

Centre for Learning and Teaching **focus** on university teaching and learning



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Note From the Director

Technology has been a part of higher education for decades and is increasingly embedded in our approaches to curriculum design. This issue of *Focus* highlights the ways in which we are using technology to foster deep learning through connection and communication as well as how students and teachers envision the future roles for technology, in both face-to-face and online courses and programs.



Suzanne Le-May Sheffield, Ph.D.
Director
Centre for Learning and Teaching

EDITORS

Suzanne Le-May Sheffield

EDITORIAL ASSISTANT

Michelle Soucy

PUBLISHED BY

Centre for Learning and Teaching

Dalhousie University

PO Box 15000

Halifax, NS B3H 4R2

Ph: (902) 494-1622

Fx: (902) 494-3767

Email: CLT@Dal.Ca

www.learningandteaching.dal.ca



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Inspiring Minds

Community Voices: Student and Teacher Response to the Centre for Learning and Teaching's Online Survey



Adrienne Sehatzadeh and
Suzanne Le-May Sheffield, CLT



"Technology allows us to teach differently, to meet new as well as old needs. It is helping drive innovation in teaching and learning. But in the end, decisions need to be made about how best to use technology, and for what purposes."

(Contact North | Contact Nord 2014)

Smart Phones, iPads, social media, blended learning and MOOCs have been buzz words discussed and debated in higher education circles over the last few years. Much has been written about 21st century educational technologies to engage student learning and promote effective teaching practices. The 2012 and 2013 *ECAR Study of Undergraduate Students and Information Technology Reports* highlighted key foci for teaching and learning in institutions of higher education. Surveying 251 universities/colleges worldwide in 2013, including 9 Canadian universities, they found that students expect the use of technologies, prefer blended courses, prefer limits on the use of social media in the learning environment and that they want to use their mobile devices more for academic work (2012 p.5; 2013 p.4-6). The *COHERE Report on Blended Learning* (2011) noted that blended learning has resulted in "improved teaching and learning, greater flexibility for learners, greater student satisfaction, improved student performance, a confluence of literacies for the knowledge economy, and an optimization of resources". While *Inside Higher Ed's 2013 Survey of Faculty Attitudes on Technology* found that the majority of faculty consider "online learning to be of lower quality than in-person courses on several key measures", a 2013 HEQCO research report noted that

"... for a range of students and learning outcomes, fully online instruction produces learning that is on par with face-to-face instruction. The students most likely to benefit are those who are academically well prepared and highly motivated to learn independently." (Carey and Trick, p.2)

In 2012, an e-Learning Team was created at the Centre for Learning and Teaching (CLT) adding a dimension of expertise in learning and teaching with online technologies that had not previously been part of CLT's core support. As a result, CLT staff began to discuss in what ways Dalhousie student and faculty preferences for technology-assisted learning and teaching might be in-line with those reported in the larger national surveys. These conversations informed our decision to conduct student and teacher surveys at Dalhousie on the use, effectiveness, and future of educational technologies. This decision was supported by the VP, Academic and Provost's Office. CLT's aim was to determine the direction, focus and priorities for e-Learning and classroom technologies at Dalhousie.

CLT developed student and teacher surveys in early 2013 with the administrative support of Dalhousie's Office of Institutional Analysis and Research (OIA). The surveys posed both quantitative and qualitative questions to students and teacher about their use of online and classroom technologies now and in the future. The surveys opened in April 2013 and OIA provided CLT with preliminary reports based on the quantitative data collected. The raw qualitative data was further analyzed by CLT to highlight key themes.

The student survey was delivered to a total of 17,778 students of which 3,841 responded for a response rate of 21.61%. Given the time of year that the survey was administered, that the winter term had concluded, and the number of other surveys students had been requested to complete, this can be considered a fair response rate. The teacher survey was delivered to a total of 3,880 teachers of which 505 responded for a response rate of 13.02%. This rate appears low until you consider the different structure within the Faculty of Medicine. A total of 1,731 faculty members in Medicine were sent the survey, which included a significant number of clinicians, with a response total of 65. The large number of Medicine Faculty and the low response rate impacted the overall response rate. The response rate excluding the Faculty of Medicine is 27.71%.

Teacher and Student Responses

Based on analysis completed to date by OIA and CLT, the following are the major themes represented by the data:

1. Importance of Online Technologies: Students and teachers overwhelmingly agree that online technol-

ogies are important for learning and teaching today and in the future. While a majority of both groups agree that online technologies help them become more efficient, this is so for a much higher percentage of students than teachers, 81.16% of students compared with 55% of teachers. However, student and teacher overall satisfaction with the current Blackboard Learning Management System dips to 72.20% and 49.85% respectively. This drop is identified as being a result of a combination of a learning management system that is not user friendly, a lack of faculty understanding of online design, and unreliable Internet connectivity.

"I think it is important for professors to learn how to use the technology themselves, whether they all have to go through a mandatory webinar or all have to go to a workshop, it is crucial to our use of technology such as blackboard that they know how to properly use it." (student comment)

"Have the system be user friendly and efficient. Changes to OWL, blackboard, etc. that happen too frequently are unacceptable. It can be very difficult to fit time in to take another course on BbLearn with competing demands on your time." (teacher comment)

2. Blended Learning: A majority of both students and teachers prefer to learn and teach in a blended environment rather than a fully online environment. This result is in-line with the findings of the ECAR Survey. Students call for well-designed online environments that are easy to access and navigate. Teachers agreed that there was a clear need for more training and support and access to on-demand tutorials and FAQs. Faculty, though, also raise the issue that there is very limited time to access training, and that when they undertake such work the time it takes needs to be recognized and valued, as with the following comment:

"The work involved in taking part in and developing an on-line course needs to be recognized at the Faculty and Department Level as more than just teaching a regular course." (teacher comment)

This sentiment was also expressed in *Educause Review Online* (2014) in an article on the top 10 IT issues as follows:

“It is time to actively help faculty develop higher levels of competence both in the technical literacy required to effectively use the available tools and in the pedagogical approaches that integrate technology into teaching. In both of these areas, faculty have often been left on their own.”

