its kind to attempt to document the broad effects of a fall reading week using mixed methods. Our interdisciplinary team combined qualitative and quantitative approaches to provide the first thorough assessment of the impacts of a fall break on students. This research was approved by the Research Ethics Boards at both universities where data collection occurred, conforming to standards of ethical conduct in research involving human participants.

Research Aims and Research Questions

**Student Experience & Mental Wellness:** How does the fall break affect the workload and stress levels of undergraduate students? How do these students spend their time during the fall break? Are hormonal markers of stress such as cortisol and dehydroepiandrosterone (DHEA) different in undergraduate students who attend a university with...
a fall break than in those at a university without a fall break?

**Faculty Experience & Mental Health:** How does the fall break affect the workload and stress levels of instructors?

**University Operations:** How does the implementation of the fall break affect budgets, staffing, and scheduling within support units?

While we collected data to assess the latter two questions, our focus here will be on the student perspective. We plan to publish the faculty and university operations findings in a forthcoming paper.

**Methods**

**Data Collection and Analysis**

**Student surveys**

During the fall 2015 academic term, all undergraduate students at our university ($N = 24,940$) were invited to participate in a two-part survey focusing on stress. Students completed the survey in October during the week before the fall break ($n = 997$) and again the week after the fall break ($n = 1444$). The survey included two validated measures of stress: the Undergraduate Stress Questionnaire (Cohen, Kamarck, & Mermelstein, 1983), which assesses the number of stressors a student has experienced recently, and the Perceived Stress Scale (Crandall, Preisler, & Aussprung, 1992), which measures perceived stress in students. We included both measures to explore the sources of stress as well as how students were managing them. We also collected data on a variety of demographic variables. Students were invited to complete a short follow-up survey in January 2016, reflecting on the impact of the fall break on their stress and academic performance over the entire fall semester, including the exam period ($n = 1146$). All surveys were hosted online; students were emailed with an invitation to participate.

**Student time management**

Any students who completed the pre-break survey were able to consent to receive text messages on their phones over the fall break to track how they were spending their time. The immediate reports of activities afforded by this approach are more valid and reliable than retrospective reports (Baddeley, 1979). We had 595 students consent to this part of the study; we sent each of them 12 text messages over the break, asking them to self-report on their current activity. Students received two text messages per day over the break; the messages were delivered at random time points in the day between 8am and 10pm. To provide clear and reliable categories of behaviour, our text messages asked students to report in which of the following activities they were currently engaged: travelling, schoolwork, work, social time, eating, exercising, leisure, and other.

**Hormonal assessment of stress**

In collaboration with a behavioural endocrinology lab at the University of New Orleans, we completed a pilot project that establishes protocols for saliva collection and hormonal analysis around the fall break. We collected saliva samples from first-year male engineering students at our university ($n = 11$) and the comparison university ($n = 5$). In order to control for within-group variance in hormonal output, we included only males in the study and only first-year student engineers from each school due to similar class schedules. The students at the comparison university do not have a fall break but have similar entrance and course requirements to those of our university; they served as a control group.

Participants were given saliva collection microtubes and were asked to identify which day in the week before the fall break that they considered to be most stressful and a day in the week after the break that they considered equally stress-inducing. Similarly, students at the comparison university identified their most stressful day during each of these weeks. Participants were instructed to go to sleep between 10:00-11:30pm on the night before their selected days, to wake at 7am, and to attend all classes on those days. They were asked to collect saliva using
a modified version of the passive drool technique (Granger et al., 2007): to avoid eating around the time of saliva collection and to drool directly into a microtube at 7am, 9am, 12pm, 3pm, 8pm on each of their two self-identified days. Saliva samples were stored at room temperature before being shipped to the University of New Orleans for hormonal analysis of DHEA and cortisol using standardized enzyme immune assay kits purchased from Salimetrics®.

Student focus groups

Students who completed any of the online surveys in October 2015 and January 2016 were invited to provide their consent to be contacted by email in order to participate in a focus group meant to further explore their experience with the fall break. Of those students who consented to be contacted, 125 students were selected at random and invited to participate in five separate focus groups in late October 2015, and 42 participated. An additional 100 students were invited to participate in a second round of two separate focus groups in early February 2016, and eight students participated. Focus groups were held in a private meeting room on the university campus. Each focus group was facilitated by a member of the research team and lasted approximately 45-60 minutes in length. All focus groups were audio recorded (with participants’ permission) to ensure accuracy. The semi-structured focus groups asked participants to discuss such topics as their expectations for how they would spend their time during the fall break, the timing of the fall break itself, and whether the fall break impacted stress levels as well as their ability to be academically successful.

Transcripts were analysed by combining structured as well as open coding processes (Bender & Ewbank, 1994; Morgan, 1996; Thornberg, 2012). We initiated the coding process with a list of keywords or short phrases that were defined according to our research aims. This was a provisional coding to establish an initial predetermined list of codes prior to a closer analysis of the focus group transcripts. This initial list of keywords was linked to the script used for the focus groups. The phrases used as codes were based on the subject of the research (structural coding).

A member of the research team collaborated with two student partners to produce a first coding of the two focus group transcripts using a provisional list of codes. Each student then began to code all focus group transcripts, and they did so simultaneously. During this process, new codes were added to the initial list as patterns based on repeated ideas, concepts or elements began to emerge, and the student partners compared their codes with one another for inter-rater reliability. These new codes consisted of terms or short phrases to summarize the main theme of a piece of data (descriptive coding). This led to a second list, which consisted of the initial codes plus those arising from the analysis. The student partners used this list to code the remaining transcripts and continued to assess one another’s coding process for inter-rater reliability. NVivo®, a qualitative data analysis software program, was used to classify, sort, and arrange information, and to examine relationships in the data.

Results

Student Surveys

Due to the small portion of survey respondents that completed both pre-break and post-break surveys (n = 247), all analyses used a between-subjects approach using independent samples t-tests. Scores on the Undergraduate Stress Questionnaire indicated a decrease in the number of stressors over the course of the fall break, t(2432) = -2.095, p < 0.05. However, scores on the Perceived Stress Scale indicated that perceived stress was higher after the break than before the break, t(1997) = 2.832, p < 0.01.

Frequency analysis of the types of stressors that students most commonly experienced provided some insight into this difference. Namely, the top three stressors before the fall break, summarized by the percentage of respondents reporting each, were: worry about the future (68.2%), sitting through a boring class (68.0%), and having too little sleep (65.1%). In contrast, the top three stressors after the break were: having lots of deadlines to meet (69.4%), having projects due (69.0%), and having a hard
upcoming week (66.6%). Thus, post-break stressors were heavily centered around academic responsibilities, while pre-break stressors were more general. The impact of this pattern is discussed below.

Analyses of the January survey, which requested students to reflect on the impact of the fall break on their entire fall semester, indicated that the majority of students had a positive perception of the fall break. Of the 1146 respondents, 80% indicated that the fall break “was a good thing” for them. When asked to evaluate the effect of the fall break on their stress, as compared to Fall 2014 (which did not have a full-week fall break), 69.1% of respondents indicated that the fall break decreased their stress, 18.2% reported that it increased their stress, 8.6% indicated that it did not impact their stress, and 4.1% were unable to assess the impact on their stress. Although these are retrospective judgments, they demonstrate a consistent perception of a positive impact of the fall break on student stress. Additionally, 53.6% of respondents judged that the fall break improved their academic performance relative to the previous fall semester, while only 9.8% judged that it decreased their academic performance. Thus, overall judgments from students reflected a positive perception of the fall break, both in terms of stress and academics. Nonetheless, there is a minority group that reported a negative experience on both measures. We are planning additional analyses to identify the characteristics of this minority, to allow universities to provide appropriate further supports.

When students were asked about the optimal timing of the fall break, responses indicated more variability in satisfaction. Our university’s fall break is held relatively early in the term (during the second week of October). While 41.4% of respondents indicated that the early break was ideal, an overall majority judged that it should be held later in the semester (first week of November: 30.5%; last week of November: 4.1%, before December exams: 16.1%). Additionally, 7.9% of respondents judged that it should not be held at all. The remaining respondents (0.2%) left this question blank.

**Student Time Management**

While we plan to eventually correlate students’ behaviour over the fall break with stress scores, at this time, text messages have been analysed only in terms of frequency of behaviour. These frequency analyses provide the total number of text messages received that reported engagement in each type of activity. The most commonly reported activities were schoolwork (n = 674) and leisure activities (n = 686), while the least commonly reported activities were exercising (n = 70) and being at work (n = 170).

**Hormonal Assessment of Stress**

We analyzed salivary cortisol and DHEA individually using a 2 (university) x 2 (week) mixed-model ANOVA. There was no difference between students at our university (with a fall break) and the comparison university (without a fall break) in their hormonal profiles based on university type or timing around the fall break. However, we also analyzed the ratio of cortisol to DHEA, since some literature suggests that the ratio between these hormones is an informative indicator of mental health (Shirotsuki et al., 2009). Students who experienced a fall break exhibited a lower ratio of cortisol to DHEA after the break, suggesting that students who had a week away from classes seemed to exhibit less stress upon their return to school in comparison to those that did not have a break. It is important to note that the observed post-break difference between the two universities was marginally different $F(1,7) = 5.456, p = 0.052$. We are currently in the process of collecting further data to support our initial findings.

**Student Focus Groups**

Frequency analysis of the focus group transcripts indicated that students were quite mixed in their self-assessment of whether the fall break reduced stress and increased their academic performance. In all five October focus groups, students generally reported a positive personal experience of the fall break. Students
appreciated the additional time spent at home with family and friends during the Canadian Thanksgiving holiday, the opportunity to rest, engage in leisure activities, catch up on course reading material, and study for midterms scheduled immediately after the break. However, the negative impact of the fall break on course scheduling and the timing of midterms and assignments was also of primary concern among focus group participants. This was reflected in the highest frequency codes, “course scheduling and workload” and “timing of fall break,” which are discussed in more detail below.

Course scheduling and workload (frequency: 69)

Analysis of the five focus groups showed that the highest recurring code related to the scheduling of course assignments, and the shifts in workload that resulted. Upper-year undergraduate students, in particular, reported that in comparison to previous years, the due dates of assignments and the scheduling of midterm examinations were compressed, such that they were scheduled either in the week immediately preceding (October 5-9) or following (October 19-23) the fall break. Students reported that this schedule caused a major increase in their perceived stress. As one student stated: “It made me a lot more stressed after [the fall break] because I was trying to do all this stuff during the week before, or during the week off, and then coming back to all these midterms and essays due all at once. It didn’t really help me at all. I was just super stressed.” Although this perception of the break as a force that compressed assignments and exams in the weeks preceding and following the fall break was common, some students did welcome the break as a “lifesaver” which allowed them an opportunity to rest and prepare for the remainder of the term.

Timing of Fall Break (frequency: 54)

Another common concern for students related to the timing of the break in the fall term. Although students acknowledged that scheduling the break during the week of the Canadian Thanksgiving holiday (October 12, 2015) limited the number of lost instructional days and gave them additional time with their families, many students considered the timing of the break to be much too early in the term to be effective in meaningfully reducing stress and in supporting academic performance. As one student reported: “I felt last year like the constant stress really helped me be more productive during the days off. Then this year with the break, it really broke my focus to have that much time off instead of focusing on school. I was just getting into the flow of things and right when I got into it, it’s like, ‘Okay you’re off for a week.’ It really confused my brain.” Several focus group participants, particularly first-year undergraduate students, expressed concern that the fall break was scheduled too early in the term, and that it significantly disrupted their adjustment to life on a university campus and to the weekly course routine they had begun to establish.

Discussion & Implications

Our survey data indicate that compared to stress levels before the break, students experienced higher levels of stress after the fall break, in spite of the fact that they were exposed to a smaller number of stressors. Post-break stressors were heavily centered around academic responsibilities, while pre-break stressors were more general. Since students’ primary responsibility is to academic success, it is possible that the experience of multiple academic-based stressors (e.g., upcoming tests and assignment deadlines) was driving the post-break increase in perceived stress. Data from the focus groups support this likelihood, with concerns surrounding course scheduling and workload being the most common theme discussed by students.

In spite of the increased stress we observed immediately after the fall break, responses in the follow-up survey in January, in which students reflected on the impact of the fall break on their entire fall semester, indicated that the majority of students had a positive perception of the fall break. Indeed, many respondents felt that it decreased their overall stress levels. One possible explanation for contrasting reports of stress between the October and January
surveys could stem from the time at which we administered the post-break survey. A substantial portion of respondents indicated that their academic workload immediately before and after the fall break was heavier than usual. It is possible that the break caused a transitory increase in stress, but that this spike was forgotten by the start of the next semester. This pattern could have implications for scheduling decisions made by instructors: being able to avoid an overly dense session of assessments could moderate student stress surrounding the fall break. Several focus group participants suggested that instructors within a department try to coordinate their assessment schedules so as to avoid having several assessments in different courses due in a given week. While the complexities of such a system are considerable, it may be worthwhile to investigate new ways of approaching this issue.

Additionally, our hormonal measures provide some indication that a fall break may, in fact, reduce student stress. Although we consider our preliminary findings promising, we are very cautious in our interpretation, since the data from our pilot study were collected from a subset of the undergraduate population (male, student engineers) and our sample size is limited (16 participants total). We are currently in the process of directing our efforts to recruit more participants in a follow-up study that will assess stress hormones around the timing of the fall break.

Our overall findings suggest that although perceived stress increases immediately after a fall break, students generally feel that the break exerts a positive impact on their stress and academic performance. University administrators may want to consider some factors that could further increase its benefit. For example, a large proportion of students indicated that they would prefer to have the fall break held later in the semester. Many other universities hold the fall break in November, and it would be interesting to assess whether stress levels after a later break correspond to those reported here. Additionally, and as mentioned above, universities may want to introduce a program to prevent excessive evaluation density immediately after the fall break. Note that it is possible that a later fall break could facilitate a less dense evaluation schedule, as instructors would have had more opportunities to evaluate students earlier in the term. It might also be worthwhile for student success and development centres to incorporate stress and time management strategies specific to the fall break within stress-reduction programs that are already available to students. At this point, the purpose of the fall break is not clearly delineated by the university. On one hand, the official terminology (fall “break”) implies that students should be using the week to take time away from academic responsibilities. On the other hand, the pattern of dense assessment schedules immediately after the break requires that students spend much of their time studying. Our data on time management over the fall break indicate that the most common activities over the fall break are academic and leisure, but it is possible that the university could further support students by providing guidance on effective ways to balance relaxation and academic responsibilities during the week away. Careful consideration of these recommendations could allow universities to ensure that the fall break truly supports students, both academically and in their mental health. Further, we would recommend that any consideration of future changes to programs would make use of the interdisciplinary, mixed methods approaches discussed herein, as they provide a robust evaluation of the complex variation within a university population.

