



# i>CLICKER CASE STUDY: UNIVERSITY OF DELAWARE

## Managing i>clicker data from multiple lab sections

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### Courses:

- CHEM104: General Chemistry II
- BISC208: Introductory Biology II



**Application:** i>clicker is used to gauge student preparedness to participate in science labs.

**Challenge:** Integrated science labs involve 330-450 students in 14+ lab sections each fall and spring semester. i>clicker was selected as the assessment tool to determine if students were coming prepared to complete the weekly experiment. The challenge was to develop a workflow to grade performance fairly because several TAs administered weekly polls. Technical simplicity, system reliability, and student data security were primary concerns.

**Summary:** In fall 2013, an integrated approach that makes connections between chemistry and biology concepts more transparent was introduced at the University of Delaware (UD). Students were primarily freshman majors in: Biology, Exercise Science, Medical Laboratory Sciences, Wildlife Conservation, Quantitative Biology, Marine Science, Environmental Science, or Biomedical Engineering. Students attended multiple lecture and lab sections each week for both the chemistry and biology courses. The problem-based learning studios used for the biology lectures are flanked by two specially equipped labs, one chemistry and the other biology. On any particular lab day, half of the students from the biology course were in the chemistry lab while the other half are in the biology lab. Multiple sections were run simultaneously on different floors. A contingent of TAs facilitated lab activities, including the execution of a selection of clicker questions from a pool to assess preparedness for the experiential lab.

**Implementation:** As all students are technically in the same course, though divided into multiple sections, it was vital to prevent signal crossover and scoring complications. Our solution included dedicating i>clicker frequencies in each room to prevent signal overlap from clicker responses submitted in as many as six concurrent lab sessions. TAs launched the i>clicker software, collected data, and reviewed correct answers using histograms during their polling session. Note that TAs were not responsible for the initial setup of the courses in i>clicker or quiz creation. They only needed to select the appropriate i>clicker course and PowerPoint quiz file each week. Data was stored in the "Classes" folder of the lab computer. The data was only related to clicker ID number which effectively secured individual student identities. The i>grader executable was removed from those folders to completely prevent association of student identities with scores collected in the lab.

Shared drive access between the classroom computers and the one used to process and post scores to the course's Learning Management System (LMS), Canvas, was established. Between sessions, an administrator remotely copied individual lab class folders from the local machine onto the password protected grading computer. The files from all sessions were compiled by the grader in the i>clicker "Classes" folder. The designated grader then launched i>grader, renamed the current session scores in each i>clicker class (e.g., "Lab1") for gradebook consistency, marked the correct answers, connected to Canvas, and posted the lab scores to the Canvas gradebook. If the session titles matched exactly and the the i>clicker integration wizard was used, each section's scores were uploaded (sequentially) and appended the same gradebook column.

**Lessons Learned:** Students must be reminded to switch frequencies. Frequency settings are different for clicker polls during lecture and lab sessions. Signs were posted in each classroom to display the classroom frequency for the integrated science classes. Some faculty and students for other classes using those spaces questioned if switching from the standard AA frequency was required. The signs were refined to indicate that posted frequencies only applied to the integrated science classes. Dedicating frequencies in these neighboring classrooms alleviated the potential issue of frequency overlap resulting in scoring errors.

A shared Dropbox solution was explored and rejected because connection to i>clicker could be disrupted if the service's sync update ran during an open poll. Although Dropbox sync can be managed by pausing the action or taking the computer offline temporarily, it was determined that using a locally shared drive was more appropriate for our situation.

The integration with Canvas does not use our standard authentication credentials and is less intuitive than our other LMS, Sakai. The current multi-step setup required to connect i>clicker/i>grader to Canvas inhibited this already complex data flow. A mid-semester coding change at Canvas required all faculty using Canvas and i>clicker to update their software at the peak of student activity. More timely communication between i>clicker and Canvas would alleviate a great deal of stress to our end users.

We also learned that TA instruction and expectations need to be clearly conveyed and enforced. Some TAs were much more lenient about students sharing answers during the i>clicker polls.

**Results:** Though far from a completely automated solution, using i>clicker instead of pen and paper to capture student responses during lab saves our team a considerable amount of time. It also gives us a fair and consistent measure for lab preparedness, with the opportunity to provide immediate feedback. Our workflow has been refined over the course of the semester and is now operating at maximum efficiency. We hope that i>clicker version 7 and Canvas will work well together, greatly improving client satisfaction with both products.