3. **Retaining Classroom Learning:** A significant number of students and teachers prefer to learn and teach in campus classrooms. This is in line with the findings of the 2013 ECAR Survey that noted “the human touch is valuable” even to the internet generation (p. 5 & p. 15). Students believe that the face-to-face environment enhances social interaction between instructors and students and between students in a way that online learning does not. One student made the following comment:

“Face-to-face lectures are important. I’m more engaged when I’m physically there. Also, especially as someone who is out of province, it is important for me to go to class and be there physically to MEET people and develop social skills. That’s more important to me than anything.” (student comment)

4. **Student Access to Class Slides and Lectures:** 83.57% of students say they would like access to more digital lectures after class, and to PowerPoint slides and/or PowerPoint hand-outs before classes. The faculty were almost split on this issue, with 48.33% of faculty agreeing on the materials being available online and 40.31% saying they would prefer not to distribute this material (11.36% were unsure). Interestingly, the initial findings of a Dalhousie pilot study of lecture capture in large, first-year science courses have found that actual use of lecture capture by students is low when looking at unique views of captured lectures. Average fall figures range from 2.39% of students viewing a lecture in Chemistry 1021 and 3.23% in Chemistry 1011, to 12.7% of students viewing a lecture in Physics 1300X and 12.89% of students viewing a lecture in Biology 1010. These findings contrast

with the lecture capture literature that has generally found that students do make use of and benefit from access to lecture capture. They also contrast with the less-detailed stats from the Undergraduate Office in Medicine showing that, overall, medical students have a very high access rate to their recorded lectures.

5. **Online Courses and Programs:** 52.76% of students would like to see more courses offered online and 43.66% would like more online program offerings. Teachers think differently on both questions, with only 38.27% agreeing that more online courses should be offered, and only 24.17% agreeing to more online programs. In addition, although the majority of teachers and a large percentage of students are not overly interested in more online courses and programs, there are specific faculties where students and teachers are interested in growing this area in the future including the Faculty of Agriculture (57.5% students, 66.7% faculty), Faculty of Management (64.4% students, 62.1% faculty), the Faculty of Health Professions (61.3% students, 55.9% faculty), and the Faculty of Computer Science (66.1% students, 62.5% faculty). In contrast, when asked about MOOCs (Massive Open Online Courses) as a learning and teaching platform, 36.44% of students and 58.22% of teachers show no interest, although there is a high percentage of both groups (34.15% of students and 22.22% of faculty) who are unfamiliar with this style of course delivery. *Inside Higher Ed’s* faculty survey (2013) found that “most faculty are currently sceptical of MOOCs.”
6. **Classroom Technologies:** PowerPoint slides and Whiteboard are the technologies that both students and teachers say are used most in the classroom. Teachers say that they would like to be more familiar with smartboard (35.18%), lecture-capture software (29.45%), and video-conferencing (22.53%). Teachers and students would like classroom technologies to work effectively and be used efficiently.
7. **Technology Ownership:** Similar to the 2012 ECAR survey, a high majority of Dalhousie students and teachers own a laptop computer that they use for academic purposes. However, a significant number of students are interested in using smartphones and tablets for academic purposes. The 2013 ECAR survey confirms this finding, saying that while the

laptop is still the most-used device by students, more students are “beginning to use smartphones and tablets for academic purposes” although they say they are “prevented or discouraged from using these devices while in class” (p5). Smartphones did not rate on the teacher list of technologies they own and use for academic purposes in the CLT survey.

- 8. Social Media:** Students and teachers have little interest in integrating social media such as Facebook and Twitter into the academic environment. Only 25.97% of students were interested in exploring these tools and even fewer teachers at 14.29%. Again, Dalhousie’s results parallel the ECAR Survey.

Students and teachers are clearly interested in blended learning and this feedback is guiding CLT’s direction with regard to educational development. However, it was clear from the survey that teachers and students currently use the online environment mainly as a repository for material and grades. A blended course is defined in the literature as “the thoughtful integration of face-to-face and online learning” (*COHERE Report on Blended Learning*, p1). Clearly, a key role for CLT is to support the design of truly blended courses that enhance student learning.

Responding to Feedback

In response to the feedback we received from the Surveys, CLT is undertaking a number of e-learning initiatives.

Pedagogical Support

- 1. e-Learning Team:** The e-Learning Team will support teachers in their development of well-designed and pedagogically sound blended and online courses. Our consultation services can help you through this kind of challenge:

“I need someone to sit with me and work with my particular course content. I wish we could have someone work directly with us to design our courses and listen to our ideas of what we’d like to do in our courses and then they could suggest what might work best.”
(teacher comment)

- 2. Focus on Blended Learning:** CLT just concluded its 2nd annual DalBlend workshop series for faculty to encourage best pedagogical approaches

and guidelines for the development of integrated, blended courses. CLT has a website devoted to Blended Learning that is accessible at <http://elab.learningandteaching.dal.ca/blendedlearning> on the CLT website.

3. Professional Development Opportunities:

- The 2014 Dalhousie Conference on University Teaching and Learning is focused this year on “Fostering Deep Learning with Technology” and provides faculty an opportunity to share their experiences using teaching technologies.
- The DalBlend workshop series will be followed up with a half-day instructional design workshop three times per year, starting May 2014, to provide a hands-on opportunity for teachers and course builders to meet with the e-Learning Team and have on-the-spot support for blended/online course development and design.
- CLT offers regular ‘Lunch and Learn’ discussions/presentations through the fall and winter terms as a venue for teachers to showcase their approaches to teaching online and to stimulate conversations about the role of technology in teaching. See <http://www.dal.ca/dept/clt/events-news/profdevelopment/lunchlearn13-14.html> for more information.

- 4. Classroom Planning:** Moving forward, CLT will have a more central role in Dalhousie’s classroom planning, including classroom technologies. With support from the Office of the VP, Academic and Provost, CLT’s Manager for Classroom Planning and Videography, Findlay Muir, will be increasingly involved in the classroom planning and design process. One of his key roles will be to consult with teachers on a regular basis to determine classroom technology and furniture needs in specific teaching and learning contexts.

- 5. Development of Online Courses:** The Centre for Learning and Teaching, the Faculty of Science, and the Faculty of Arts and Social Sciences, received funds to create online versions of three already-established face-to-face courses and one new, elective course. The aim of this project is to provide the flexibility for students to take key disciplinary foundational/core courses at Dalhousie, rather than on letters of permission elsewhere and to ensure high academic standards for student completion of

introductory and mandatory courses. Teachers involved in the creation of these online courses, have the on-going support of CLT's e-Learning Team, providing them with the opportunity to investigate the potential of online teaching and learning in their discipline with the necessary pedagogical and technological supports in place. These courses are being initially offered in the summer and fall of 2014.