References


Canadian Association of College and University Student Services (2016). Canadian Student Health Data Executive Summary. Toronto, ON: Canadian Association of College and University Student Services.


Lunau, K. (2012, September 5). The mental health crisis on campus: Canadian students feel hopeless, depressed, even suicidal. Maclean’s. VIEW ITEM

McMaster Daily News (January 15, 2015). McMaster approves full week fall break. VIEW ITEM


Pilato, K. (2014). Exploring the impact of a Fall Break on student mental health outcomes (Year 1 Report). St. Catharines, ON: Brock University. VIEW ITEM

Queen’s University (n.d.). Identifying and responding to students in distress. VIEW ITEM

**Impacts of the Fall Reading Week on Student Stress**

*Academy of Child and Adolescent Psychiatry, 38*(7), 908-915. VIEW ITEM


Statistics Canada (2016). Postsecondary enrolments by institution type, registration status, province and sex. VIEW ITEM


Universities Canada (n.d). Facts and stats: Overview. VIEW ITEM

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Section IV

Effective Learning
Problem-based learning (PBL) is a self-directed learning strategy where students work collaboratively in small groups to investigate open-ended relatable case scenarios. Students develop transferable skills that can be applied across disciplines, such as collaboration, problem-solving, and critical thinking. Despite extensive research on problem-based learning, a thorough examination of student engagement in relation to PBL is lacking (Savin-Baden, 2014; 2016). We studied student motivation through self-reflection exercises, surveys, and peer-evaluations in a third-year undergraduate anthropology course (N = 49) with students of differing levels of course material experience. We hypothesized that throughout the course student motivation would be highest in students with the most subject matter experience. The results show that student motivation was higher in students with more subject matter experience at the beginning of the course, however during the course their motivation decreased. By the end of the course the majority of students had high motivation toward PBL, however, we were surprised that forensic specialists with the most subject matter experience had low motivation at the end of the course. This research is important to demonstrate the challenges of implementing PBL in a traditional curriculum, and to provide suggestions for engaging diverse student populations in PBL.

Studies in the health sciences have found that problem-based learning (PBL) increases student motivation and engagement in course material over traditional lecture formats (Albanese & Mitchell, 1993; Murray & Summerlee, 2007; Prosser & Sze, 2014). PBL follows constructivist theory by allowing students to control their own learning process in small group collaborations where they work out practical case-based scenarios (Douglass & Morris, 2014). Instructors act as facilitators to promote student-centered learning by asking relevant open-ended questions that enable students to develop their own paths to achieve the learning outcomes of the course. Students gain transferable skills such as critical thinking, collaboration, and problem-solving that they can apply across disciplines (Klegeris & Hurren, 2011). Problem-based learning began as a teaching method to foster problem-solving skills in medical students (Barrows, 1996; Barrows & Tamblyn, 1980). It has subsequently been successful in other professional science-based programs (Masek, Yamin, & Ridzuan, 2011; Prosser, 2004; Vardi & Ciccarelli, 2008); however, the extension of PBL to the wider undergraduate curriculum has primarily involved modified (i.e., hybridized) versions that integrate mini-lectures or content driven sessions as scaffolding to accommodate larger class sizes and greater student diversity (Allen, Donham, & Bernhardt, 2011; Fukuzawa & Boyd, 2016; Savin-Baden, 2014).

Many studies have compared PBL to traditional lectures in medical health programs (e.g., Albanese & Mitchell, 1993; Koh, Khoo, Wong, &
Koh, 2008; Prosser & Sze, 2014; Strobel & van Barneveld, 2009; Vernon & Blake, 1993). Most of these studies focus on learning outcome assessments using meta-analysis (Albanese & Mitchell, 1993; Gijibels, Dochy, Van den Bossche, & Segers, 2005; Strobel & van Barneveld, 2009; Vernon & Blake, 1993). These studies have had mixed results especially in the ability of PBL to improve student retention of content for a particular course, although most studies found an improvement in clinical reasoning and long-term skill retention (Gijibels et al., 2005; Vernon & Blake, 1993). Koh et al., (2008) however, did not find significant evidence to support greater problem-solving skills in PBL medical school graduates versus traditional graduates with 1 - 23 years of clinical experience, in their meta-analysis of 13 studies. Large meta-analysis studies are limited because most do not examine the student experience during the implementation of PBL (Prosser, 2004; Prosser & Sze, 2014). Two components of the student experience that are essential to consider are intrinsic motivation and subject matter knowledge.

Intrinsic Motivation

Even though student engagement is a key component of PBL (Allen et al., 2011; Savin-Baden, 2014, 2016), there has been little to no examination of student engagement in PBL studies. Furthermore, the current definitions of student engagement may be misleading because they are focused on institutional learning outcomes such as content retention (Savin-Baden, 2014), rather than including “student connection with the learning context, discipline, peers, and tutors that enable transition and voicefulness in learning” (Savin-Baden, 2016, p. 3). Self-regulation demonstrates engagement as students identify goals, compose strategies to plan and manage resources, and monitor their progress towards their intrinsic goals (Zimmerman, 2002). Self-regulation requires intrinsic motivation (Sungur & Tekkaya, 2006). Students must be intrinsically motivated to successfully engage in self-directed learning (Hung 2011; Savin-Baden, 2014). According to Self-Determination Theory, extrinsic motivation is guided by external factors such as grades and approval, while intrinsic motivation is based on autonomy, competence, and relatedness (Douglass & Morris, 2014; Masek et al., 2011). Intrinsic motivated students use their own interest and sense of satisfaction to challenge themselves with a particular task (Raiyn & Tilchin, 2015). PBL has been suggested to increase student intrinsic motivation through these mechanisms because students are responsible for their collaborative process to investigate a relatable problem. The premise is that the more control students have over their own learning process, the greater their intrinsic motivation will be as demonstrated by their self-regulatory engagement in the course material (Douglass & Morris, 2014; Radovan & Makovec, 2015).

Assessment of Intrinsic Motivation

Assessing intrinsic motivation during PBL can be challenging and it is critical that appropriate assessment strategies are used to measure student achievements (Murray & Summerlee, 2007; Raiyn & Tilchin, 2015). For example, traditional content driven assessments (e.g., multiple choice tests) have been negatively associated with PBL because they encourage students to focus on content learning rather than higher order thinking (Murray & Summerlee, 2007; Raiyn & Tilchin, 2015). In contrast, PBL assessments should align with the teaching approach by emphasizing the learning process through collaboration, problem-solving, and critical thinking (Murray & Summerlee, 2007). Critical self-reflection is a method where students integrate their learning experience with learning outcomes. An effective self-reflection encourages students to think differently about their learning and guides them from superficial interpretations of complex problems toward critical thinking (e.g., the Describe, Evaluate, Assess Learning (D.E.A.L.) method (Ash & Clayton, 2004; Ash, Clayton & Atkinson, 2005; Ash, Clayton & Moses, 2007). Students express their motivation in the critical reflections through their perceived ability to: complete a task (i.e., competence); collaborate with
their peers (i.e., relatedness); and see benefits from successfully completing the task (i.e., autonomy) (Belland, Kim, & Hannafin, 2013).

Subject Matter Knowledge

Prior subject matter knowledge has also been discussed as a key determinant for successful PBL (Jonassen, 2011; Schmidt & Gijseelaers, 1990; Sockalingam & Schmidt, 2013). Studies have found that students with more subject matter experience have improved group dynamics, subject interest, and academic achievement; however, problem familiarity does not influence critical reasoning of a particular problem (Schmidt & Gijseelaers, 1990; Sockalingam & Schmidt, 2013). Thus, subject matter experience likely plays a large role in the success of PBL implementation and learning outcomes.

We focused on student motivation during the implementation of PBL as part of a larger ongoing project investigating different active learning initiatives in a technologically innovative classroom at the University of Toronto Mississauga. Our student population (N = 49) had a diverse subject matter experience and no previous exposure to active learning. By focusing on student experience during the implementation of PBL, we hope to contribute to the broader discussion of what variables influence the effectiveness of PBL (Allen et al., 2011; Loyens, Jones, Mikkers, & van Gog, 2015). We expect the results to show that students with greater subject matter experience will be more intrinsically motivated throughout PBL implementation. Ultimately, we hope to produce suggestions on successful implementation of PBL for student populations with diverse subject matter experience.

Methods

Course Structure

The University of Toronto Mississauga (UTM) is part of a large tri-campus research intensive university. UTM has an undergraduate population of approximately 14,000 students and 600 graduate students. Human Osteology is a third-year undergraduate course that is a core requirement for the forensic anthropology program and a recommended course for the biological anthropology specialist program. In the 2015 iteration of the course, groups of 2-3 students were assigned one adult human skeleton for the term, and 2 of these groups were combined to form each PBL group (i.e., 4-6 students studying 2 skeletons). Two PBL cases relating to 1) sex determination of their adult skeletons and 2) age determination of their adult skeletons were conducted through the course. We composed the PBL groups based on students’ course material experience as indicated in pre-course critical self-reflections and their program affiliation at the university. Forensic science specialists (N = 9) have been accepted into the forensic science program based on science related pre-requisites (minimum mark 75% in each course) and a minimum grade point average of 3.0. Biological anthropology specialists (N = 15) have previous experience in skeletal anatomy, and biological anthropology majors (N = 19) are students with an introduction to skeletal anatomy. Biological anthropology minors (N = 6) have no experience in skeletal anatomy but they have completed an introductory course in biological anthropology. Each PBL group included at least one forensic specialist, or one anthropology specialist, along with one anthropology major and one anthropology minor. Weekly PBL sessions were held in a technologically enhanced classroom to improve the active learning experience (Neo & Neo, 2005).

Each PBL group had direct access to online resources (e.g., internet resources, course references, electronic whiteboard & discussion board). Two sessions with interactive group exercises were given at the beginning of the course to encourage a cooperative atmosphere between group members; to emphasize the relevance of PBL principles to the field of anthropology; to familiarize students with the technology in the active learning classroom; and to provide a foundation of basic course terminology (Robinson, Harris, & Burton, 2015). During PBL sessions students could conduct online research simultaneously and collaborate on a discussion board that was projected at each PBL group table for the
facilitator to monitor. This technology allowed two facilitators for 12 PBL groups. Google documents were used by the students to track their contributions to the PBL assignment. Students had access to a number of online resources on writing a scientific paper and their textbooks gave them a good overview of the literature as a place to start deciding what methods they would employ. The instructor and teaching assistant received PBL training from an experienced educational developer who oversaw the study. They acted as facilitators by asking open-ended questions to encourage productive group discussions. Each week the groups also met in the laboratory where they studied their assigned skeletons and learned different parts of the skeletal anatomy.

We followed the traditional closed-loop model of PBL (Murray & Summerlee, 2007; Savin-Baden, 2014; Schmidt, 1983). Groups of 4-6 students were given a practical problem to investigate as a group in a 5-phase process. During the problem phase groups brainstormed the key issues of the question to identify the information that they needed to investigate a solution. They used available resources to hypothesize possible solutions and then assigned specific tasks to each group member. During the self-directed learning phase, students worked individually on their tasks to investigate the problem. The PBL groups then reconvened for the reporting phase where they shared their individual findings and decided as a group on the methods that they would use to investigate the problem. They then moved to the laboratory, where they performed the application phase and actually tested out their chosen methods on the specimens. Lastly, they finished the PBL process by producing a scientifically written group report.

Student Assessments

Student assessments and grading were based on the critical self-reflections and peer evaluations within groups that were submitted with each written PBL group report (Murray & Summerlee, 2007). Students wrote critical reflections using the D.E.A.L. method at the beginning of the course and after the submission of each PBL report to reflect on their motivation for the course; their previous experience with course material; the learning outcomes of the course; their understanding of problem-based learning; how they felt about group work; and an assessment of their strengths and weaknesses. In their reflection on motivation, students ranked motivation as low, medium, or high and then described why they chose that level. For each student group (forensic specialist, anthropology specialist, anthropology major, and anthropology minor), student motivation at the beginning, middle, and end of the course was compared using a Friedman’s ANOVA (nonparametric analysis of variance for repeated measures). Subsequently, for each student group post hoc analysis with Wilcoxon signed-rank tests were conducted to test for significant differences in student motivation between the beginning and end of the course.

The written PBL reports were assigned both a group grade and an individual grade based on the peer evaluation and the contribution of each group member (as indicated on the Google document). It is important to remember that in PBL there is not a single correct solution. Students worked with the instructor to determine the grading rubric for the PBL reports at the beginning of the course. This criterion-based rubric was produced to give students a clear understanding of the learning outcomes and to help students to focus on the learning process (Vardi & Ciccarelli, 2008). Students indicated in the reflections that they used the feedback on the rubric from their first PBL report to improve the writing of the second PBL report. Student reports were graded on their ability to: appropriately research the literature; justify the methods that they chose; make inferences from the literature; execute the methods; and create a comprehensive discussion on the methods’ accuracy and validity.

Students also responded to PBL surveys at the end of the course where they used a Likert scale (1, strongly disagree to 5, strongly agree) along with a written section to evaluate student motivation in the course according to relatedness (participation goals), competence (learning of course material and learning outcomes), autonomy (the application of PBL outside of the course), and the use of technology in the application of problem-based learning. This study fell within section 2.5 of the University of Toronto...
Tri-Council Policy Statement on Ethics, and it was approved by the University of Toronto Mississauga ethics officer as a program evaluation review within normal educational requirements.

**Results**

**Motivation: Forensic and Anthropology Specialists**

At the beginning of the course, all the biological anthropology specialists ($N = 15$) and 80% of the forensic specialists ($N = 9$) stated that they were highly motivated for the course material and group-based problem solving (Figure 1). In self-reflections, all of the specialists mentioned that a primary motivator in the course was either their grade point average or a graduate school application. Most mentioned that the course was a program requirement and 70% of the specialists stated that previous knowledge of the course material and their ability to memorize a lot of material very quickly were their primary learning strengths. In the mid-course critical reflections, the high motivation of the specialists had substantially decreased (Figure 1). These forensic specialists stated time management as their greatest weakness in relation to the course. They felt that they did not have enough instructor guidance to properly “solve” the problem, but they did recognize that PBL groups forced them to collaborate with peers and take more responsibility for their own learning. Similarly, anthropology specialists felt that the PBL projects involved a significantly greater workload than traditional courses.

