Teaching & Learning Development Grant: Final Report (suggested maximum 4 pages)

1. Title of your project: Regular session, i>clicker and on-line tutorials: Exploring student experiences and learning outcomes with emerging learning technologies

2. Your name and co-applicants: Sheri Fabian, Senior Lecturer; Barry Cartwright, Senior Lecturer

3. Please summarize your findings using the question(s) you investigated as an organizer (take these directly from your final grant proposal). Provide the results of your analysis for each information/data source.

Phase 1

a. How can we best assess student experiences, attitudes toward, and learning outcomes with regular, i>clicker, and on-line tutorials, using an on-line survey instrument?

We had initially considered designing an on-line survey from scratch, using the services of a local consulting company. Following a recommendation from the Teaching and Learning Centre, we decided instead to purchase and use on-line survey software from Fluid Surveys. This satisfied the requirements of the SFU Research Ethics Board, because unlike Survey Monkey (and other American programs), the data is stored in Canada. The on-line survey templates, built-in skip logic, data collection tools, data analysis tools, plus the mechanism to send out email invitations and periodic reminders to eligible student participants made Fluid Surveys a comparatively easy program for us and our two research assistants to navigate and use effectively. We found that we were able to design and administer the survey ourselves.

b. What steps can we take to maximize student participation in and completion of the on-line survey?

Our literature review indicated that in order to minimize survey abandonment or survey noncompliance, and to enhance completion rates, we needed to design the on-line survey employing ‘skip logic’ (also known as branching or piping). Skip logic ensured that required questions were answered by all participants, whereas other topic-specific questions were only presented to participants who triggered them through their previous responses. This skip logic kept participants from answering questions that were not intended for them, thereby reducing the length of the survey for students who had not experienced all three types of tutorials. The literature also indicated that response rates could be increased through the use of cash prize incentives. We offered two cash prizes of $200 each, two cash prizes of $100 each, and two cash prizes of $50 each (awarded through a randomized draw, involving all participants who completed the survey fully). In addition, the literature suggested that we could encourage participation through the use of personalized invitations, and by sending out periodic reminders to non-respondents (sent out thoughtfully, however, as overuse of these could alienate potential respondents). The average time required to complete the survey was 11 minutes and 22 seconds. We had a response rate in excess of 50%, and a survey completion rate of 94%, which is considered extremely high for on-line surveys of this nature.

c. What can extant studies on emerging learning technologies contribute to the planning and execution of our study?

Our literature review suggested that the jury is still out when it comes to i>clicker technology. While i>clickers have been widely embraced at colleges and universities around the world, testing of their effectiveness suggests that they may at best have a mild to modest positive effect in large, first and second year courses, with this impact diminishing (or disappearing entirely) for smaller, third and fourth year classes.
One of the reported benefits of i>clicker technology (which we sought to measure in our survey) is how students appreciate the anonymity, and are thus more likely to participate actively in classroom discussion. Another issue raised in the literature is whether the use of i>clickers actually helps students to get better grades (which we also sought to measure in our study). Our literature review suggested that many faculty members still question the value of on-line discussions (an integral part of the on-line tutorials for one of the courses being studied), so we pursued this angle as well. Building upon the extant literature, we explored student experiences with interactive computer games (an integral part of the on-line tutorials for another of the courses being studied), and their responses to a 'blended' approach, using direct contact and emerging learning technology (especially when it came to the value of students being able to return to on-line resources repeatedly when studying for upcoming examinations).

**Phase 2**

d. How effective are emerging learning technologies, compared to more traditional teaching methods?

On-line tutorials and i>clicker tutorials appear to be at least as effective as regular session tutorials when it comes to encouraging student attendance and participation. As importantly, students seem to be quite willing to embrace these emerging learning technologies. Those who had taken regular session tutorials felt that they received better instruction through face-to-face contact (56.4%), and that they understood the course content better (62.2%). Above all, 64.5% said that they enjoyed the opportunity afforded by regular session tutorials to meet and interact with other students. On the downside, 44.7% said that they didn’t enjoy having to speak in class, 51.4% said that they didn’t enjoy having to do the type of student presentation often associated with regular session tutorials, and 51.4% said that they found a disparity in the quality of instruction (depending upon the tutorial leader). The biggest complaints with regular session tutorials, however, were the conflict with other classes that the students wished to take, or conflict with their work schedules (59.2%). With i>clicker tutorials, 53.1% of the respondents said that they appreciated being able to gauge their knowledge through formal and informal clicker quizzes, 70.5% said that they appreciated being able to practice the types of questions they would see on the exams, and 51.5% felt that they were more able to participate actively in class discussions. The main concern with i>clicker tutorials was the three hour time period (a two hour lecture followed by a one hour tutorial) (52.7%), and the $40 cost of the i>clicker (47%). With on-line tutorials, 53.5% said that they were better able to understand the course content and the required readings, 57.8% said that they appreciated being able to gauge their knowledge through the formal on-line quizzes, while 63.5% felt they were more able to participate actively in the tutorials. The most prominent finding was that 82.5% said that they liked being able to attend the (on-line) tutorial at a time of their own choosing. The main complaint with the on-line tutorials was the $40 cost (72.6%). Overall, 20.22% of those who had experience with two or more of these tutorial modalities said that they would prefer on-line tutorials, 15.7% that they would prefer regular session tutorials, and 14.3% that they would prefer i>clicker tutorials. Moreover, 10.6% said that they would like to see some combination of regular session and i>clicker tutorials, while 8.4% said they would like to see a combination of regular session and on-line tutorials.