- 6. Graduate Student Online Teaching Development:** Future teachers will likely be called upon to teach blended or online courses during their academic career. Graduate students who are registered in the CLT's Certificate in University Teaching and Learning and take the course, CNLT5000 – Teaching and Learning in Higher Education, have the opportunity to experience a blended course and to design an online activity in Blackboard with instructional designer support.

Technology Support

- 1. Nova Scotia Universities LMS Review:** CLT, along with Dalhousie Libraries and ITS, is working with other Nova Scotian universities to take part in a multi-institutional review of LMS systems with a view to a possible licensing partnership. This review will include a substantive consultation process with the Dalhousie community about the best LMS choice for teachers' and students' future use.

“The programs that Dalhousie purchases should be tested rigorously before being used. There should be recognition by the university administration... that they should engage faculty in a consultation process when purchasing new “upgrades.” (teacher comment)

In addition, licensing reviews for other technologies including classroom response systems, curriculum mapping, and lecture capture will be conducted over the next year and community input will also be sought.

- 2. Technology Support for Classrooms:** A Room View Server will be installed in rooms that currently have Crestron systems, allowing CLT's technical team to monitor classroom technology usage and troubleshoot in advance possible equipment failures. Over the next two years, Dalhousie will make the shift to HDMI enabled projectors.

- 3. Help-Desk LMS Support for Students:** Help desk staff are currently being trained to provide assistance to students throughout libraries across campus. Teacher support will continue to be provided by the Libraries IT support (previously ILO) for BbLearn.
- 4. e-Learning Portal:** In partnership with the Dalhousie Libraries IT support for Blackboard group, CLT will be developing an e-Learning website portal to direct teachers and students to LMS and other educational technology support resources through CLT and the Libraries. From a student perspective:

“Make sure that several online services are accessible in one place – help for OWL, help with plagiarism and RefWorks, computer software help including help about which software might be best for which purpose, information about AV services, self-help tutorials dealing with “how to” and pitfalls of many online technologies.” (Student comment)

The Future of e-Learning at Dalhousie

Teachers see the future of e-learning at Dalhousie as one in which students have greater access to courses without the restrictions of time and place, emphasizing blended learning. While Dalhousie teachers and students are not interested in significantly increasing fully online courses and programs, in some Faculties, such as Health Professions and Management, faculty and students are particularly aware of the value of such resources to those who are working or who have families and need more flexible options for continuing their education. When asked, “what do you believe can be the future role for online technologies with teaching and learning at Dalhousie”, one student's response was:

“Expanding access to education, and making Dal a little more progressive (we're pretty traditional compared to a lot of places)” (student comment)

Some students see the use of technologies as a way to enhance communication with teachers or with other students, while teachers commented that they see the use of technologies as a way to enhance the learning experience.

But throughout the qualitative data there was the oft-voiced caution about maintaining a strong face-to-face learning environment,

“I think they should have a supporting role but the main method of teaching and learning should always remain face to face.” (student comment).

Many students perceive that face-to-face learning is critical to their success and to the future of teaching and learning at Dalhousie. This student sums it up as follows:

“I don’t want online technologies to become overused. By having a course with too much online emphasis, students are less likely to show up to class. I still think a classroom setting and labs are the best way to learn. There are too many distractions online, and many students are inefficient at working when connected to the internet. Absolutely no facebook or any social media, please.” (student comment)

The President’s *100 Days of Listening Report* featured e-learning (blended and online course delivery) prominently. The results of the CLT online survey and CLTs ongoing support of e-learning are providing a foundation on which Dalhousie can begin to build strength in this area, while continuing to also support the development of face-to-face teaching. COHERE member universities do suggest, though, that if blended learning is to have a transformational impact on higher education, that it must be “integral to broad institutional goals” (p16). More specifically, the *COHERE Report on Blended Learning* (2011) cautions that to move blended learning from a grassroots approach, there needs to be an institutional strategy with “clear definitions, pedagogical and technological support and dedication of resources.” (pii). In addition, Jones and Slate (2012) remind us of the significant cost of developing online courses under the current educational and funding models, demonstrating the need for adequate resources. Thus, the grassroots approach to e-learning at Dalhousie will move forward more effectively in the long-term if the university has a strategic direction for it. CLT will be working in partnership with the VP Academic and Provost’s Office to develop an e-learning plan for Dalhousie in line with the strategic vision and direction of the university.

References

- Contact North | Contact Nord, “A New pedagogy is Emerging ... and Online Learning is a Key Contributing Factor”, retrieved February 25, 2014 from <http://www.contactnorth.ca/trends-directions/evolving-pedagogy-0/new-pedagogy-emergingand-online-learning-key-contributing>
- Carey, Thomas and David Trick, “How Online Learning Affects, Productivity, Cost and Quality in Higher Education: An Environmental Scan and Review of the Literature”, HEQCO Research Publications, July 30, 2013. <http://www.heqco.ca/en-CA/Research/Research%20Publications/Pages/Home.aspx>
- Dahlstrom, Eden, J.D. Walker, and Charles Dziuban, with a forward by Glenda Morgan. *ECAR Study of Undergraduate Students and Information Technology*, 2013 (Research Report). Louisville, CO: EDUCAUSE Center for Analysis and Research, September 2013, <https://net.educause.edu/ir/library/pdf/ERS1302/ERS1302.pdf>
- Dahlstrom, Eden, with a forward by Charles Dziuban and J.D. Walker. *ECAR Study of Undergraduate Students and Information Technology*, 2012 (Research Report). Louisville, CO: EDUCAUSE Center for Applied Research, September 2012, <http://net.educause.edu/ir/library/pdf/ERS1208/ERS1208.pdf>
- Top-Ten IT Issues, 2014: Be The Change You See: *EDUCAUSE Review Online*, Retrieved March 28, 2014, from <http://www.educause.edu/ero/article/top-ten-it-issues-2014-be-change-you-see>
- Innovative Practices Research Project: COHERE Report on Blended Learning*. 2011. Retrieved March 16, 2014 from <http://cohere.ca/wp-content/uploads/2011/11/REPORT-ON-BLENDED-LEARNING-FINAL1.pdf>
- Jones, Craig H, Slate, John R., “Online Courses, Instructional Quality, and Economics: A Conceptual Analysis”, URL: <http://cnx.org/content/m41567/1.5/Pages:3-10>, in *NCPEA Handbook of Online Instruction and Programs in Education Leadership*. 2012. URL <http://cnx.org/content/coll1375/1.24> (login required)
- Lederman, Doug, “Survey of Faculty Attitudes on Technology”, *Inside Higher Ed*, August 27, 2013. Retrieved 29 August, 2013 from <http://www.insidehighered.com/news/survey/survey-faculty-attitudes-technology>

Blended Learning to Actively Engage Agricultural Students in a Principles of Microeconomics Course



Diane Dunlop, Department of Business and Social Sciences, Faculty of Agriculture, Dalhousie University.