At the completion of the course, most anthropology specialists (84%) had high motivation while 88% of forensic specialists had low motivation (Figure 1). Forensic specialists felt that the workload outside of the classroom was unmanageable. They felt that they were not given enough direction toward the solutions to the problems and they did not see the applicability/practicality of PBL skills in future research. The Friedman ANOVA of nonparametric variance showed a significant difference in motivation throughout the course in forensic specialists ($X^2 (2) = 7.600, p = 0.022$) and anthropology specialists ($X^2 (2) = 17.688, p = 0.001$). Post hoc analysis with Wilcoxon signed-rank tests displayed a significant difference in motivation in forensic specialists between the beginning and the end of the course ($Z = -2.428, p = 0.015$), but no significant differences in anthropology specialists between the beginning and end of the course ($Z = -1.633, p = 0.102$). Ordinal values were assigned as 1 for low motivation, 2 for medium motivation, and 3 for high motivation (Figure 1).

**Motivation: Anthropology Majors and Minors**

Anthropology majors ($N = 19$) and minors ($N = 6$) had lower levels of motivation at the beginning of the course (Figure 1). Many of the minors stated that they were taking the course to get a science course requirement for their degree in the social sciences. In contrast to the specialists, majors and minors were more focused on their weaknesses. The majority discussed time management and remembering a lot of facts as their primary concerns in doing well. Similarly, anthropology specialists felt that the PBL projects involved a significantly greater workload than traditional courses.

At the completion of the course, most anthropology majors ($X^2 (2) = 17.077, p = 0.001$) and anthropology minors ($X^2 (2) = 8.588, p = 0.014$) displayed statistically significant changes in motivation throughout the course, as well as a significant difference in motivation between the beginning and the end of the course for anthropology majors ($Z = -3.051, p = 0.002$), and for anthropology minors ($Z = -2.000, p = 0.046$) (Figure 1).
Post course PBL surveys

The post-course PBL surveys showed that 95% of all the students felt that they had achieved the course learning outcomes. The majority of students recognized that problem-based skills could be used across disciplines, and felt that although the course required more participation than other courses they had learned to work collaboratively in a group setting. They felt that PBL taught them how to investigate the literature to solve a problem but they did not feel that the process helped them think more critically about the material. Less than a third of the students felt that PBL benefited their learning process more than the traditional lecture format, and more than half of the students stated that they would choose a traditional lecture-based course over a PBL course (Table 1). There were no significant differences found between the final grades of the different student categories as determined by a one-way ANOVA \( (F(3,46) = 0.489, \ p = 0.691) \) (minors 68.2%, majors 71.9%, anthropology specialists 73.5%, forensic specialists 71.7%).

\[\text{Figure 1} \]

*Changes in student motivation during the beginning, middle and end of the course*¹

¹ A Friedman ANOVA test was used to determine significant differences in motivation for each student group (forensic specialists, anthropology specialists, anthropology majors, and anthropology minors) throughout the course \( (p = 0.001) \). Low motivation (ordinal variable = 1), medium motivation (ordinal variable = 2), and high motivation (ordinal variable = 3). * \( p \leq 0.05 \). ** \( p \leq 0.01 \). *** \( p \leq 0.001 \).
Table 1

*Problem-based Learning Post-Course Survey (N = 49)*

<table>
<thead>
<tr>
<th>Participation Goals</th>
<th>Percentage of students who moderately/strongly agree (Likert scale 4 &amp; 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I felt that PBL helped me to think more critically about the material in this course</td>
<td>44</td>
</tr>
<tr>
<td>I felt that PBL helped me to work collaboratively in a group</td>
<td>61</td>
</tr>
<tr>
<td>I felt that PBL engaged me as an active participant in my learning</td>
<td>56</td>
</tr>
<tr>
<td>I felt that PBL benefited my learning over standard traditional lectures</td>
<td>27</td>
</tr>
<tr>
<td>I would like more PBL in class sessions (than the 3 per paper)</td>
<td>22</td>
</tr>
<tr>
<td>I would like less PBL in class sessions</td>
<td>41</td>
</tr>
<tr>
<td>Compared to other courses, PBL required me to participate more often</td>
<td>63</td>
</tr>
<tr>
<td>I would like to take another course with PBL</td>
<td>41</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Learning of Course Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>I felt that the PBL exercises increased my knowledge of osteological research</td>
</tr>
<tr>
<td>I felt that PBL 2 was easier to investigate based on the feedback from PBL1</td>
</tr>
<tr>
<td>I felt that I needed more guidance to successfully complete PBL1</td>
</tr>
<tr>
<td>I felt that I needed more guidance to successfully complete PBL2</td>
</tr>
<tr>
<td>I felt that PBL was an important in applying osteological knowledge to research</td>
</tr>
</tbody>
</table>

<table>
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<tr>
<th>Application of PBL</th>
</tr>
</thead>
<tbody>
<tr>
<td>I felt that PBL helped me to deal with group related problems of everyday life</td>
</tr>
<tr>
<td>I felt that PBL helped me to use the literature to solve problems without assistance</td>
</tr>
<tr>
<td>I can see how PBL will help me in work related situations upon graduation</td>
</tr>
<tr>
<td>I can see how PBL principles can be applied across academic disciplines</td>
</tr>
</tbody>
</table>
Discussion

The purpose of this study was to examine the effect of subject matter experience on student motivation in PBL. We expected motivation to increase as the course progressed in keeping with other studies that have emphasized the importance of student engagement for PBL success (Masek et al., 2011; Raiyn & Tilchin, 2015). We also expected students with the most subject matter knowledge to have the highest motivation as previous studies have suggested that prior subject matter knowledge is a key determinant for successful PBL (Jonassen, 2011; Schmidt & Gijseelaers, 1990; Sockalingam & Schmidt, 2013). As we expected, there was an increase in intrinsic motivation for most students in this PBL course. In general, these students recognized the applicability of the skills learned in PBL (relatedness, autonomy, competence) to other disciplines and future endeavors. Contrary to our expectations, when the students were divided by their subject matter experience, the forensic specialists with the greatest course material experience and high motivation at the beginning of the course had the lowest motivation at the end of the course. We expected forensic specialists to have high autonomy with the problems and collaborative process as these are integral parts of a forensic profession. In our study, PBL did not motivate forensic students to engage in self-directed learning. We will discuss possible explanations for the challenges to motivate these students.

The Educational Environment

Similar to other studies (Hung, 2011; Vardi & Ciccarelli, 2008) we found that encouraging students to develop intrinsic motivation through PBL is a challenge in an environment of traditional lectures and exams where students have been rewarded for their extrinsic motivation. Hung (2011) argues, that in order for study habits to transition from traditional to constructivist self-directed learning, students need to change their self-regulatory goals. Since the PBL research is largely conducted in medical and other professional settings it may not be applicable to general undergraduate courses in the social sciences because many medical programs have adopted PBL throughout the curriculum. In addition, they may be a more homogeneous student population where students have more common learning goals, and problems are developed systematically (Hung, 2011; Masek et al., 2011). In our study, forensic specialists were fixated on content learning because this course was a core pre-requisite for fourth-year specialist courses that are being taught in the traditional lecture format. They were concerned that the self-directed learning of PBL meant that they were not learning enough of the course material to succeed in their intensive program.

Student Learning Behaviors

For students to be motivated in PBL they must understand and engage in PBL learning outcomes. Problem-based learning outcomes emphasize a self-directed learning process (collaboration, research, and problem solving) and differ from traditional learning outcomes that emphasize content retention (Prosser & Sze, 2014; Savin-Baden, 2016). In our study’s pre-course self-reflections, students expressed their strengths and weaknesses in terms of subject matter knowledge and rote learning skills because they did not have any experience in self-directed learning. We learned at the end of the course through the critical reflections and surveys that 95% of the students, including the forensic students with low motivation, felt that they had successfully achieved all the PBL learning outcomes. Student motivation, therefore, is not necessarily reflected in learning outcome assessment. Hung (2011) points out that when PBL studies focus only on learning outcomes they are missing out on variables (such as student motivation) that can lead to the improvement of PBL practices. Students with low intrinsic motivation engage in “ritual behaviors” where they appear to be active in the learning process but they continue to be content driven and fail to demonstrate higher order thinking, such as being able to make inferences between the literature and the problem (Dolmans, Wolfhagen,
van der Vleuten, & Wijnen, 2001, p. 885). Forensic specialists expressed frustrations over the lack of guidance and they attempted to draw answers from the facilitators. They continued to emphasize traditional learning outcomes such as the importance of their course grade as a primary motivator to learn the course material.

Time management was another common contributor to low motivation. Students found that researching and critiquing the literature required more time outside of the classroom than traditional courses. Forensic specialists, in particular, felt that the time requirement was unmanageable. Minors and majors who increased in motivation through the course recognized their weaknesses in their critical reflections at the beginning of the course and perhaps this made them more open to the concept of PBL as an investment for future learning (Bate, Hommes, Duvivier, & Taylor, 2014). Forensic specialists may have resisted the transition to intrinsic motivation because they were successful in the traditional model with extrinsic motivation; however, the other student groups could have been equally successful in the traditional lecturing format in other disciplines.

Strategies for the Transition to Problem-Based Learning

Based on our findings and other published work, we have the following recommendations to improve the PBL experience for diverse student populations. When individual PBL courses are introduced in a traditional curriculum, instructors must impart to students the direct benefits of PBL. In order to invest in the transition from content driven to process driven learning, students must view PBL in a positive light (Bate et al., 2014). Students have to understand the pay-off for the extra effort and time as they take control of their own learning. They must believe that PBL will give them lifelong skills that are transferable in a continually changing world (Savin-Baden, 2016). Our introductory group exercises allowed students to engage in PBL in a relaxed group environment with no grade attached. Students took turns leading group discussions on a number of short, and practical open-ended problems. We stressed the application of PBL skills to the everyday experience of the students so that they would see the importance of self-directed learning. The students positively evaluated these exercises in their critical self-reflections.

Many post-secondary institutions are focused on improving student engagement. This provides a good opportunity for student self-reflection in the curriculum (Douglass & Morris, 2014). The greatest obstacle in critical student reflections is getting students to think more critically about their learning experience. Structured critical reflections such as the D.E.A.L. method guide students to think about their learning in different ways (Ash et al., 2005). Critical reflections throughout the PBL process allowed us to monitor students’ insight into their motivation in active learning. We recommend that instructors allow for some flexibility in the course structure based on the critical reflections.

Instructional Support

Problem-based learning has been modified into a diversity of forms that vary in their problem types, facilitation, form of group interaction, and assessment (see Savin-Baden, 2014). These hybridized versions of PBL demonstrate its flexibility for different learning contexts but make it difficult and often futile to compare student motivation between different PBL implementations (Savin-Baden, 2014). Hybridized forms of PBL can be used to introduce students to active learning because they can be modified for the context and student population (Fukuzawa & Boyd, 2016). We recommend short weekly problems in introductory PBL courses. This strategy gives students short-term reinforcements to encourage their motivation for the PBL process, and it gives them time to become familiar with the tasks that are required in active learning environments.

Hybridized PBL courses use the principles of PBL but often support the instructional design with added instructor interventions. This structural scaffolding may be in the form of short lectures, class discussions, or added resources to guide the students.
through the process (Allen et al., 2011; Belland et al., 2013). Scaffolding is important to prevent student frustration and unease when they do not have the confidence to work through missteps or conceptual impasses (Allen et al., 2011; Belland et al., 2013; Masek et al., 2011). Savin-Baden (2014) however, suggests that scaffolding can also hinder self-directed learning because false starts and uncertainty through collaboration are crucial components of self-directed problem solving. Scaffolding may prevent students from crossing what Savin-Baden (2016) calls a “transdisciplinary threshold”, which involves the evolution of thinking to a higher order that transforms the way students view concepts (Savin-Baden, 2016, p. 2). Belland et al. (2013), however, argue that the correct scaffolding design can inspire student motivation in PBL. We recommend scaffolding in introductory PBL courses as a way to encourage the students’ confidence in their ability to engage in active learning. This is particularly important when PBL is introduced in a traditional lecture-based curriculum. Students are enrolled in other courses that emphasize extrinsic motivation, and so they may need instructor support to encourage investment in self-directed learning. Scaffolding can be reduced as students’ intrinsic motivation increases.

Limitations of this Study

It is important to recognize that there may be unique circumstances in this one course that are not applicable to all undergraduate social science courses. The small sample size could overemphasize individual eccentricities. Also, forensic specialists may have adopted more elements of intrinsic motivation than they recognized in their self-reflections. There may have been variables other than subject matter experience (e.g., sex, demographics of the students) that resulted in a difference in motivation in forensic specialists. It may be that this particular program attracts a certain type of learner. This was not investigated in this study.

Conclusion

Our study found that students with more subject matter experience did not necessarily have greater intrinsic motivation toward PBL in a third-year undergraduate anthropology course consisting of students of differing subject matter experience and no exposure to active learning. Problem-based learning implementation in a traditional curriculum requires more instructor support to encourage the students to invest in the transformation of their learning. We suggest that instructor supports should include introductory group exercises that emphasize the benefits of collaborative PBL without a grade attached. Assessments should include self-reflection exercises for students and instructors to monitor motivation throughout the PBL process, and adjust the implementation of the problems as the course progresses. We also found that the students responded positively to their participation in the creation of criterion-based assessments that clearly involved learning outcomes related to PBL (i.e., participation [relatedness] in the research process [competence] and then the application of their findings [autonomy]). Short weekly problems instead of prolonged projects may be more effective in introductory courses to give students ongoing feedback and support. Scaffolding in the form of class discussions or short content-driven lectures gives students confidence to feel comfortable engaging in the PBL process. Even if scaffolding hinders the development of intrinsic motivation we feel that it is beneficial at the beginning of the process and can be reduced once the students start to feel more confident in their problem-solving abilities. We are implementing all of these suggestions in a future iteration of this course.

References


**Biography**

Sherry Fukuzawa is a sessional lecturer III in the Department of Anthropology at the University of Toronto Mississauga.

Cleo Boyd is an educational developer and senior lecturer at the Robert Gillespie Academic Skills Center at the University of Toronto Mississauga.

