

Engaging learning and addressing over-assessment in the Science laboratory: solving a pervasive problem

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Aims & research questions

This small-scale, mixed method research study aimed at improving the learning experience for students in laboratory practical sessions. A subgroup of undergraduate science students performed their biochemistry practical component using a range of innovative integrated approaches over one semester, which were then evaluated. This intervention focused on addressing four research questions

- (1) *Would modifying the manner in which practical laboratory sessions are conducted and assessed improve the student learning experience?*
- (2) *Could the assessment/feedback process be improved so that all parties can engage in a feedback-feed-forward dialogue to generate improvement?*
- (3) *Would the introduction of an incremental marking system stimulate an always improving, self-learning trait in students?*
- (4) *Would reducing the number of lab reports required, in combination with the introduction of formative assessments and peer-assessment oriented approaches, facilitate understanding of a topic and students' practical skills?*

A common strategy of institutions is to ensure students experience 'holistic learning environments' containing a varied mix of assessments, capable of engraining life-long learning skills. The conduct and assessment of practical sessions is critical to meeting this milestone. To achieve this goal, the objectives and aims of this study were to:

- * reduce over-assessment in science labs
- * improve students' technical abilities
- * enhance students' learning experience in practical sessions
- * instil a mentality of self-learning and always-improving
- * improve grades achieved in laboratory reports
- * improve feedback uptake
- * advance group and teamwork.

Findings & impact

- Reducing the number of lab reports, combined with the introduction of formative assessments and peer-assessment oriented approaches, facilitated students' understanding of a topic and development of practical skills.
- An incremental marking system stimulated an always improving, self-learning trait in students while the self-assessment/feedback process was improved so that all parties involved actively engaged in a feedback-feed-forward dialogue that led to improvement in the quality of laboratory reports submitted.
- With the laboratory representing a significant place for learning and understanding, it is critical an effective learning framework is present to maximise development of both lifelong learning and practical skills in our future scientists.
- On a personal level, this was an impactful research project that paved the way for many future initiatives in this space, and provided a teaching and learning enhancement platform for further collaboration opportunities also. Aspects described in this innovation have also been extended to other modules.

Student reflections

"I personally found myself learning a lot more (with the reduction in assessment) because I was enjoying the laboratory practicals and not constantly fretting about what I was going to write in the reports."

"I felt like the difference in the quality of my first submission and my last submission was huge because of it (feedback)."

"I think it (self-assessment) forced students into actually thinking about the quality of the work that's being submitted one last time and even encourages students to improve as they're judging their own work."

The incremental marking approach "encourages you to do your best, keep improving" through developing a "new mind-set", when subsequent reports are worth more, you "work harder" and "right your wrongs" through uptake of feedback.

Reference

Bree, R.T., Dunne, K., Brereton, B., Gallagher, G., & Dallat, J. (2014). [Engaging learning and addressing over-assessment in the Science laboratory: solving a pervasive problem](#). The All Ireland Journal of Teaching and Learning in Higher Education (AISHE-J), 6(3).

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