How do you move your classroom beyond “Chalk and Talk” supported by PowerPoint slides? In this article I outline how the use of a variety of interconnected learning techniques enriched my students’ learning environment, and supported students’ independent engaged and meaningful learning.

I have been teaching Principles of Microeconomics (ECO1000.03) for 19 years in the Faculty of Agriculture (FOA). Although the course evaluations were positive, I increasingly found that student motivation to engage in discussions of economic theory had become inadequate despite several changes to course content. Students were not preparing for lectures by doing the reading, there was low class participation and repeated class absences.

Partnering with a member of the e-learning team, Aaron Panych, with the Centre for Learning and Teaching at Dalhousie University, allowed me to create a blended learning course that enabled students to perceive meaning in economic concepts.

Literature

Blended learning is an integrated instructional approach that combines face-to-face interaction with online activities. The unique pedagogy combines multiple learning environments and activities using synchronous and asynchronous collaboration. The approach generates motivational and independent student learning within an engaged learning environment. (Bliuc, *et. al.* (2011), Fleck 2012, Poon (2013), and Van Der Merwe 2007. Blended learning and teaching is student centered, reducing in-class lectures and creating active and interactive approaches to learning in and outside of class. Clearly defining the nature of the blend is essential for students to understand the interdependence of online activities and in-class events.

The literature addresses the need to replace passive in-class lecturing with more active learning strategies in undergraduate economics courses to boost student satisfaction, motivation and academic achievement. “A

plausible proposition is that boosting student motivation to study economics in a lasting way requires revisiting the range of available teaching and learning techniques to assess how these can be expanded, mixed and given greater reach.” (Van der Merwe, 2007, p.126 and Michael Watts *et. al.*, 2011.) Evaluating a national survey on teaching and assessment methods of several undergraduate courses found that introductory economic courses have “Chalk and Talk” as the dominant teaching strategy. Thus, blended learning clearly is an alternative to “Chalk and Talk” to motivate, and increase academic achievement, in studying first-year economics, especially as introductory economic classes are dominated by non-majors which brings a challenge to motivate students from shallow to deep learning. (Becker 2000, Fearon *et. al.*, 2012, Schwert *et. al.*, 2011, and Van Der Merwe 2007)

Nottingham Trent University (NTU) in the United Kingdom changed their entire undergraduate program to blended learning. University evaluations of blended learning illustrates benefits to both students and faculty. Students perceived blended learning to be a flexible, and time convenient – anytime, anywhere learning. Another student commented that the “different teaching methods makes the delivery easier to understand, as a result, we are more engaged to our study” (Poon, 2013, p. 280). Faculty also agreed that a benefit was time convenience to students and that student learning outcomes were enhanced.

Structure of Blended Learning Course

In my blended course, class time was primarily spent on collaborative learning and synthesis of material. Lectures were reduced by forty percent. There were a significant number of activities in which students needed to be fully engaged to be successful. This provided a higher level of faculty student interaction and allowed class time to be more focused on discussion. When I did provide in-class lectures, frequently clicker technology was used to allow students to independently assess their comprehension of the readings and lecture concepts. Lectures focused on critical concepts and on what students needed to know to complete activities and other assignments.

Class activities were completed in student groups allowing for discussion. For example, the jigsaw method was used which allowed students to teach concepts to one another. A flipped classroom model was also used where students completed an in-class assignment based on required independent on-line readings. On-line posts were generally reflective exercises or discussions about course content. However, videos of real world applications of economics to on-line discussions and reflective blogs supported active student engagement in the online environment.

One example of the integration of face-to-face and on-line learning consisted of students developing a crossword puzzle. Students used lecture and on line material to develop a crossword puzzle of core concepts associated with market structures. In addition, there was a follow up online reflective exercise with this material. Students wrote a one page reflective blog on how market structure affects the price of food. Students realized the relationship between the face-to-face and the on line activity. Online activity increased the students' skills in reflection and research and increased in-class participation and interaction.

All tests and the final exam were written on the computer via Moodle. Because of the active learning, I was able to ask students to integrate material at a higher

level during the exam. In the past students had difficulty applying course concepts to exam problems.. Blended learning allowed students to establish a better foundational understanding for the more advanced concepts.

Student Responses to Blended Learning

At the end of the semester, students evaluated the course in two ways. The first evaluation consisted of an in-class clicker session in which questions were asked in a multiple-choice format. Secondly, students filled out the Faculty of Agriculture's standard course evaluations.

Table 1 illustrates some of the results from the clicker session. Overall, students were supportive of the blended learning format. Ninety six percent agreed that blended learning motivated them to learn course material. The workload was not overwhelming to 70% of the class. Students found this blended approach to be a better way to learn and expressed the desire to have more blended learning courses in their program. However, 50% of students wanted more professor lecturing indicating the desire for some passive learning. The use of clickers resulted in an over whelming response to their use and students strongly encouraged the use in all of their courses.

Table 1: Brief Summary of Student Evaluation of Blended Learning

	Somewhat Agree	Agree	Strongly Agree	Disagree
This approach motivated me to learn the course material.	56%	28%	12%	4%
Because of blended learning, I felt over whelmed in this course.	32%	0%	0%	68%
In class activities should be reduced and the Professor should lecture more.	16.67%	29.17%	4.17%	50%
Blended learning was a better method of learning verses having each class with Professor lectures and individual out of class assignments.	14.29%	33.33%	42.86%	9.52%
I recommend that more courses in my program use blended learning.	20%	40%	20%	20%
Clicker technology helped me understand course material better.	0%	50%	45.93%	4.17%
I wish more courses would use clicker technology.	13.64%	36.36%	45.45%	4.55%

I also received several student comments about blended learning via the FOA student course evaluation. One student noted that the course allowed them to connect personal business problems to course related work, another felt it allowed them to connect economics to the real world. The course also inspired some students to change their major to economics or take

additional economics classes. Students did give suggestions for improvements to the course. First, the classroom structure was not conducive to group work. Second, while some students encouraged me to include more class activities, others desired to hear me lecture more often. Overall, the students suggested minor changes to the blended microeconomics class.