Joel Cahn is a PhD candidate in Forensic Anthropology at the University of Toronto.
The Collaborative Case: From Class Assignment to Publication

Colleen Sharen
Brescia University College

Mark Feltham
Fanshawe College

Michelle Braecker
Parkwood Hospital

This essay describes an undergraduate research project involving collaboration among two professors and a student. The result, a business case about the student’s workplace, was ultimately presented at an academic conference and is now under consideration for publication. We describe the circumstances that led to the project, its outcomes, and our experiences. In addition, we provide guidance to other professors who wish to promote research collaborations with undergraduate students, referring to principles of assignment design as articulated by John Bean (2011) and the National Council of Teachers of English (2016), among others.

Undergraduate students frequently seek to participate in the published discourse of their fields. Even advanced undergraduates, however, often require considerable assistance with the process of learning to write what MacDonald (1994) termed “expert insider prose” (as cited in Bean, 2011, p. xii). Citing MacDonald’s term, Bean (2011) encourages teachers to design portals through which students can “enter their field’s discourse community, especially learning how disciplinary genres embody disciplinary ways of thinking and making knowledge” (p. xii). As “students cross the threshold from outsider to insider,” Bean later states, “they also cross the threshold from superficial learning motivated by grades to deep learning motivated by engagement with questions. Their transformation entails an awakening—even, perhaps, a falling in love” (p. 253).

Such transformative border crossings require considerable efforts in curricular bridge building, as Bean notes in his extended discussion under the heading “Departmental Collaboration to Teach Undergraduate Research” (p. 253). A related approach, however, involves professor-student collaborative authorship. The authors of this essay engaged in just such a collaboration—a business professor (Colleen), her student (Michelle), and an English professor (Mark) together transformed a course assignment into a conference presentation and a publication. By learning about how this collaboration came about, readers of this essay may be inspired to imagine ways to tailor their own strategies for fostering such collaborations with their own students.

The Context

The collaborative process began in a third-year course in Leadership Development, required for the leadership major offered at Brescia University College, a small liberal arts university in London, Ontario. Like many academic collaborations, this one arose from an informal conversation between Colleen and Michelle. During a class break, they were
discussing the lack of high-quality teaching materials for leadership development at the organizational level. Michelle, who had previously graduated from community college and was finishing university part time while working full time at a local hospital, mentioned a situation in her workplace that would make a good business case about leadership development. Colleen and Michelle agreed to pursue this opportunity.

After receiving approval from Michelle’s employer, Michelle and Colleen set out to obtain the university’s approval for Michelle to take an independent-study course based on this project. With Colleen’s help, Michelle prepared a course syllabus requiring a literature review, a decision-based case, an instructor’s manual, and an essay reflecting on her own writing, leadership development, and research skills. Michelle met with the Dean and received approval for the independent study. Michelle and Colleen planned to have the case and instructor’s manual ready for classroom testing in the Leadership Development course the following academic year and to submit the case to the Administrative Sciences Association of Canada annual meeting, a peer-reviewed academic conference.

The Genre: Business Cases

A case “is a description of an actual situation, commonly involving a decision, a challenge, an opportunity, a problem or an issue faced by a person (or persons) in an organization” (Mauffette-Leenders, Erskine, & Leenders, 2007, p. 5). Business programs often use cases: Bloomberg Businessweek found that many internationally ranked MBA programs use business cases for up to 75% of classroom instruction (Levy, 2015). Cases focused on a decision allow students to practice decision-making by analyzing individual, organizational, and environmental factors affecting an organization; developing alternative courses of action; and providing a recommended plan for addressing the issue (Andersen & Schiano, 2014; Erskine, Leenders, & Mauffette-Leenders, 2003; Mauffette-Leenders et al., 2007; Naumes & Naumes, 1999; Yin, 1994).

The case genre, then, calls for a variety of skills. First, the authors must have sufficient expertise to deal with the subject matter of the case. As this subject matter arose from an actual problem in Michelle’s workplace, this element fell perfectly into place. In terms of the insider expertise required to write genre-specific prose, cases require a broad range of writing skills: authors must consider the audience’s perspective and provide both industry context and the information required to make the decision in question.

Additionally, cases require a description of the protagonist and a logical narrative structure. Cases, moreover, have numerous conventions that often diverge from those of other common school and workplace genres—essays, formal reports, and so on. For instance, cases use the past tense, lack a conclusion, and deliberately—indeed, necessarily—omit information. At the same time, the author must provide enough information to allow the reader to analyze the situation and make a recommendation. The author must also structure the narrative so that the reader can apply the relevant concepts, frameworks, and theories.

In addition, the instructor’s manual requires that the author analyze the case situation, select an appropriate business concept or theory, and apply that theory to the case. This manual also requires pedagogical knowledge, as it typically includes learning outcomes, suggestions for specific courses in which the case can be used, a brief summary of the theory that the case illustrates, and a series of discussion questions that help readers engage with the case.

The Research and Writing Process

Even advanced students benefit from expert guidance in grappling with such complex writing requirements. Colleen thus provided Michelle with exemplars of published cases and instructor’s manuals; she also suggested several books on case writing (Erskine et al., 2003; Naumes & Naumes, 1999). In addition,
Colleen and Michelle met regularly to monitor progress; these meetings also allowed Colleen to provide any required support, including formative feedback. In particular, they discussed interviewing and note-taking techniques to prepare Michelle for the case-writing process. During this process, Michelle also prepared a literature review of the concepts and theories that she planned to use in the analysis of the case. In addition, Colleen and Michelle discussed each of the theories, assessed their appropriateness with respect to the case situation, and identified the information that Michelle would need to gather and include in the case to allow readers to apply the theories. Michelle then evaluated her entire learning process via a reflective essay.

After submission of the final grade, Colleen and Michelle revised the case using the call for cases (2015) from the Administrative Sciences Association of Canada: this call provided an authentic writing context for the case. They then met with Mark for a series of editing workshops, wherein Colleen provided guidance regarding the case genre and all three collaborated on a substantive review of the case and instructor’s manual. The case was accepted for presentation at the conference and publication in the conference proceedings in spring 2015. After peer review, Michelle and Colleen further revised and submitted the case and instructor’s manual to a publisher, where it is currently under review.

Voices

Reflections and conclusions about the process varied quite significantly, as the first-person accounts below illustrate.

Michelle

My writing skills have significantly improved as a result of writing the case and instructor’s manual. To write an effective business case, you need to write clearly and pay attention to detail to meet the needs of your audience. A business case needs to lead the reader through the problem, to consider various solutions. It therefore needs a clear structure, with headings and sub-headings to guide the reader. It was helpful to understand that the case and instructor’s manual are best written simultaneously to ensure there is sufficient information in the case to answer the questions. My learning continued through the editing process—specifically, how to communicate a thought succinctly using fewer words. It is amazing how a sentence can have the same meaning by cutting the word count in half! Aside from the improvements in my writing skills, my communication skills have developed further in that I know I have to be curious and ask more questions, no matter how insignificant I perceive them to be, especially when I am in a new situation and learning something that is new to me. I realized that actively listening to others broadens your knowledge because you only know what you know. As a mature student, I not only found value in the voices of others, but I also learned that the ability to collaborate with others effectively leads to successful relationships.

Colleen

Working collaboratively with a highly-motivated student was an enriching and enlightening pedagogical experience. Michelle contributed her expertise and personal experience with the subject matter of the case, I contributed expertise with the case genre and course theory, and Mark contributed expertise with writing and editing. Much of the work happened during in-person writing and editing sessions. These sessions were highly illuminating: each contributor learned a great deal about the other person’s area of expertise. Moreover, as the next section discusses, we also learned strategies for reproducing this positive experience with future projects.

Mark

Although broadly familiar with the business-case genre from prior editing work with Colleen, I am far from expert. I do, however, have extensive experience as an editor and writing teacher, and I brought these skills to our discussions. Interestingly, however,
during our editing sessions, a lot of my advice was context-dependent in the sense that experienced case writers have their own ways of doing things. I also have almost no knowledge of the subject matter of the case, matter in which Michelle is the expert. I frequently found myself in a three-way conversation with Michelle and Colleen, as I had to adjust my advice based on what Michelle meant when she wrote a particular sentence and on Colleen’s expert knowledge of the generic and rhetorical conventions of the case genre.

Design Assignments with Intent: Optimizing Assignments to Promote Opportunities

The process described above benefitted from highly fortuitous circumstances: the course material and outcomes and Michelle’s own background experience and professional life meshed perfectly with the genre of the business case. All of this arose from a chance conversation during a break in class and was implemented as an independent study course, another enabling factor promoting a high level of customization and collaboration. Although such happy conjunctions can arise spontaneously, such moments are probably relatively rare. Collaborative professor-student projects are special situations: every course assignment cannot turn into this kind of a project for every student. World enough and time both are lacking. Despite time and resource constraints, however, there are some ways to design courses and assignments so that such opportunities become more likely.

The right design decisions can optimize course assignments so that even if full-scale collaborations do not occur, the assignments help prepare students for future opportunities in subsequent courses, jobs as research or teaching assistants, senior projects, graduate programs, or whatever other opportunities await the students in a given course. Although strategies for promoting such opportunities will vary with the research methods, generic conventions, and publication opportunities in different fields, there are ways to avoid surrendering to circumstance. Professors seeking to foster such moments can stack the deck.

Careful assignment design is one way to do so. Interested and able students are a necessary but not sufficient condition for collaboration: some vehicle for collaboration must also exist. Such vehicles are the result of design decisions: professors can thus maximize the potential for such collaborative opportunities by engaging in what John Bean (2011) calls “backwards design” (p. 96). This concept plays a significant part in Bean’s book-length discussion of how to design assignments that allow students to engage critically and actively with authentic problems; it also provides a compelling model for describing the assignment that gave rise to this entire collaboration. Under the heading “Planning Your Course Backward by Designing the Last Assignment First,” Bean observes that when “teachers design [the] last assignment first, they can analyze its level of difficulty, determine the kinds of problems students are apt to encounter, and then design earlier assignments that help students build the skills needed for the final assignment” (p. 96). In terms of the collaboration under discussion here, circumstances presented an opportunity for a custom course designed backwards from a business case.

Professors should thus be alert to the opportunities posed by the professional discourses and genres of their own fields, and they should seek to craft assignments that reach towards potential publication. Of course, not all genres are appropriate for even highly advanced undergraduate students: for example, it is unlikely that even the most advanced bachelor's candidate would co-author a scholarly monograph with a professor. However, an undergraduate might complete an assignment that leads to work as a research assistant, resulting in experience with the production of a monograph and mention in the acknowledgements.

Even when it is not appropriate for a student to create a real-world example of a genre with an eye towards publication, though, professors can carefully introduce students to these genres by anatomizing them, explaining their role within the discourses of their fields, and modelling how they themselves use—and create—the genres. Such use of “mentor or
exemplar texts” is a best practice for writing teaching that promotes the formation of a “mental model of the genre” (National Council of Teachers of English, 2016, What Does This Mean for Teaching section, para. 3). Bean (2011) makes essentially the same point when he notes that “students aiming for expert insider status need to present their research in one of the real genres of their discipline” (p. 256).

Part of the professor’s job, then, is to design realistic opportunities that lead to more advanced opportunities later, whether in proximal post-course work or work at the distant end of the curriculum. For example, when publication is not possible, professors can also design assignments and assignment processes that simulate real-world publication genres of interest to the students. Such opportunities may give rise to entries in writing contests, submission to student conferences, student journals, graduate student journals, or even professional journals, depending on the circumstances. As Bean (2011) further notes, such design criteria can span an entire curriculum, in collaboration with other faculty members. “Working together,” he states, “departmental faculty can design the curriculum backwards to ensure that the skills and knowledge needed for expert insider prose are taught gradually and sequentially in key courses throughout the major” (p. 260).

Genre exposure via exemplars, check-in meetings, literature reviews, and the various other supportive elements of the course that Colleen and Michelle designed illustrate the principle of scaffolding, a well-known and oft-cited term in teaching and learning closely connected to the concept of backwards design discussed above, as Bean (2011) himself repeatedly indicates. All of the scaffolds noted above, including the choice of exemplars, their level of difficulty, and their generic features will necessarily vary according to the individual courses and disciplines. These basic structural elements, when carefully designed and built into achievable assignments, will increase the chances of productive collaborations, even if these collaborations do not materialize until years later in more advanced courses.

The End Is not the End: Committing to the Process

When collaborative publications do occur, the end of the course is never the end of the work. As a result, the professor and the student must both be willing to make the necessary time commitments to help the collaboration succeed. In addition, the professor and the student must actually get along with each other: a collaborative project will probably not succeed if the parties cannot work together effectively. The participants must thus be particularly attentive to the interpersonal factors in play during the shift from the conventional professor-student relationship to a relationship in which the professor functions more like a collegial mentor. Beyond these basic interpersonal factors, moreover, both parties need to manage the workload associated with the process: even if they have the time, they must also be able to work productively within the time available. Finally, the student must be able to handle the peer-review process both intellectually and emotionally, especially in terms of engaging with the honest—sometimes brutally honest—comments that often arise when outside eyes appraise his or her work.

Phone a Friend: Bring in Outside Eyes, As Needed

Certainly, Colleen did not require outside assistance to help Michelle write a business case—as a business professor and author of many such cases, Colleen is already an expert insider. Depending on the project, though, the situation may be different. For example, a psychologist may need to engage a statistician, a biologist may need to engage a biochemist, and a physicist may need to engage a mathematician. Less obvious interdisciplinary collaborations may be particularly interesting: one wonders what as-yet-unthought-of projects might involve English professors working with physicists, or anthropologists and mathematicians sitting down to collaborate over coffee. It is also possible that no additional expertise
will be required, depending on the project in question.

In this case, although Mark’s involvement was not strictly necessary, he and Colleen had collaborated on other projects, and she wanted to provide Michelle with an enriched experience that not only included exposure to other forms of disciplinary expertise but also a fresh audience. In this way, his involvement actually modeled interdisciplinary aspects of collaborative authorship and, moreover, introduced Michelle to the idea of an academic community as a network of experts engaged in collegial collaboration. Indeed, as described above, Mark’s engagement with the draft case went beyond just copy editing: it resulted in a three-way conversation about how the language of the draft related to its generic requirements and content.

Such conversations are a common—and often joyful—part of writing life. A glance at the acknowledgements section of almost any publication usually reveals the names of various academic friends who have read and commented on drafts of the text. A published text is, after all, meant to be public—meant to become the nexus of a community of readers. Early exposure to community responses, simulated by formative feedback from a friendly yet critical audience, can introduce the student to such community networks while simultaneously enhancing the project. Indeed, the National Council of Teachers of English (2016) emphasizes the importance of collaboration, along with the larger point that writing happens in the midst of a web of relationships. Most clearly, the relationship between the writer and the reader can be very specific: writers often have a definite idea who will read their work, not just a generalized notion that their text will be available to the world. Furthermore, particular people surround the writer—other writers, friends, members of a given community—during the process of composing. (Writing is embedded in complex social relationships section, para. 1)

This statement is an extremely helpful guiding curricular principle: by building a web of relationships and careful assignment design, professors can make in-course writing processes more authentic, thus minimizing the writing-in-a-vacuum effect that can accompany course papers for which the only audience is the professor required to grade them.