e. How do reported student perceptions of and experiences with alternative learning technologies compare to actual learning outcomes?

The fact that students liked the online tutorials more than traditional, regular session tutorials, and that they rated i>clicker tutorials on roughly the same plane as regular tutorials, does not necessarily imply that online tutorials and i>clicker tutorials are superior to—or the equivalent of—regular session tutorials, or other traditional means of course delivery (e.g., smaller seminars) when it comes to learning outcomes. Rather, it suggests that students are indeed receptive to these emerging learning technologies, and that they find certain aspects of them—such as the convenience, the opportunity to practice exam-style questions, and the ability to earn points for attendance and participation without having to speak in front of an audience—appealing. That said, our data analysis suggests that implementation of these new learning technologies has had a slight (1.5%)—but nevertheless positive—effect on learning outcomes, as measured by final grades.
and grades on midterm and final examinations. These results must be interpreted with caution, as it is not 100% clear whether this is attributable to something as simple as inadvertent ‘grade inflation’, or to the university raising its admission standards at around the time that the new learning technologies were implemented. Nevertheless, if students are open to these emerging learning technologies, feel more engaged in the learning process as a consequence, and feel that they learn—and perform—better on examinations, then the argument can be made that these learning technologies deserve wider deployment in higher education.

f. How can our study assist in the revision of existing i>clicker and on-line tutorials and in the development of future courses that employ new teaching technologies?

Results of this study are presently guiding the total redevelopment of the regular session version of Criminology 101 (the largest enrolment course in the School of Criminology), as well as the total redevelopment of the on-line and distance education version of Criminology 101. Consistent with student responses to this on-line survey, on-line tutorials will be added to both the regular session version and the on-line and distance education versions of Criminology 101. Clicker technology will be retained for the two hour lecture segment of the regular session version of Criminology 101, and is being considered for the two hour lecture segments of the regular session versions of Criminology 104 and 131. Student responses to the survey have already changed the quantity and quality of instructor and teaching assistant involvement and intervention in the on-line discussion groups that comprise part of the Criminology 131 online tutorials.

4. In carrying out your project, did you do anything differently than had been planned (based on your project proposal)? If yes, please describe.

N/A

5. How did you disseminate your findings amongst your department/school colleagues? Any interesting reactions? Do you have plans for a broader dissemination of your findings? If yes, please explain.

The preliminary results of our on-line survey were presented at the TLC’s Symposium on Teaching and Learning: Embracing Change, on May 16th, 2013. Our symposium presentation included a hands-on demonstration of i>clicker technology. We are scheduled to do our presentation again (on November 14th, 2013) at the TLC’s Symposium Encore Series. The results of our survey have been reviewed extensively with the Director of the School of Criminology, the Associate Director of Undergraduate Studies for the School of Criminology, the Director of the Centre for On-line and Distance Education, and with the Director of Academic Programs for the Centre for On-line and Distance Education. We are scheduled to present a paper on our research findings on November 19th, 2013, at the 6th Annual Conference on Education, Research and Innovation, in Seville, Spain. This is a large international conference (with a projected attendance of 700 delegates from 75 different countries), sponsored by the International Association of Technology, Education and Development. The paper has already been submitted for publication in the conference proceedings.

6. How have you (or how do you plan to) apply the findings of your project to your teaching practice?

Findings from this project have already been applied and/or are now being applied to our teaching practices, as outlined in 3 f (above). The new regular session and on-line/distance education versions of Criminology 101 are being developed in accordance with the survey findings. The quantity and quality of instructor and teaching assistant involvement/intervention in the on-line discussion groups that comprise part of the Criminology 131 online tutorials has already been changed. Serious consideration is being given to adding clicker technology to the extant versions of Criminology 104 and 131 (although the added cost has to be carefully assessed beforehand).