Professor Experience

Students were completely engaged in every in-class and on-line activity that led to a higher level of discussion during lectures. Students understood my expectations for preparing for and engaging with the readings, lectures and activities. Students responded positively by taking responsibility for their own learning. The blended approach gave economics meaning and came alive in the classroom. As I listened to student group discussions and read their online posts each week, I witnessed critical thinking, problem solving, and increased student retention of material. There were, however, about 20 percent of the class who wanted more passive learning through increased professor lectures and less readings and class activities. To address this concern in the next iteration of the course I will post short video lectures focused on difficult course concepts in Moodle.

Another notable effect of the blended course was an increase in class attendance. 76 percent of students were always in class and 24 percent attended most classes. The consistent, engaged and independent learning resulted in retention of course material for the final exam. Previous averages of the course showed students were not motivated throughout the entire semester. This resulted in final exam marks being substantially below term mark averages. This allowed students to have a poor final exam performance and receive an acceptable final mark. With the blended learning course, the term, exam and final marks were comparable.

It is now difficult for me to imagine teaching my courses by any other pedagogy than blended learning. In fact, a complete economics and business program offered by blended learning would likely create deeper learning, especially if there was a high level of integration of learning outcomes between courses. The approach would foster an enriched learning environment that motivates students and generates a higher level of academic achievement. The Business and Social Sciences Department of the Faculty of Agriculture may want to consider this approach for both the Business and Economic majors within the Bachelor of Science in Agriculture. Further, the Diploma in Technology would garner many benefits by transforming to a blended learning approach as hands-on learning is central to this diploma. To achieve this goal, university support for course redesign would be needed. Moreover, faculty would have to commit

to different learning outcomes within the program than are currently established and to changing their approach to achieving them. If undertaken, blended learning could well result in a positive effect on student retention and enrollment in the department programs.

References

- Becker, William E (2000). Teaching Economics in the 21 Century. *Journal of Economic Perspectives*, 14(1): 109-119.
- Bliuc, Ana-Maria, Roberta A. Ellis, Peter Goodyear, and Leanne Piggott (2011). A Blended Learning Approach to Teaching Foreign Policy: Student Experiences of Learning through Face-to-Face and Online Discussion and Their Relationship to Academic Performance. *Computers and Education*, 56: 856-864.
- Fearon, Colm, and Simon Starr and Heather McLaughlin (2012). Blended learning in higher education (HE): Conceptualising key strategic issues within a business school. *Development and Learning in Organizations*, 26(2): 19-22.
- Fleck, James (2012). Blended learning and learning communities: opportunities and challenges. *Journal of Management Development*, 31 (4): 398-411
- Penson, Peter E., and MPharm (2012). Opinion: Lecturing: A Lost Art. *Currents in Pharmacy Teaching and Learning*, 4:72-76.
- Poon, Joanna (2013). Blended Learning: An Institutional Approach for Enhancing Students' Learning Experiences. *Journal of Online Learning and Teaching*, 9(2): 271-288.
- Schwerdt, Guide, and Amelie C. Wuppermann (2011). Is traditional teaching really all that bad? A within-student between-subject approach. *Economics of Education Review*, 30: 365-379.
- Van Der Merwe, Alex (2007). Using Blended Learning to Boost Motivation and Performance in Introductory Economics Modules. *South African Journal of Economics*, 75(1):125-135.
- Watts, Michael, and Georg Schaur (2011). Teaching and Assessment Methods in Undergraduate Economics: A Fourth National Quinquennial Survey. *The Journal of Economic Education*, 42(3): 294-309.

Clickers: A Tool to Increase Student Engagement and Foster Active-learning in the Classroom



*Mindy McCarville,
Senior Instructor, Biology Department*

Handheld student response devices or “clickers” are a promising tool in classrooms today with the potential to transform the lecture experience from one that is instructor-centered to one that is learner-centered. The process generally involves posing a question to the students (often multiple-choice, and usually shown on a PowerPoint slide), permitting time for students to respond (maybe 20-60 seconds), and then displaying the collective results for the entire group to see (usually in the form of a histogram). This can be seamlessly integrated into lecture slides and the results can either remain anonymous or later be linked to individual device IDs. The instructor now has the opportunity to use this feedback to identify and address any gaps in understanding, and adapt the lecture accordingly, which is a variation of “just-in-time” teaching (Marrs and Novak, 2004). Meanwhile, a plethora of research and literature on best practises indicate that clickers increase student engagement and foster deep-learning by moving away from the passiveness of note-taking, and by providing opportunities for entire class participation (Bruff, 2010; Caldwell, 2007; Harlow et al., 2009). Instructors in the Biology department recently made the collective decision to implement the use of clickers into the large Introductory BIOL 1010/1011 courses, as well as at least three of its second year core classes. This decision has resulted in students’ consistent engagement with clicker questions in large, lower level courses. When I lectured in BIOL 1010 last year, I experimented with clickers in several ways:

1. Daily quizzes covering material from the previous lecture were given at the beginning of every class. This encouraged students to review past content and also served as a smooth transition into the current lecture. These select questions were “for-credit”, which encouraged the initial buy-in from the students, and also promoted regular attendance.
2. Quick recall questions relating to that day’s material and also previously covered concepts were frequently inserted between lecture slides. These acted as quick reminders about fundamental concepts and illustrated connections between lectures. This also allowed me to evaluate the need for clarification of specific concepts.
3. Trivia-type questions that involved intriguing scenarios with “little-known facts” that related to the material, but fell outside of specific learning outcomes were occasionally thrown in for engagement purposes. These questions were strategically inserted amongst drier material.
4. Peer instruction questions were more involved than the other question types and were carefully planned in advance. In these cases I would ask a more challenging question, poll the students, display results (perhaps without indicating the correct answer) and then prompt the students to discuss the question in pairs. The class then voted a second time to see how the distribution of correct answers changed. This technique has been well documented as having a high impact on student learning (Smith et al., 2011; Harlow et al., 2009). These thought-provoking questions were slightly more time consuming, but I believe that the benefits of this meaningful interaction with the material more than compensated for the minimal sacrifice in content.