Conclusion

A chance conversation between a student and a professor led to this collaboration; this professor happened to have a collaborative relationship with another professor willing to assist during the post-course writing process. Different characters and different relationships will produce different outcomes. Just because this collaboration arose from this particular matrix of circumstance, however, does not mean that others cannot reproduce its general result. Professors seeking to do so will necessarily operate in their own contexts, shaped by individual preferences, affinities, workloads, ethics, and even institutional policies. Moreover, as Bean (2011) observes, the quest towards expert insider prose involves multiple elements, including “subject matter knowledge, genre knowledge, discourse community knowledge, information literacy, rhetorical knowledge, and writing process knowledge” (p. 254). Although the discussion above touches in various ways on each of these points, readers will know that each one accords itself into a vast file of separate design questions, each with its own sub-questions. Such variable-laden situations do make for complicated problems in curriculum design. Nevertheless, such problems tend in their solving to produce the most rewarding results. The collaboration that began with a chance conversation has thus far produced a successful course assignment, a business case and instructor’s manual, a conference presentation, and now this published essay. The case itself is under consideration for publication. By taking the right steps to engineer the right circumstances, others can achieve similar results.
References


National Council of Teachers of English. (2016, June 2). Professional knowledge for the teaching of writing. VIEW ITEM


Biographies

Colleen Sharen is an Associate Professor of Management and Organizational Studies in the School of Leadership and Social Change at Brescia University College.

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“Did I do Good?”: The Teaching and Learning of Ethics

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We often assume that students will simply understand specific ethical requirements as they progress, but in reality this does not happen. Students need instruction in ethics. With adherence to the Tri-Council’s ethics policy now mandatory for university research with human participants, understanding of ethics is a necessity. We need students to be empowered to understand and appreciate ethics. This article explains an interactive discussion model, based on teaching experience. Students are assigned readings, with guiding questions, and come to class for a discussion of ethical issues and principles. Details and examples of discussions are given. More must be done to help students develop true understanding of ethics and their application, and engagement in discussion is a crucial tool to achieve this end.

“Virtue being of two kinds, intellectual and moral, intellectual virtue derives both its origin and its growth mainly from teaching (wherefore it requires experience and time), while moral virtue is the fruit of habit” (Aristotle, 350 BC/1963, p.28).

Ethical principles are important in all aspects of life; from day-to-day interactions with others to discipline-specific ethics codes. In research, the government of Canada now requires all institutions with government funding, such as universities, to have a formal Research Ethics Board (REB), which evaluates proposed research. It is thus necessary to adhere to ethical standards even if only from the purely practical perspective of having research approved and funded. The Canadian government’s main grant funding bodies, the former Medical Research Council (MRC), now the Canadian Institutes for Health Research (CIHR), the Natural Sciences and Engineering Research Council (NSERC), and Social Sciences and Humanities Research Council (SSHRC) came together as the “Tri-council” to produce an over-arching policy statement on research ethics, the policy on Ethical Conduct for Research Involving Humans (CIHR, NSERC & SSHRC, 2014). This policy must be followed for any research funded by grants from any of the three agencies. Not only faculty members and research scientists, but also students need to follow these guidelines and standards. Currently in Canada student research projects must also be evaluated, either by the full REB itself or by a Student Research Ethics Review Panel (SRERP).

With so much attention now being given to ethical principles in research and in professional practice we need to understand how such ethical principles are acquired. We often assume that students will simply come to understand specific requirements as they progress through university, but in reality such “learning by ‘osmosis’” (Bicknell, 1985, p. 25) just does not happen. Students need instruction in ethics, particularly as it relates to codes and requirements. With adherence to the Tri-Council code of ethics now mandatory for any university research with human participants, understanding of ethical principles is no longer something that would be good to have but is now a necessity (The Expert Panel on Research Integrity, 2010). Interestingly, as Woody (2008) has noted, our ethics codes have no direct requirements for teaching
of ethics. Even in many universities there is a lack of instruction in ethics. Whilst some instruction regarding ethics occurs, there are few courses in ethics per se, and still fewer specifically dealing with research ethics. It seems that ethics are given a cursory treatment in a lecture or two near the beginning of some courses, but little more. Students then are left with little understanding of real ethical principles and the need for ethical regulations, and often question the relevance of the REB or SRERP. We need students to be empowered to understand and to appreciate ethics, both in the abstract and the specific required principles.

There is thus a need for understanding of ethics and ethical principles, but often any discussion of ethics relating to students focuses more on issues of student misconduct, such as plagiarism by students (Devlin & Gray, 2007; Stephens, Young, & Calabrese, 2007). What is lacking is teaching with the aim to inculcate understanding of ethical principles and the need for such principles. Sierra and Hyman (2008) propose that “instructors (and university administrators) can help to develop their students’ sensitivity to ethical dilemmas” (p. 61). Students need to learn about ethical behaviour and why issues such as falsification or fabrication of data are unethical – not only for their undergraduate work but also because our students are the population from which future scientists and clinicians arise. Students need to fully appreciate why a behaviour is considered unethical before they themselves conduct research and submit papers for publication, or engage in professional practice in areas such as psychology or medicine.

As noted above, we cannot assume that students will simply absorb ethical principles as they pass through their undergraduate years – as many have noted, there is need for explicit training in ethical practices (e.g., Bicknell, 1985; Woody, 2008). Teaching of ethics must be practiced, and in such a way as to engender ethical thinking and true adoption of ethical principles by the student. I would argue that an interactive approach, encouraging critical thinking and depth of understanding is crucial. One way in which to achieve the necessary understanding is to discuss ethical dilemmas, using these to illustrate application of ethical principles and relevant codes of conduct. The discussion and engagement model of application of ethics to situations aids student understanding of both ethical principles and codes of ethics.

This paper explains one method of engaging students in a discussion of ethics, previously offered as a workshop at the 2016 annual meeting of the Society for Teaching and Learning in Higher Education (STLHE). Although there was no formal feedback, attendees were engaged in the workshop and appreciated the insights gained.

Description of Method

Teaching of ethics can be in a lecture-based format, but discussion of situations and application of principles leads to fuller engagement and deeper understanding by students (Plante, 1998).

Learning Objectives

As outcomes of the discussions, participants should be able to: describe concepts underlying ethics and relate these to application; understand the necessity for concepts of ethics and codes of conduct for practice; discuss their own perspective of ethics; describe the benefits of an active learning approach to ethics; and develop their own abilities to discuss ethics with others.

Discussion Structure

After a brief introduction to the issue(s), students are divided into small groups (four or five persons) for discussion. Participants then engage in discussion of a situation and applicable ethical principles, in an interactive classroom discussion (approximately 20 minutes). Students then engage again as whole group for further discussion, when ideas and comments from small groups are collated, and further discussion ensues (10 to 15 minutes).

Participant engagement is encouraged in two ways. First, in a small group discussion; this “break
out” into smaller groups allows students to feel more comfortable for initial exploration of concepts. Second, by a larger, whole-room discussion when information from the small groups is shared with all present.

Being asked to speak in front of an entire class can be intimidating for students, and having to explain an ethical principle or justify a position may be difficult if done “cold”. With the small group/whole group structure students have time to first consider concepts and to “try out” ideas in a more comfortable atmosphere, before explaining to the whole room.

In my courses, students would be given readings in advance – anything from excerpts from classic works such as Aristotle’s “Ethics” to a recent journal article on ethics in clinical practice – with some guiding questions. Students come to class bringing their copies of the readings and answers to the set questions, prepared to engage in discussion. Some additional questions are set at the class discussion, particularly for lower-level students (see examples, below). These questions are usually more exploratory in nature: to foster discussion of situations, or of themes with no real “right” or “wrong” answer. The discussion itself follows the format outlined above. Students are free to explore ethical concepts and issues in their discussions, the only rule being that we as a class expect an atmosphere of respect. As with the saying attributed to Voltaire: “I may disagree entirely with what you are saying, but I will defend to the death your right to say it”. Thus, a student is free to hold an unpopular opinion and may not be called “stupid” (for example) for doing so, but will be expected to explain and to defend their position rationally, as will all students in the discussion.

At the end of the discussion, students will have explored (an) ethical principle(s) in the abstract, considered their own held ethical principles, and been exposed to other interpretations/understandings of the principle(s) in question.

### Examples

From practical experience in the classroom, this discussion format appears to work well for students in a variety of courses and at different levels of their university career. For lower-level courses one would set less difficult (and, frankly, shorter) pieces for reading, and with appropriate level of questions. Students in earlier years of their degree progression

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<th>Instructions</th>
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<tr>
<td>1. Briefly outline each of the two articles.</td>
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<td>2. What are, in your opinion: (i) the main benefits and (ii) the major negative issues arising, with gene editing of embryos?</td>
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<th>Additional Questions – Given in Class</th>
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<tr>
<td>Assuming that gene therapy and gene editing become readily available:</td>
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<tr>
<td>What are the ethical and practical issues arising from allowing parents to “design” their children?</td>
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**Figure 1**

*An example discussion from the Introduction to Child Development class*
will require more support and guidance than those in upper years, but all are expected to think for themselves. To illustrate, I provide here two examples, one from a second-year course (Figure 1) and one from a course taken by third and fourth year students (Figure 2).

Introduction to child development (primarily second-year students)

General instructions include asking students for each article to discuss the answers to a set of questions in a few lines to a paragraph each, noting that this is not meant to be an essay. Students are directed to use their own words as much as possible. In addition, students are directed to leave space between each of their typed answers in which to write their commentary from the discussion. Students are directed to take notes during the discussion regarding the points raised which they had not previously considered, the different ideas proposed, and additional information provided from the discussion. Student groups are asked to indicate when all members agree on the main points; i.e., that they have no new insights to note. Students are required to also write down any additional information from the overall class discussion, when information from the small groups is collated (see figure 1).

Ethics in psychology (third and fourth year students)

In the first discussion for this class students examine the different ethics codes. The subsequent four discussions require students to read their course materials and/or particular article(s) and write a paper answering the set question(s) (see figure 2). The overall length of each paper should be at least 650 words, not including the cover page/title and any references. As with the second-year class, students are told to use their own wording where possible and to clearly denote and properly reference any quotations.

Readings

Read the relevant information in the coursepack; particularly the articles by Bostrom and Sandberg (2009) and Chatterjee (2007).


N.B. These are not necessarily the sole references; you may find that there is useful information on this issue in the CPA and APA codes.

Questions

1. Summarize the pro/con arguments in this situation and discuss which ethical issues arise.

2. What ethical principles (generally and from the ethics codes) most apply and why?

Figure 2

*An example discussion from the Ethics in Psychology Course*
Teaching and Learning of Ethics

Students are directed to come to the discussion classes prepared to discuss the set questions and related issues. During the discussion class students are advised to make notes of the main points, different ideas proposed, and other ideas raised during the discussion. Students append these notes to the typescript of their answers.

The above examples not only show the preparation for the discussions, but also how the level of difficulty and “scaffolding” given change, both with the level of course and specificity of the course. Both of these discussion examples relate to issues of genetic modification of humans (not all discussions are analogous, these two were chosen for comparative purposes), but the second-year students read shorter, simpler articles and engage in a more “general” level discussion.

Conclusions

An understanding of ethics and practice of ethical behaviour are expected of students, researchers, and in professional practice, and formal ethics codes exist outlining expectations of behaviour. Students, however, receive little direct instruction in ethical principles. This lack has been noted for some time (e.g., Sierra and Hyman, 2008), and more must be done to increase not just factual knowledge but also development of true understanding in this area. This development must be a more conscious aspect of courses at our universities, and engaged, guided, discussions are an important way of developing sensitivity to, and understanding of, ethics and ethical principles – understanding which students can then take beyond the university to their everyday lives and into their future careers. Inclusion of active discussion of ethics in multiple courses and at all levels of the university will inculcate what I like to call an “ethos of ethics” in our students.

References


Plante, T. (1998). Teaching a course on psychology ethics to undergraduates: An experiential


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**Biography**

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Interdisciplinary and Transdisciplinary Research and Education in Canada: A Review and Suggested Framework

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Transcending disciplinary boundaries is becoming increasingly important for devising solutions to the world’s most pressing issues, such as climate change and food insecurity. Institutions of higher education often present challenges to teaching students how to work and innovate on transdisciplinary teams. We first define transdisciplinarity and like concepts, using these to review databases of three major funding agencies (CIHR, NSERC, and SSHRC) for awards given to inter- and transdisciplinary programs across ten fiscal years beginning 2005-2006 and ending 2014-2015 to identify trends in funding as an indicator of skill need. We then search for programs offering transdisciplinary learning opportunities at Canadian universities accounting for 71% of all students. Though the proportion of interdisciplinary and transdisciplinary funded research grants has risen considerably, we found only a few examples of interdisciplinary learning opportunities for students in post-secondary education programs. Generally, while students were able to take a range of courses, instruction remained discipline-specific. Specifically, Canadian undergraduates lack an in-program, experiential, transdisciplinary learning opportunity. We propose a framework (ICON) as a solution to fill this gap. Using senior independent study courses, which often have built-in curricular flexibility, students can participate with ICON while still obtaining credit towards their degrees. We conclude that transdisciplinary education opportunities are an essential part of the undergraduate experience and should be recognized across degree programs.

Fifty years ago, the most celebrated minds of bionic technology gathered to discuss their research. Otto H. Schmitt, instead, presented a paper on the challenges that the field faced. Of top priority was to teach people to think across transdisciplinary lines. He suggested that the way to solve this problem in academia was by facilitating the meeting of researchers in diverse areas to avoid the “splintering into innumerable special groups” (Schmitt, 1960, p. 484). Little has changed since Schmitt’s initial recommendation. There still remains a well-established need to eliminate disciplinary borders both in academic and professional settings.

Specifically, within the academic framework, our ability to solve problems through the generation of knowledge has traditionally been addressed from discipline-specific points of view. However, it has become apparent that the research needed to address today’s complex problems requires the expertise of multiple disciplines (Choi & Pak, 2006; Hagoel & Kalekin-Fisherman, 2002). Cross-boundary complementary research and educational programs that are transdisciplinary in nature are necessary for our continued generation of knowledge. To encourage and build the skills that are necessary for transdisciplinarity to become more prominent in
academic thinking, we should introduce the concept and begin practicing it during students’ post-secondary education.