Clickers could also be used to predict the outcome of an in-class experiment or a demonstration (Crouch et al., 2004), replicate behavioural research findings (Cleary, 2008), or even be used anonymously where students can express opinions on potentially sensitive topics or personal experiences (Bruff, 2010).



In addition to the many benefits that clickers bring to a classroom, there are also challenges to be considered. Administration on the back end can be time consuming, and potential technology glitches can cause frustration. To further complicate things, there are a variety of device models on campus, resulting in some students being required to purchase more than one clicker! If Dalhousie were to eventually adopt a single-clicker policy campus-wide, students would need to buy only one device and it could be used in a variety of classes. Alternatively, technology is available that would allow for students to use their own personal devices such as smart phones, tablets, or laptops to respond to questions posed during lectures, which could potentially eliminate the need for students to buy a clicker in the first place. Finally, like all technology in the classroom, clickers need to be used correctly, with thoughtful consideration of instructional goals. We have all witnessed “good” and “bad” PowerPoint presentations – clicker implementation requires the same sort of diligence in preparation.

I am confident that clickers were a positive addition to BIOL 1010’s large lecture environment. The polling experience caused our limited time together to be more interactive, and the frequent digressions from one-way lecturing were appreciated by those of us on BOTH sides of the lectern. The students clearly enjoyed using the clickers, as without fail they would perk up when the familiar “clicker-question-background” popped up on the screen, and there was always an auditory response when the histogram was

displayed. Students reported anecdotally that the clickers kept them alert throughout the 75 minute lecture and that they found them to be fun! I have found that electronic response systems command the attention of an audience, and because those students have participated in generating the data that is now on display, for a precious few seconds you have their undivided attention which has the potential to lead to teachable moments. Like all tools we have at our disposal, it is prudent to pick and choose the ones that are most complementary to our own unique teaching style, and make sense in the particular learning contexts of our students. But I do think that clickers have a place in many classrooms, and with the proper implementation they have potential to enliven the lecture experience.

References

- Cleary, A.M. (2008). Using wireless response systems to replicate behavioural research findings in the classroom. *Teaching of Psychology*. 35, 42-44.
- Bruff, D. (2010). Multiple-choice questions you wouldn’t put on a test; Promoting deep learning with clickers. *Essays on Teaching Excellence*. 21 (3), 1-6.
- Caldwell, J.E. (2007). Clickers in the large classroom: Current research and best-practice tips. *CBE - Life Sciences Education*. 6 (1), 9-20.
- Crouch, C.H. Fagen, A., Callan, J.P., & Mazur, E. (2004). Classroom demonstrations; Learning tools or entertainment. *American Journal of Physics*. 72 (6), 835-838.
- Harlow, J., Paulo Kushnir, L., Bank, C., Browning, S., Clarke, J., Cordon, A., Harrison, D., Ing, K., Kutas, C. & Serbanescu, R. (2009). What’s all the clicking about? A study of classroom response system use at the University of Toronto. *Collection of Essays on Learning and Teaching (CELT)* 2, 11-121.
- Lasry, N. Mazur, E. & Watkins, J. (2008). Peer instruction: From Harvard to community colleges. *American Journal of Physics*. 76 (11), 1066-1069.
- Marrs, K.A. & Novak, G. 2004. Just-in-time teaching in biology: Creating an active learner classroom using the internet. *CBE – Life Sciences Education*. 3, 49-61.
- Smith, M.K., Wood, W.B., Krauter, K., & Knight, J.K. (2011). Combining peer discussion with instructor explanation increases student learning from in-class concept questions. *CBE – Life Sciences Education*. 10, 55-63.

Running Dalhousie's First MOOC



Aaron Panych, Online Instructional Designer, Dalhousie University

Massive Open Online Courses, or MOOCs, have received a lot of attention - some would say hype [1] - in higher education recently [2]. Most MOOCs are free and open to all. Many have come from high-profile American universities. Some have class rosters the size of small cities [3]. So when I was approached to help in the design and development of Dal's first MOOC,

I jumped at the chance. I had designed many online courses before, but never a MOOC. This was going to be a fresh challenge, and I had many questions:

How was a MOOC going to be different from a "normal" online course? Were we going to build a cMOOC or an xMOOC?¹ [4] How many students would register? Where would they come from? How would we handle interaction if we had hundreds of students? How many would complete all course requirements and receive the certificate?

In 2013 Fred McGinn of Dalhousie's School of Health and Human Performance received a DalVision Academic Innovation grant (2013-2014) for an Inter-professional MOOC. Blaise Landry, soon to be the content expert and instructor of the MOOC, met with Fred shortly after funding was secured. They decided a course that focused on teaching people how to seek out and apply for community-focused grants would be a popular choice for a MOOC. It turned out to be a shrewd decision.

We built a 5-week, module-driven course targeted to newcomers in grant writing and called it the Grant Writing Bootcamp MOOC. If students completed all course quizzes, one main assignment, and a peer review, they would be eligible for a departmental certificate from Dalhousie's School of Health and Human Performance. They would also finish with a completed grant proposal based on a real-life grant opportunity.

1 cMOOC as more connectivist and networked with a focus on distributed interaction on the Internet (e.g. Siemens, Downes, Cormier, Couros); xMOOC as largely video-based, content-focused, and centralized at one website (e.g. Thrun, Koller, Ng, Khan).

We kept the course navigation and content as straightforward and clear as possible. Five modules were built around specific learning objectives, each with a collection of screencast lecture-type videos, self-check quizzes, and links to related external resources such as articles and websites. Each module also ended with a discussion board for communication and interaction. We used Canvas Network ("an index of MOOCs" at www.canvas.net) to run the course online, which gave us an established network with automatic exposure to a wide audience.

Grant Writing Bootcamp MOOC began on October 8th, 2013, and we were all a bit shocked to learn that by Day 1 there were over 1500 people from all over the world registered for the course. According to a demographics survey filled out by 549 of the students after registration, 82% came from North America, 75% were female, 64% had a bachelor's degree or higher, and 73% were taking the course to "gain skills for a career opportunity."

This higher-than-expected number of registrants amplified a concern we all had from the beginning: how would we handle interaction with such large numbers of students? Interaction was key for us, including student-student, student-instructor, and student-content interaction. We also wanted to maximize instructor presence. So our biggest concern became how to deal with the vast amounts of communication that we expected on the discussion boards, and then how to integrate useful interaction and instructor presence into a meaningful learning experience.