Yet, upon entrance into post-secondary studies, students are splintered into groups. The selection and dispersion into respective majors is facilitated by a calendar of required courses and/or electives that produce disciplinary knowledge experts. In doing so, post-educational institutions foster discipline-specific thinkers. Yet, as Kolb and Kolb (2005) state, learning requires “facing and embracing differences,” including those that exist between various banks of knowledge (p. 207). As a result, for today’s students to be successful, they now require both discipline-specific knowledge and additional skills, including, but not limited to, effective communication, leadership, and teamwork (Hubball et al., 2010). Research by Tourse and colleagues (2008) supports the use of transdisciplinary education as a means to respond to this demand. As evidenced by their study, they concluded that by teaching transdisciplinary skillsets, students were able to approach tasks/challenges with a broader lens, could communicate and collaborate more effectively, and were more reflective when problem-solving towards a shared vision. Accordingly, while transdisciplinary programs in academia are not without challenges, the potential benefits are necessary for moving into a 21st-century approach to teaching and learning.

Further, it is important to add that transdisciplinary thinking and practices are not contradictory to disciplinary activities; rather, they complement and even extend disciplinary understanding. McGregor and Donnelly (2014) argue that the collaborative nature required for transdisciplinarity goes beyond institutions and into the larger global community, and fosters reconciliation between “all sciences and civil society,” inviting a more holistic perspective (p. 165). Without transdisciplinary interactions, some disciplinary research may not ever have been considered (Rosenfield, 1992). By bringing together experts from a range of disciplinary backgrounds, including both students and researchers, broader social problems can be addressed thereby fostering a deeper and more extensive analysis (Rosenfield, 1992; Roux, Stirzaker, Breen, Lefroy & Cresswell, 2010; Tourse et al. 2008). By bringing together individuals from varying fields, there is an increase in potential opportunities to strengthen team building, communication skills, and mentoring, all of which are less likely to occur under traditional discipline-specific research and educational conditions (Roux et al., 2010).

Despite the priority for transdisciplinary collaboration, academia itself can act as a barrier because faculty members are often loyal to their discipline (Hagoel & Kalekin-Fisherman, 2002). In this way, students are often not exposed to other ways of thinking and lack opportunities to broaden their skillsets through experiential and transdisciplinary learning. Breaking down disciplinary barriers is essential to promote transdisciplinary training. This must be acknowledged by faculty and administration to ensure the success of any cross-disciplinary higher level experiential learning approach to curriculum (Kolb & Kolb, 2005). We need to teach students how to foster skills that promote collaborative thinking outside traditional disciplinary silos.

To demonstrate the need for transdisciplinarity, both in research and education, we turn to the study of bibliometrics. Bibliometrics is defined as the “organization, classification and quantitative evaluation of publication patterns…by mathematical and statistical calculus” (Sengupta, 1985, p. 168). In this way, areas of research can be classified according to the amount of funding provided and the quantity of subsequent publications that result. We seek, not to quantify the output of inter- and transdisciplinary publications as an indicator of the need for multidisciplinary projects, but rather to consider only whether trends in funding to these kinds of projects exist. In part, we are utilizing data that may have bibliometric significance, but propose an alternate view of what this relationship might suggest about research need. Should there be an increase in funds allocated to inter- and transdisciplinary projects, it is arguable that Schmitt’s 1960 proposal is being realized. As such, higher education has a responsibility to prepare students to meet this need.

In this paper, we present (a) whether there are trends in funding allocation to inter- and transdisciplinary programs, (b) if there are programs available to students, particularly undergraduates, to
prepare them for entering an inter- or transdisciplinary job market, and (c) the presentation of an educational framework that responds to the growing need for transdisciplinary education in the undergraduate curriculum.

Theoretical Framework

Currently, data about funding are used in the study of bibliometrics to determine the relationship between funding and its respective publication results. However, trends in funding signal another question about which programs get funding and why. A 2009 article by Singh, Illes, Lazzeroni and Hallmayer proposes that media and societal pressure are some of the driving factors that steer funding allocation in specific directions. Their study considered recent increases in funds awarded to autism research in the United States and how demand for increased understanding led to a subsequent increase in the funding autism research projects received. Thus, demand for research becomes the acknowledgment of an area of research need.

Another example is the need for outreach programs that encourage women to pursue careers and education in science, technology, engineering, and mathematics (STEM); fields that are still largely comprised of men. Social stereotypes, pay-rate inequality, job demands, and overall career success, rather than poor academic achievement, suggest the need to change the way we view career options in STEM fields for women (Hango 2013; Stauffer 2015). It is not ability holding women back from these careers, but rather traditional limitations. Fostering programs that aim to transcend some of these long-held setbacks is a goal shared by high schools, second career programs, and within the higher education sector. Certainly, funding to these programs is also based on demand.

Today, funding allocation is not taken for granted. As Abramo, D’Angelo and Caprasecca (2009) present, there are pressures upon governments (and other funding organizations) as a result of demand for both fundamental and applied science. As such, an increase in awards given to inter- and transdisciplinary projects would be indicative of a societal need to pursue innovative efforts that encompass the needs driven by this demand.

Defining Terms

To investigate the prevalence and nature of existing transdisciplinary education programs, it is first important and necessary to define the term transdisciplinary as it shall be understood in this essay, and how it differs from the terms intradisciplinary, multidisciplinary, and interdisciplinary.

Intrdisciplinary projects are those that involve knowledge builders from more than one subdiscipline within a larger parent discipline (Schary & Cardinal, 2015). Here we use the term knowledge builder to purposefully capture the diversity of research systems available to discipline building beyond the western science paradigm (e.g. local and/or indigenous traditional knowledge). In an interdisciplinary setting, knowledge builders from subdisciplines within a larger parent discipline work together to solve problems using the tools, methods, and training that are contained within the entire domain of the discipline. Efforts to synthesize findings that benefit the entire discipline and progress the field through the addition of new knowledge is the result of such collaborations (Schary & Cardinal 2015). Intradisciplinary endeavors are perhaps the least daunting form of disciplinary collaboration because each member of the team understands the basic lexicon of the domain, reducing potential issues with knowledge translation and transfer (KTT), and knowledge mobilization (KM).

Multidisciplinary teams can be thought of as a collection of intradisciplinary teams that are working towards a common goal but do not actively engage in the process of knowledge building among each other (Rosenfield, 1992). There is no specific KTT or KM between groups.

Interdisciplinary programs involve the collaboration of knowledge builders from two or more disciplines (Aboelela et al., 2007; Schary & Cardinal, 2015; Rosenfield, 1992). In its simplest form, knowledge builders in one discipline identify that a solution to their discipline-specific problem requires the tools and methods of another domain to
solve. As suggested by Schary and Cardinal (2015), this leads to the synthesis of results across disciplines, utilizing methods beyond only one discipline. Accordingly, in order to facilitate collaboration, there must also be a common lexicon that can be shared and understood by all members. To achieve this, it is necessary to ensure that all knowledge builders understand the challenge to be solved and how each will contribute to the solution. That is, KTT and KM become more relevant in interdisciplinary projects. On the other hand, Rosenfield (1992) suggests that the results reported following interdisciplinary projects are usually sequential and confined to respective disciplines, creating a division of knowledge. Nevertheless, outcomes often lead to the growth of both domains through the discovery of new knowledge or sharing of methods (Aboelela et al., 2007; Committee on Facilitating Interdisciplinary Research, National Academy of Sciences, National Academy of Engineering, Institute of Medicine, 2005; Grey & Connolly, 2008).

Transdisciplinary research differs in that knowledge builders from two or more disciplines come together to develop new and participatory methods for creating solutions to a challenge that seemingly appears to fall within each domain (Pohl & Hadorn, 2007; Wilcox & Kueffer, 2008). They work together to transcend their disciplines, to develop a space for viewing a problem in a completely new way (Aboelela et al., 2007; Wilcox & Kueffer, 2008). Clearly, skills in KTT and KM are necessary for a transdisciplinary team to be successful.

Teaching Transdisciplinarity in Higher Education

As Schmitt queried in 1960, how does one create a space for knowledge builders to develop a transdisciplinary solution that transcends the disciplines involved? Further, given the need to address pressing transdisciplinary problems such as climate change, food insecurity, and public health, how do we embed experiential learning opportunities within a transdisciplinary setting in higher education that benefits a spectrum of current and future knowledge builders (e.g., students, faculty, and community experts)?

In this article, we explore these questions by reviewing the current state of transdisciplinary research and educational efforts in Canadian universities. For all of these programs, we catalogued details such as project focus, actors engaged (funding agencies, community partners, students, researchers), level of transdisciplinarity, KTT or KM likelihood, and techniques used (scholarships, experiential learning, research application). We included a characterization of the level of transdisciplinarity based on the concepts of intra-, multi-, inter-, and transdisciplinary research as described previously, and we note that programs that have been self-identified as transdisciplinary may be characterized in other ways here. Finally, we propose a framework for transdisciplinary education in institutes of higher learning at the senior undergraduate level, one that requires minimal restructuring.

Methods

To describe the current state of transdisciplinary efforts in institutes of higher education in Canada, data were collected in two ways. First, we queried the three major funding agencies in Canada to identify the prevalence of transdisciplinary programs at the research level, and an indication of HQP (highly qualified personnel) training occurring in a transdisciplinary setting. Second, we systematically reviewed the available academic literature and Canadian university web pages to identify existing transdisciplinary programs across the country.

Tri-Council Funding

Each of the three major funding agencies in Canada, the Natural Sciences and Engineering Research Council (NSERC) (http://www.nserc-crsng.gc.ca/ase-oro/index_eng.asp), the Canadian Institutes of Health Research (CIHR) (http://webapps.cihrisc.gc.ca/funding/%20Search?p_language=E&p_version=CIHR), and the Social Sciences and Humanities Research Council (SSHRC)
Interdisciplinary and Transdisciplinary Research and Education

(\text{http://www.outil.ost.uqam.ca/CRSH/RechProj.asp x\text{vLangue=Anglais)}), provide an online database of successfully funded grants that include the grantee, their institution, the grant type, the amount awarded, and the year(s) of the award. These data were filtered by keyword using the search terms \textit{interdisciplinary}, \textit{inter-disciplinary}, \textit{transdisciplinary}, and \textit{trans-disciplinary}, and exported to Microsoft Excel. Data were aggregated to determine the number of yearly payments to successfully funded grants, and total dollars awarded by each tri-council agency for each year, and for each year and search term. Data with matching keywords of \textit{inter-disciplinary} and \textit{interdisciplinary} were treated as the same, and likewise for \textit{trans-disciplinary} and \textit{transdisciplinary}. Other than noting 1) an inflation rate of approximately 15\% between 2006 and 2015\(^1\) (Bank of Canada, n.d.), and 2) a 7\% reduction in after-inflation tri-council funding overall since 2007\(^2\) (Statistics Canada, 2016), we have ignored the effects of inflation for our comparison.

\textbf{Canadian programs}

To understand the scope of transdisciplinary programs in universities across Canada, we searched the peer-reviewed literature (via Google Scholar, PRIMO, and Web of Science) for articles matching the search terms/phrases \textit{transdisciplinary/interdisciplinary + research/program/project + Canada/Canadian + university/universities}. We also obtained a list of 96 Canadian universities from the Universities Canada website,\(^3\) and filtered this list to include only those schools with more than 15,000 full- or part-time undergraduate students based on 2015 enrolment numbers. Of 96 Canadian universities, 26 were selected, representing slightly more than 71\% of all Canadian students enrolled either full- or part-time at the undergraduate or graduate level (Table 1).

Each of the Canadian university websites included in the filtered list was searched using the terms \textit{transdisciplinary} and \textit{interdisciplinary}. Programs discovered through our research were considered for this review if they were active at some point during the period 2006-2015, and if they self-identified as transdisciplinary or interdisciplinary.

We evaluated each program using a scale of transdisciplinarity as described by Jacobs, Nicol, and Helms (2014) to categorize programs as having low, medium, or high transdisciplinarity. Programs on the lower end of this spectrum represent some limited form of transdisciplinarity wherein only 2 or 3 related fields have worked in cooperation on a project. Programs at the high end of the scale represent efforts where a large number and variety of disciplines have worked together on a project. Those programs that rank in the medium level of transdisciplinarity represent either more diversity in the disciplines collaborating, or in a greater number of fields being represented than those that rank on the low end of the spectrum, but do not have enough of these qualities to qualify as high on the transdisciplinary scale. Programs were then listed, reviewed, and evaluated (where possible) based on (a) level of transdisciplinarity (low/medium/high); (b) project prospects (whether it was available to undergraduates, graduates or researchers); (c) funding source; (d) whether or not there was a community partner; (e) whether the efforts are likely to foster KTT or KM (based on level of transdisciplinarity as it relates intra- inter- multi- and transdisciplinary as defined above); and (f) additional techniques used (e.g. community engaged scholarships, experiential learning).

\(^1\) Inflation rate was determined by inputting the date rate (2006-2015) into the appropriate boxes in the calculator section of the website. Percent change is equivalent to the inflation rate.

\(^2\) To determine the percent reduction in after-inflation tri-council funding, we went to the website and changed the date rate to reflect 2007 values up until 2015, and only selected the 3 desired federal agencies.

Table 1

*Full-time (FT) and part-time (PT) students enrolled in undergraduate (UG) or graduate (G) degrees in all public Canadian universities, and in public Canadian universities with FT+PT UG enrollment exceeding 15,000 students.*

<table>
<thead>
<tr>
<th></th>
<th>FT UG</th>
<th>FT G</th>
<th>PT UG</th>
<th>PT G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number Students (all Canadian universities)</td>
<td>865,065</td>
<td>157,146</td>
<td>237,317</td>
<td>52,846</td>
</tr>
<tr>
<td>Number Students (Canadian universities &gt;15,000 FT + PT undergraduates)</td>
<td>606,850</td>
<td>123,750</td>
<td>163,220</td>
<td>33,050</td>
</tr>
<tr>
<td>Percent of students covered by this study*</td>
<td>70</td>
<td>79</td>
<td>69</td>
<td>63</td>
</tr>
</tbody>
</table>

*Universities with enrolment over 15,000 included: Athabasca University, University of Alberta, University of Calgary, The University of British Columbia, Simon Fraser University, University of Victoria, University of Manitoba, Dalhousie University, Brock University, Carleton University, McMaster University, Queen's University, Ryerson University, University of Waterloo, University of Guelph, University of Ottawa, University of Toronto, University of Western Ontario, Wilfrid Laurier University, York University, Concordia University, McGill University, Université Laval, Université de Montréal, Université du Québec à Montréal, and the University of Saskatchewan.