To help Blaise facilitate the course, we invited Jill McSweeney, a Dalhousie PhD candidate in the Interdisciplinary PhD program to be the course TA. We developed a communication strategy that focused primarily on the Announcements tool in Canvas. Jill monitored the boards, sending a daily (M-F) announcement to everyone summarizing the activity on the discussions boards for that day. Blaise would then respond to Jill's announcement with a daily announcement of his own, connecting back to the activities for that week's module, including direct links to discussion boards for students to continue the conversation. We believe this approach went a long way in bringing a successful sense of instructor presence to a course with so many people.

The course assessments were another big challenge. How could we possibly assess so many students? The self-check quizzes were automatically graded by Canvas, but we did not have the resources to provide feedback on all the grant proposals that would be submitted for the assignment. So we decided to set up a peer review process that would match all students who submitted assignments together in pairs and then prompt them to review each other's assignment. We were very careful to make this process as simple and clear as possible, creating videos that demonstrated the process. We had to troubleshoot a few of these peer reviews, but overall it worked quite well, largely due to the relatively seamless way the Peer Review tool worked in Canvas.

In the end we believe that the Grant Writing Bootcamp MOOC – Dalhousie University's first MOOC – was a successful 5-week course. It took a lot of work and planning but it was a great learning experience for all of us, and we were all quite inspired with how engaged many of the students were with the material and with each other. Most students who took the time to fill out the end-of-course survey also seemed satisfied with the result. 82% of them felt the activities in this course (quizzes, assignments, and discussions) were “just right.” 91% of them felt the instructor involvement was “just right.” And 84% of them gave the course a rating of 4 or 5 out of a total of 5. 118 of the 1534 students finished all course requirements for the certificate – a full completion rate of about 8%. This is consistent with completion rates for most MOOCs[5].



Dalhousie and Canvas both have received requests from students for another Grant Writing Bootcamp MOOC, so maybe we will see future iterations. Looking back we can confidently say that this first experience gave us a solid foundation to continue the conversation about MOOCs and other emerging technologies in education here at Dalhousie.

And although I now have answers to some of my original MOOC questions, they have been replaced by more:

Do MOOCs have a future at Dalhousie? If so, what would that look like? How would they be funded? Is it possible to make a business case to run them? Do we even want to make a business case? Are they still “open” in a pay model? Would students enroll if they had to pay? Can we use MOOCs to attract students and boost enrollment? Can we use MOOCs to promote some of our unique programs at Dalhousie?

References

- [1] Kolowich, Steve. (2014, Jan 15) Doubts About MOOCs Continue to Rise, Survey Finds. *The Chronicle of Higher Education*. Retrieved March 17th, 2014, from <https://chronicle.com/article/Doubts-About-MOOCs-Continue-to/144007/>
- [2] Mangan, Katherine. (2012, Oct 1) MOOC Mania: It's raising big questions about the future of higher education. *The Chronicle of Higher Education*. Retrieved March 17th, 2014, from <http://chronicle.com/article/Massive-Excitement-About/134678/>
- [3] Unknown Author. (2013, January 23). New MITx Course by Walter Lewin Has Potential to Be the Largest MOOC Ever. *MIT OpenCourseWare*. Retrieved March 10th, 2014, from <http://ocw.mit.edu/about/media-coverage/press-releases/lewin-mooc-announced>
- [4] Morrison, Steve. (2013, Apr 22) The Ultimate Student Guide to xMOOCs and cMOOCs. *MOOC News and Reviews*. Retrieved March 17th, 2014, from <http://moocnewsandreviews.com/ultimate-guide-to-xmoocs-and-cmoocso/>
- [5] Parr, Chris. (2013, May 19) MOOC Completion Rates ‘below 7%’. *Times Higher Education*. Retrieved March 10th, 2014, from <http://www.timeshighereducation.co.uk/news/mooc-completion-rates-below-7/2003710.article>

Integrating Pedagogy and Technology to Create a 21st Century Curriculum

*Dr. Marie Matte, Associate Dean, and Ms. Jennifer Wipp, Curriculum Coordinator
Undergraduate Medical Education, Faculty of Medicine, Dalhousie University*

Introduction

Since the implementation of a renewed curriculum model in 2010, Dalhousie Medical School has delivered its undergraduate medical education curriculum to students in distributed sites across Nova Scotia and New Brunswick. This distributed model of medical education is an instructional model that allows widely distributed human and instructional resources to be utilized independent of time and place in rural, remote and urban communities distributed across these two locations in the Maritimes. Through the use of technology, the curriculum can be delivered, synchronously and/or asynchronously to all students. In this way, students can learn what it is like to live, study and practice medicine in various settings/communities. As medical schools across Canada strive to meet the health care needs of the populations they are mandated to serve, Dalhousie Faculty of Medicine, through the use of technology and the distributed medical education model, is poised to do just that.

There are many players and technologies involved in this model to enable the best and most current learning experiences. The students receive their curricular content synchronously via a sophisticated videoconferencing system, and asynchronously through Blackboard Learn (BbLearn), Dalhousie's Learning Management System. Their daily and weekly schedules are accessed via One45. Each aspect is managed and organized by various administration and staff members from the Associate Dean, Curriculum Coordinators in Undergraduate Medical Education (UGME), highly trained IT staff in the control room, and supported by MedIT. The coordination of the delivery of medical curriculum is impressive as it is on the cutting edge.

Videoconferencing (VC)

Undergraduate Medical Education has moved away from the more traditional classroom teaching environment to a much more technology-driven and media-rich platform. We now provide dynamic and robust curriculum to Halifax as well as Saint John medical students. Over the past 4 years faculty

members have been given the opportunity to learn and make use of the VC system. The system enables the faculty members to manage the controls for the interaction across the sites as well as control the display of their lecture materials. The current videoconference rooms have been custom designed and engineered to support and facilitate learning. There was great care in the design to ensure that both spaces in Halifax and Saint John had the same look and feel to ensure that "in-person" feel is achieved and the students feel as though they are sharing one space. This collaborative learning environment has been implemented to give students and faculty at both sites a chance not only to learn together but from each other as well. This is achieved through the use of a custom-programmed microphone queuing system that accommodates the interactions between learners and lecturers; this system can be adapted to many pedagogical styles. Synchronous learning is extremely important in the delivery of the renewed curriculum. The MedIT staff strive to ensure that these lectures are delivered without issue or incident; this is facilitated by a dedicated fiber optic network and custom programmed control system. All lectures are recorded and provided to the students via BbLearn. The control room performs resource allocation, management and routing. They are also the first line of technological assistance for the faculty during the lecture should the need arise.