†The final row of the table outlines the proportion of each group represented in this study.

Results

Transdisciplinary Research in Canada

Tri-Council Funding

A total of 4,467 records matching the keyword search were extracted and downloaded from the online tri-council funding results databases spanning the 10 fiscal years 2005-2006, through 2014-2015. Each record represented a single annual payment to a successful award. As such, a multi-year research program would be represented in each year in which it was paid. The records represented over $427.2 million in funding, of which $10.2, $86.5, and $4.8 million were self-identified as transdisciplinary within the NSERC, CIHR, or SSHRC databases, respectively. These values represent 0.10%, 1.01%, and 0.07% of the total funding awarded by each of the tri-council agencies during this same period.

To understand trends in interdisciplinary and transdisciplinary funding by the tri-council agencies, data were aggregated and compared for the time periods with the fiscal year ending in 2006-2010, and 2011-2015. The two periods are compared using a per-year average. Summary data are provided in Table 2.

Overall, the annual number of interdisciplinary and transdisciplinary awards paid per year have increased approximately 55% between the two periods, with annual funding up 45%. This far out-paces the 7% increase in total funding paid across all tri-council agencies for all awards between these two periods. This is not a consistent trend between the two labels as the number of awards paid per year for self-identified transdisciplinary grants are down approximately 10%, with total funding down slightly more than 2%. Further, these trends are not consistent within the tri-council funding agencies.

Of the tri-council funding agencies, NSERC has seen the most significant changes to the number of awards paid per year, and in total funding awarded to programs labeled interdisciplinary or transdisciplinary. Specifically, the yearly number of award payments made and total funding have increased more than 3 times for research programs labeled as either interdisciplinary or transdisciplinary between the period 2006-2010, and 2011-2015. The
Table 2

A summary of self-identified interdisciplinary (I) and transdisciplinary (T) funded research awards and funding per year, by tri-council funding agency, paid during periods with the fiscal year ending 2006 through 2010, and 2011 through 2015.

<table>
<thead>
<tr>
<th>Funding Agency</th>
<th>Period</th>
<th>Number of Grants Paid Per Year (T)</th>
<th>Number of Grants Paid Per Year (I+T)</th>
<th>Funding Paid Per Year (T in $millions)</th>
<th>Funding Paid Per Year (I + T in $millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSERC</td>
<td>2006-2010</td>
<td>2.80</td>
<td>85.40</td>
<td>$0.29</td>
<td>$6.26</td>
</tr>
<tr>
<td></td>
<td>2011-2015</td>
<td>9.00</td>
<td>264.20</td>
<td>$1.76</td>
<td>$21.26</td>
</tr>
<tr>
<td>CIHR</td>
<td>2006-2010</td>
<td>46.00</td>
<td>165.80</td>
<td>$9.54</td>
<td>$24.46</td>
</tr>
<tr>
<td></td>
<td>2011-2015</td>
<td>32.00</td>
<td>169.20</td>
<td>$7.77</td>
<td>$24.37</td>
</tr>
<tr>
<td>SSHRC</td>
<td>2006-2010</td>
<td>3.20</td>
<td>98.80</td>
<td>$0.44</td>
<td>$4.10</td>
</tr>
<tr>
<td></td>
<td>2011-2015</td>
<td>6.00</td>
<td>110.00</td>
<td>$0.52</td>
<td>$4.98</td>
</tr>
</tbody>
</table>

An award that spans multiple years will contribute to the yearly count of awards, and the total funding paid for each year the award is active.

change is even more dramatic when considering that NSERC paid 3 times more transdisciplinary grants in the period 2011-2015 than in the period prior, but total funding paid out increased 6-fold. Moreover, the average annual payments for transdisciplinary awards increased 86% from approximately $105,000 in the 2006-2010 period, to $195,000 in the 2011-2015 period. This compares to only a 12% increase in average annual payments for all NSERC awards paid out between the two periods. Finally, transdisciplinary funding increased from 0.03% to 0.17% of the total funding awarded by NSERC between 2006-2010, and 2011-2015. These changes are likely a result of the introduction of granting programs (e.g. NSERC CREATE, and NSERC Strategic Partnerships) with an interdisciplinary or transdisciplinary collaboration focus.

Between 2006-2010 and 2011-2015, CIHR saw a 2% increase in the number of awards paid (with funding decreasing by slightly less than 1%) to interdisciplinary and transdisciplinary programs. The annual number of awards paid to self-identified transdisciplinary grants in the most recent period dropped to 70% (and annual funding to only 81%) of the previous 5 years. Average annual payments to transdisciplinary awards increased 17% from slightly more than $207,000 to approximately $242,000 – on par with the 16% increase in average annual payments made to all CIHR awards. It should also be noted that funding to transdisciplinary awards decreased from 1.13% to 0.90% of all CIHR awards between the two periods.

Similar to NSERC, SSHRC has increased annual funding for self-identified interdisciplinary and transdisciplinary programs. In the most recent five-year period, the number of payments to interdisciplinary and transdisciplinary awards increased by approximately 11% between periods, and average annual funding paid to transdisciplinary awards decreased 37%, from approximately
$137,850 to $86,700. Total funding to transdisciplinary awards stayed relatively stable at 0.07% and 0.08% of the total funding awarded by SSHRC during these two periods.

Transdisciplinary Education in Canadian Universities

A review of the literature and of Canadian university websites identified numerous undergraduate or graduate courses, degree programs, research groups, faculties, or institutions that self-identified as being interdisciplinary or transdisciplinary in nature. Of the universities surveyed, a vast majority offer interdisciplinary degree programs at the undergraduate or graduate level. Several universities also offer certificates in interdisciplinary studies, including Dalhousie, Simon Fraser, and Ryerson, with the bulk of these focused in the domains of health and medicine. There were no undergraduate or graduate degree programs, or certificate programs found that identified as being transdisciplinary in nature, save for a graduate degree in biophotonics offered at Université de Laval. In the following sections, we summarize some of the findings at the undergraduate and graduate level, highlighting relevant resources and specific programs. For a more detailed list of transdisciplinary programs, please refer to Appendix A.

Undergraduate programs

Undergraduate programs labeled as interdisciplinary were found to vary across Canada and within institutions. They include minors, stream-based coursework, and formal degrees in interdisciplinary studies that span the physical and engineering sciences, arts, social sciences and humanities, and health sciences domains, with a goal of teaching students the skills and methods of two or more disciplines. Several of the interdisciplinary programs reviewed appear to be contained within a single broad domain (such as the University of Alberta’s Peace and Post Conflict Studies Certificate, or the University of Guelph’s Interdisciplinary Physical Science program), while others combine studies from two or three domains (e.g., Carleton’s Bachelor of Health Sciences program, or Dalhousie’s Interdisciplinary Health Studies Certificate program). Despite this, the undergraduate programs appeared to lack a specific space for an interdisciplinary (or transdisciplinary) classroom to truly take shape. That is, if a university offers an interdisciplinary undergraduate program spanning disciplines X and Y, students are usually required to learn about each discipline through separate siloed courses. Several exceptions include the University of Alberta’s InSciTE program, and the University of Guelph’s Interdisciplinary Physical Sciences program. In the former case, students study a life sciences or physical sciences stream, with three prescribed siloed courses (e.g., Biology, Math, Chemistry), and a two-semester project course with a focus on data analysis and the scientific method. In the latter, students forgo siloed mathematics and physics courses and instead take two-semester long courses that combine the pedagogical outcomes required for studying physics and math.

We could not find any specific evidence that universities are presently offering a regular for-credit course that teaches students skills for working in an interdisciplinary or transdisciplinary setting at the undergraduate level. This is not to say that interdisciplinary and transdisciplinary courses do not exist, but that most of the undergraduate programs identified put the onus of interdisciplinarity and transdisciplinarity on the student. That is, the student is held responsible for synthesizing the methods and skills of each discipline, understanding and disambiguating potentially overlapping lexicons, and creating a space for new methods to emerge. Beyond this, we failed to identify any courses designed for the undergraduate level to encourage and develop skills in KTT and KM, skills necessary to work in a truly interdisciplinary or transdisciplinary setting.

Graduate programs

As is the case with undergraduate programs and certificates, interdisciplinary programs directed at graduate students were found within and between the
domains of physical and engineering sciences, arts, social sciences and humanities, and health sciences. Again, there were no programs identified that self-labeled as transdisciplinary.

In most cases, students enrolled in interdisciplinary graduate programs are left to their own devices to develop a *choose-your-own-adventure* degree. The students necessarily register their degree within a participating department but take courses offered in several. While this provides the student with flexibility to explore multiple disciplines through discipline-specific courses, it means that student learning takes place in a siloed context. As such, much of the interdisciplinarity (or transdisciplinarity) of the graduate degree occurs outside of a formal classroom setting, most likely appearing as part of the student’s specific research, or present during graduate committee meetings when multiple disciplines are present in the form of advisors and other domain experts. There does not appear to be many tools provided to the student that would have them purposefully working with and learning from other disciplines to solve a problem, and no spaces for truly interdisciplinary or transdisciplinary solutions to emerge. And again, the onus is generally upon the student to make meaning of interdisciplinarity.

Beyond a lack of tools provided for interdisciplinary and transdisciplinary work, few programs were found to offer specific graduate courses in KTT or KM. There are several notable exceptions that have been highlighted by KTClearinghouse.ca, a CIHR funded online KTT repository jointly managed by the University of Toronto and St. Michael’s Hospital. These include courses in knowledge translation (or with major learning outcomes that address KTT and KM) for graduate degrees primarily in the health sciences offered at the University of Alberta, the University of Calgary, McMaster University, University of Ottawa, University of Toronto, Western University, and Laval.

Institutions, faculties, and other resources

To help manage or facilitate interdisciplinary programs and research, many universities have created interdisciplinary institutions, faculties, or some form of governing bodies. Examples include (but are not limited to) Athabasca University’s Centre for Interdisciplinary Studies in the Faculty of Humanities and Social Sciences (http://cis.athabasca.u.ca/), Carleton’s Institute of Interdisciplinary Studies (http://carleton.ca/iis/), the School of Interdisciplinary Science at McMaster University (https://www.science.mcmaster.ca/sis/), the Centennial Centre for Interdisciplinary Science at the University of Alberta (https://www.ualberta.ca/science/about-us/facilities), the Centre for Interdisciplinary Research in the Mathematical and Computational Sciences at Simon Fraser University (http://www.irmacs.sfu.ca/), and the Transdisciplinary Research Hub at Brock University (https://brocku.ca/transdisciplinarity/). The role of such institutions, faculties, and governing bodies is to provide students and faculty with open spaces that facilitate cross-disciplinary research collaborations, or to provide students with a specific set of program requirements, and program related information. Here we highlight a few examples from a subset of Canadian universities.

Within the University of Ottawa’s Faculty of Education exists the research group known as the Multiplicities and Transdisciplinary Experimentations Research Unit. With a focus on developing education and educational practices, the unit tries to break down assumptions about disciplinary boundaries through various research projects (Faculty of Education, University of Ottawa, n.d.). As a result, the publications and presentations listed by the group span a wide variety of topics within the arts and social sciences, but all with a focus on education (Bangou & Masny, 2014). Those involved in the research unit are primarily professors and graduate students at the masters or doctorate levels interested in researching transdisciplinary education (Bangou & Masny, 2014).
To encourage transdisciplinary work, Brock University has also created a hub dedicated to transdisciplinary research (https://brocku.ca/transdisciplinarity/). Of the programs reviewed in this study, Brock University’s transdisciplinary initiative appears to be the largest and widest reaching in terms of the breadth of knowledge and disciplines being combined. Five different hubs exist at the university: The Advanced Biomanufacturing Centre, The Brock-Niagara Centre for Health and Well-being, The Environmental Sustainability Research Centre, The Centre for Lifespan Development Research, and The Social Justice Research Institute (Brock University, n.d.). As their names suggest, each of these hubs has a different focus and each incorporates different disciplines to achieve research goals. These hubs primarily involve faculty and graduate students4.

Mount Royal University has incorporated transdisciplinary work into their Faculty of Arts through their Centre for Community-Based Disaster Research (Mount Royal University, 2015). This program seeks to benefit from professionals from an array of disciplines in the fight to create and implement plans that best assist communities when they experience various disasters, and investigate the consequences of such disasters on victims (Mount Royal University, 2015). The centre involves members from across the university, including students, researchers, community members, and other stakeholders (Mount Royal University, 2015).

McMaster University has created an interdisciplinary school, designed to integrate engineering and technology, as well as to establish some scaffolding between Masters students and senior undergraduates (Walter Booth School of Engineering Practice and Technology, 2016). Undergraduates are able to take courses that can be put towards graduate studies later on while getting exposed to a higher level of learning through collaboration with graduate students on real-world challenges. Graduate students take on the position of mentors, with the ability to promote deeper analytical thinking in their mentees by challenging them to consider other points of view. During the experience, all students are able to connect to members of the community and industry, adding a valuable component to this initiative.

Other universities have identified the potential effectiveness of transdisciplinary work in the healthcare domain. The programs range from those spanning multiple universities, to those specific to a singular post-secondary educational institution, such as the CIHR funded transdisciplinary research program for health care, or the Terry Fox Transdisciplinary Training Program, both located at Queen’s University (Queen’s University, n.d.).

The University of Ottawa has explored a transdisciplinary approach to educating undergraduate students in the health sciences through their Transdisciplinary Community Health Project (University of Ottawa, Faculty of Health Sciences, 2010; University of Ottawa, 2012). As part of this initiative, students spend time exploring modules related to community-engaged scholarship, social justice, etc., and then work with a community partner on a health-related project within the community (University of Ottawa, 2012). One of the goals listed by the project is to allow students to gain transdisciplinary skills through work with professionals from various disciplines (University of Ottawa, 2012).