From an educational standpoint, third year students appreciate the opportunity to access their learning materials without having to leave their clinical learning sites, thus allowing a smoother integration of clinical and didactic learning.

Learning Management System

Moving to a largely paperless curriculum, BbLearn is the learning management system (LMS) that is used to organize all learning materials for students at all distributed sites. This is a virtual learning environment that houses the majority of the learning content for undergraduate medical students. All lecture slides are made available to the students prior to their lecture

and all lecture recordings are posted for the students to review. These materials are managed and updated by staff members in the Undergraduate Medical Education office (UGME). The use of the LMS allows for the availability of media-rich lecture materials online for a more interactive and engaging learning opportunity for the students, away from the face-to-face classroom. The use of online formative quizzes also provides faculty with a means of guiding student learning throughout the academic year. Students are granted 24-hour access to their learning resources.

One45 - Scheduling

The students' schedules are managed through One45 – the medical school management solution. Each session that a student attends is added and managed within One45. The UGME office is responsible for ensuring each student navigates their schedule without issue. Exams, deadlines, skilled clinician sessions, evaluations, assessments, lectures and tutorials are all input and managed by UGME staff. The lecturers and tutors are also able to access their schedules, assessments and evaluations via One45. One45 is integral to the evaluation and assessment processes currently implemented by the UGME office; the majority of evaluation and assessment is done online. One45 is supported by MedIT staff, who can address any issues that arise within the scheduling software.

The use of One45 for student evaluation and assessment has helped to streamline these processes for both faculty and students. One45 and BbLearn

provide a means for faculty to track, time and collate data on program evaluation as well as data on the assessment of student performance.

Looking Forward

Advances in technology and innovative learning tools challenge the traditional teaching model. When thinking about the delivery of medical education in a distributed setting, one has to imagine the multiple players and players at each level of the delivery. As medical schools across Canada strive to meet the 10 recommendations outlined in the *Future of Medical Education – MD Report* (2010), the use of technology and the distribution of medical education to remote and rural sites is a necessity. As such, part of the work of the Undergraduate Medical Education Office in collaboration with the University and Faculty of Medicine IT departments is to ensure the best use of technologies to fit the needs of not only the faculty and students, but of the patients and communities we serve. Dalhousie Medical School looks forward to meeting the challenge of further technological advances and is seeking new ways to integrate and augment an already outstanding, integrated curriculum.

References

AFMC (The Association of Faculties of Medicine of Canada), *The Future of Medical Education in Canada (FMEC): A Collective Vision for MD Education*, 2

Dalhousie e-Learning Team

The e-Learning team with CLT offers e-Learning advice and support to the Dalhousie community. With two experienced instructional designers, the e-Learning team is available to offer guidance with both online and blended/hybrid course initiatives.

Aaron Panych, M.Ed. (DE)
Online Instructional Designer
(902) 494-1224 | Aaron.Panych@dal.ca

Adrienne Sehatzadeh, MA, MEd
Instructional Designer
(902) 494-3634 | Adrienne.Sehatzadeh@Dal.Ca

DalBlend

The DalBlend site will guide you through a blended course-design process while showing you examples of how some Dalhousie instructors are currently blending their courses.

<http://elab.learningandteaching.dal.ca/blendedlearning>

2014 Change One Thing Challenge Recipients



**Alison Thompson,
Department of Chemistry**

Please and Thank-you, with a Smile

CHEM2401, Introductory Organic Chemistry, has >330 registrants and is a “high stakes” class, scheduled at 8:30 am. Many students approach the class with the desire to attain an exceptional grade as they prepare applications for professional schools.

Over the years, I have built a variety of learning and teaching aids, including extensive multi-media on-line resources, and a database of problems via which students learn to become comfortable using the new material to solve problems. Despite using innovative methods, the class is quite intense and this is not lessened by the fact that I do not use pre-prepared slides, but draw and write chemical starting materials and their reaction products using my tabletPC; students are expected to do likewise. This active aspect of lectures means that students may see the material as something that can be figured out, not memorized or regurgitated.

In the fall of 2013 I planned to introduce more in-class activities: short opportunities for students to use and apply the new knowledge. I believed that the trick to creating a more engaged learning environment was to build trust and to encourage risk-taking. What better way to build trust than to consistently use good manners? Therefore, I implemented a strategy to smile, and to say “yes, please” and “thank-you” more often during our lectures.

In class my smiles would be directed at anyone and everyone looking like they needed encouragement, my “yes, please” would be directed to those with raised hands, and my “thank-you’s” would naturally follow.

My smiles, please’s and thank-you’s were, perhaps, small things but I found that they made a massive difference to class dynamics, and that it turn made a difference to both the well-being of our lecture environment and the learning that ultimately happened inside and outside of class.



**Shelley Cobbett,
School of Nursing,
Yarmouth Campus**

Bridging a Geographical Gap for Rural and Northern Nursing Students: Online Nursing Research Journal Club

Evidence-informed nursing practice is a requirement for the registered nurse practicing in the 21st century. There is a plethora of research critique and integration experiences available to nursing students in an urban area, however rural and northern nursing students have limited opportunity for professional networking to participate in formal research critique discussions, and subsequently, make decisions related to translation of the best available evidence into practice. To help bridge this gap, an online Student Nursing Research Journal Club, using BbLearn as the platform, was developed to enable rural and northern nursing students to engage in group discussions, moderated by a faculty member, related to critiquing research-based nursing articles.

In addition to this being a required activity for Nursing Research Course, other benefits included increased professional socialization activities for students, appreciation of cultural health care practices, increased technological competency, and peer discovery-based learning.

The Online Nursing Journal Club was first implemented in Winter 2013. Student evaluations informed the revisions that were made for the second cycle in the Winter of 2014, for second and third year nursing students at the Yarmouth Campus, and third year nursing students at the Nunavut campus. In addition, three journal articles will be critiqued during the winter 2014 term, rather than two.

Feedback from students indicated that their learning was greatly enhanced by the ability to work together to practice their critiquing skills, and to read other students’ perspectives that may differ from their own.