The Transdisciplinary Understanding and Training on Research-Primary Health Care (TUTOR-PHC) is a training program that was funded by the CIHR and involved several universities across the country (Welcome to TUTOR-PHC, n.d.). Participants of the program included students completing graduate degrees and post-doctorates, or industry professionals (Overview and Justification, n.d.). The TUTOR-PHC program differs significantly from most other transdisciplinary programs reviewed in that it was not specific to a single university, and was focused entirely on improving healthcare by educating transdisciplinary thinking healthcare professionals (Overview and Justification, n.d.). A similar initiative known as Tomorrow’s Research Cardiovascular Health

4 A detailed reading of the various ‘Research Units’ listed on the “Transdisciplinarity at Brock” homepage describes which disciplines are involved in which units. Availability to faculty and graduates was determined by further reading of webpages on each site.
Professionals (TORCH) is a joint program between the University of Alberta and the University of Calgary that seeks to educate researchers in the health sciences from a transdisciplinary mindset to improve research quality (Centre for Health Evidence, 2012).

Beyond the institutions and research hubs described previously, other institutions have identified the importance of interdisciplinary and transdisciplinary research and education through various other means. For example, the Provost of Ryerson has created an Interdisciplinary Teaching Award to support innovative and interdisciplinary teaching on campus. The award “recognizes a Ryerson educator or a group of educators who have made contributions to advancing teaching and learning at Ryerson with a particular focus on Interdisciplinary teaching and on students’ Interdisciplinary learning and who have an outstanding teaching record” (Ryerson University, n.d., para. 1). This is the only teaching award that our research identified with a specific focus on interdisciplinary or transdisciplinary education. Further, York University has recently identified a call for a Tier One Canadian Research Chair in Global Governance and Social Innovation within their School of Health Policy and Management. The specific mandate of the Chair is to create a Social Innovation Think Tank that will act as a hub for transdisciplinary research, training, and mentorship (York University, 2016). Finally, several universities including Concordia and the University of Quebec at Montreal have made interdisciplinary and transdisciplinary education and research an integral part of their most recent (or upcoming) strategic mandates (Concordia University, n.d.; University of Quebec at Montreal, 2009).

Trends in Canadian University Transdisciplinary Projects

The review of interdisciplinary and transdisciplinary Tri-Council funding and university programs across Canada has identified several key observations and trends that are relevant to developing transdisciplinary opportunities within the setting of higher education. We adopted the rating scale by Jacobs et al. (2014), classifying the level of transdisciplinarity as either low (having two distinct disciplines), medium (having three distinct disciplines) or high (having four or more distinct disciplines). An example of a distinct discipline would be biology and geography, but not environmental versus electrical engineering. All findings provide some insight regarding potential mechanisms for facilitating a space for knowledge builders to come together in a transdisciplinary setting. Specifically:

1. Interdisciplinary and transdisciplinary research has been readily accepted by the health sciences earlier and more often than any other discipline. This is exemplified by the array of projects from Brock University, the University of Ottawa, the University of Alberta, the University of Calgary, and all those universities that have been part of the TUTOR-PHC program (Armstrong et al., 2004; Brock University, n.d.; University of Ottawa, Faculty of Health Sciences, 2010; University of Ottawa, 2012; Welcome to TUTOR-PHC, n.d.).

2. Regardless, both NSERC and SSHRC have increased the funding awarded to research programs that have self-identified as interdisciplinary or transdisciplinary in nature. Presumably, this suggests that the number of graduate student research opportunities that span or transcend disciplines is increasing as well.

3. Total annual funding awarded by NSERC to self-identified interdisciplinary and transdisciplinary research programs is now on par with CIHR, while total annual SSHRC funding awarded to such programs currently sits at approximately 25% of NSERC awards. Moreover, NSERC has increased the total annual awards for transdisciplinary research (from 0.03 to 0.17% of its total budget), while SSHRC has remained stable, and CIHR has decreased.

4. Funding for transdisciplinary specific research programs is awarded primarily from CIHR. It provides more than 4 times the
funding than NSERC awards and almost 15 times the funding awarded by SSHRC.

5. Interestingly, despite a significant number of research hubs, institutions, and programs across the country which focus on transdisciplinary health care education, the total funding from CIHR for transdisciplinary programs has decreased. In fact, CIHR funding for transdisciplinary research programs has dropped from 1.13 to 0.90% of their total yearly funding awarded.

6. Regardless of the funding amounts awarded by Tri-Council agencies to self-identified transdisciplinary programs, there were no undergraduate or graduate degree programs identified as transdisciplinary in nature.

7. Of the interdisciplinary undergraduate and graduate degree programs identified, all were relatively siloed. That is, students enrolled in the programs were required to complete courses spanning multiple disciplines (becoming mini-masters of multiple domains), but there was no evidence that they were provided tools to transcend the disciplines. In essence, students, while able to customize their studies based on individual preferences, did not have an available course designed specifically to aid in their ability to integrate knowledge beyond disciplinary boundaries.

8. The programs and faculties identified as interdisciplinary or transdisciplinary in nature were limited to a few disciplines. In numerous cases, the disciplines fell under the umbrella of a single domain of work (e.g., physical and engineering sciences, arts, and humanities). That is, students choosing to study under the interdisciplinary or transdisciplinary banner were typically exposed to similar disciplines (refer to Appendix A).

9. There were few courses dedicated to teaching undergraduate or graduate students the skills (e.g., KTT) necessary for truly transdisciplinary work to occur. Further, students participating in interdisciplinary or transdisciplinary programs were provided experiential learning opportunities (such as a community-engaged scholarship), but this was not the norm.

Despite Tri-Council funding that supports or requires interdisciplinary and transdisciplinary research (e.g., NSERC’s CREATE grant), Canadian universities lack undergraduate or graduate programs that successfully balance research goals with the education of students. Institutions typically have implemented a research hub model by combining two or more disciplines focused on the study of a particular issue. Many of these hubs, however, were created for the purpose of fostering an interdisciplinary or transdisciplinary research approach, but they were not able to or did not consider integrating an educational framework. That is, hubs have been created to facilitate graduate student and faculty research, but specific courses that foster skills required for interdisciplinary and transdisciplinary thinking at either the undergraduate or graduate level were few and far between. In essence, new silos of transdisciplinary research have been erected but with little to no access for undergraduate students. Even in cases where undergraduate or graduate programs for interdisciplinary or transdisciplinary work exist, students are faced with a lack of tools that foster interdisciplinary or transdisciplinary thinking.

Ultimately it appears that Canadian universities have attempted to embed interdisciplinary and transdisciplinary research and education using a trickle-down approach that does not disrupt the traditional academic framework. Funding has supported the development of hubs, and some degree programs, however, formal interdisciplinary and transdisciplinary training is lacking.

With these observations in mind, there is clearly a need to develop a framework that supports and encourages transdisciplinary skills.

**Proposed Framework**

These initiatives have paved the way for new and increasingly transdisciplinary programs that include both graduate and undergraduate students. But is
offering a truly transdisciplinary learning and research opportunity to undergraduate students even possible within the current academic framework? Typically, within Canadian post-secondary institutions, degree-granting programs are run by discipline-specific departments within a larger unit (i.e. college or faculty). These departments generally offer a few senior undergraduate courses with built-in flexibility and very few restrictions to allow students to conduct research or write a literature review on a topic of personal interest. These courses normally have a designated faculty coordinator, with each student also having a faculty advisor. Therefore, the faculty to student ratio is slightly more than 1:1, depending on the number of students enrolled in the course. Undergraduate students usually also have access to a variety of institution-level courses with similar flexibility but these are taken as electives rather than credit towards the degree major.

Creating new courses is an arduous task that often requires several years of consultation and administrative paperwork. Creating a course that would be recognized by all departments as credit towards a student’s degree major would perhaps be impossible. Therefore, we sought to create a pilot project that could 1) be used by students towards their degree major and 2) did not require the creation of a new course.

The pilot project, called Ideas Congress (ICON), is being developed and practiced at the University of Guelph. ICON is available to all senior undergraduate students with access to an independent study course through their degree major. The program uses the existing course codes for the independent study projects such that no new courses or changes to graduation requirements were necessary. Therefore, all students enrolled in their department’s independent study course are given a choice: follow the traditional model with a faculty supervisor to work on a research project or literature review, or join ICON to work within a transdisciplinary learning environment on a collaborative project.

In this way, we attract students from many disciplines who learn about the principles of KTT and work together on a project developed in partnership between faculty at the University and a different community partner each semester. Students are able to earn course credit towards their degree major and fulfill those requirements set out by their individual courses while working on a real-world problem that they will solve in a transdisciplinary learning environment. The community partner benefits from interactions with the students, tapping into a new source of innovative and creative solutions. By the end of the program, the challenge is solved, often with several options from which to choose. Finally, this type of program is beneficial to faculty and administrators. The format of the course allows for a greater ratio of students to advisors (First year: 1:12, second year: 1:20), furthering access by students to these often-limited enrollment experiences.

ICON has three major goals:

1. To encourage and foster transdisciplinary learning, research, and appreciation by bringing together students with skills from different departments and challenging them with real-world problems from the local, regional, and/or global community.

2. To strengthen discipline-specific knowledge learned in class by providing students with the appropriate platform and tools to act as a teacher to their fellow students.

3. To enhance discipline specific knowledge learned in class by requiring students to work directly with community partners, thereby exposing students to outside-the-classroom education and relevant discipline knowledge application.

Following two offerings of ICON, we have identified several areas for improving our model. While our model of tapping into all of the senior undergraduate courses serves our purpose for creating a transdisciplinary learning environment for students, it requires that we meet the individual and specific assessment requirements for each of them. This means that students in ICON are evaluated in different ways and often with different weightings for each assignment. We believe that our model as it is currently will allow us to continue to offer ICON and to conduct program assessments while we work towards establishing a university-wide ICON course that will be recognized by all degree majors.
Conclusions

This article has provided an overview of the state of interdisciplinary and transdisciplinary research and education opportunities for students in Canada. While there have been some interdisciplinary efforts in schools across the country, the review suggests that transdisciplinary education programs are not widespread or intensive. Where interdisciplinarity is identified, students are often forced to integrate knowledge from siloed courses without specific training in KTT or KM. To address these shortcomings, we have presented a novel framework on which to develop a classroom at the undergraduate level that specializes in KTT, KM, and transdisciplinarity.

References


Brock University. (n.d.). Transdisciplinarity at Brock. VIEW ITEM


Concordia University. (n.d.). Strategic directions. VIEW ITEM

Faculty of Education, University of Ottawa. (n.d.). About: Aims of the research unit: to read the world in multiple ways [website description]. VIEW ITEM


Mount Royal University. (2015) *A new centre and award winning research.* VIEW ITEM

Overview and Justification. (n.d.). Western University, TUTOR-PHC. VIEW ITEM


Queen’s University. (n.d.). *Terry Fox Foundation training program in transdisciplinary cancer research in partnership with CIHR.* VIEW ITEM


Ryerson University. (n.d.). Provost’s Interdisciplinary Teaching Award [website description]. VIEW ITEM


Statistics Canada. (2016). *Table 358-0164: Federal extramural expenditures on science and technology performing, by performing sector and major departments and agencies.* VIEW ITEM

Stauffer, J. (2015, Fall). Changing the face of STEM education: Balancing the scales in science, technology, engineering and math. *University of Waterloo Magazine.* VIEW ITEM

University of Ottawa. (2012). The Faculty of Health Sciences congratulates the community involvement of its students. VIEW ITEM

University of Ottawa, Faculty of Health Sciences. (2010). Transdisciplinary community health engagement: Request for registration. VIEW ITEM


Walter Booth School of Engineering Practice and Technology. (2016). Faculty of Engineering introduces the new Walter G. Booth School of Engineering and Technology. VIEW ITEM

Welcome to TUTOR-PHC. (n.d.). Western University, TUTOR-PHC. VIEW ITEM


York University (2016). Canada Research Chair (Tier 1) in Global Governance and Social Innovation: School of Health Policy and Management, Faculty of Health. VIEW ITEM

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Biographies

Daniel Gillis, PhD, is an Associate Professor in the School of Computer Science at the University of Guelph. He is also the director of The Physical Science and Engineering Education Research Centre (PSEER). His research interests span statistics, computer science, biology, pedagogy and community-engaged scholarship.

Jessica Nelson was an undergraduate student conducting her research under the supervision of Shoshanah Jacobs and Daniel Gillis. She graduated with a double major in Biology and English.

Brianna Driscoll was an undergraduate research assistant working under the supervision of Daniel Gillis. She graduated with a degree in English and Anthropology.

Kelly Hodgins is a program coordinator for the Feeding 9 Billion Challenge in the Department of Geography at the University of Guelph.

Evan Fraser, PhD, is a Professor in the Department of Geography and the Director of the Arrell Food Institute at the University of Guelph. His research interests include food security, land use, and global environmental/economic change.

Shoshanah Jacobs, PhD, is an Assistant Professor in the Department of Integrative Biology and a member of the College of Biological Sciences Office of Educational Scholarship and Practice at the University of Guelph. Her research interests span Arctic seabird foraging ecology, knowledge translation and transfer, and science education.
Appendix A

Research of Transdisciplinary Programs Offered in Universities Across Canada. Programs were evaluated on a number of criterion, as indicated below. The rating component refers to the level of transdisciplinarity as adopted by Jacobs et al. (2014). Education level refers to who was able to access these programs, whether undergraduates (UG), graduates (G) or postdoctoral (PD) students. Programs were given a rating of yes (Y) or no (N) for community partner and knowledge translation and transfer (KTT) criterion based on direct reference to partners or KTT/knowledge mobilization efforts, respectively.

<table>
<thead>
<tr>
<th>Program</th>
<th>Research Component</th>
<th>Education level</th>
<th>Rating</th>
<th>Major Fields of Study</th>
<th>Community Partner</th>
<th>KTT Component</th>
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<td>Advanced Biomanufacturing Centre</td>
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<td>Y</td>
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<td>STEM</td>
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<td>Program</td>
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<td>KTT Component</td>
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</table>

**University of British Columbia**

| Transdisciplinary understanding and training of research (TUTOR-PHC)   | √                   | G + PD          | Med    | STEM                    | Y                   | N            |

**University of Western**

| TUTOR-PHC                                                            | √                   | G + PD          | Med    | STEM                    | Y                   | N            |
| Robarts Research Institute: Transdisciplinary training program       | √                   | G               | Med    | STEM                    | N                   | N            |

**McGill University**

| Schulich School of Music                                             | √                   | G               | High   | STEM + ARTS             | N                   | N            |

**Concordia University in Montreal**

| Major Research Clusters in their Strategic research plan 2013-18     | √                   | G + PD          | High   | STEM + ARTS             | Y                   | Y            |

**Simon Fraser University**
<table>
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<tr>
<th>Program</th>
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<th>Education level</th>
<th>Rating</th>
<th>Major Fields of Study</th>
<th>Community Partner</th>
<th>KTT Component</th>
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