Case study 5

Layers and loops: scaffolding feedback opportunities in first-year biology

To watch Senior Tutor Tova Crossman provide an overview of the feedback
in this subject, visit https://youtu.be/BXqUHKoQwA4.

Summary

This case highlights the work undertaken to design and deliver feedback information in a large-scale, first-year Biology subject. A teaching team of twenty educators, led by a Senior Tutor, utilised a range of sustainable and effective feedback practices throughout the semester. The feedback design included: weekly online quizzes; in-class clicker quizzes; end-of-class tests; and a formal lab report.

Key features of this case study include:
- Consistent leadership from a Senior Tutor, which ensured considered development of the subject's assessment and feedback design, with changes enacted quickly when needed;
- A stable teaching team for this subject, which allowed practices, values and expectations in relation to feedback provision to be refined over time; and
- Regular, scheduled interactions between the teaching team to plan and discuss teaching sessions and feedback processes.

Keywords

automated feedback; first year; labour model; large scale; teaching teams

The case

This subject is a core first-year Biology subject taken by a large cohort of learners from a range of backgrounds. The majority of learners who enrol in the subject are new to higher education, and their previous knowledge of biology ranges from science subjects at Year 10 or VCE level to a small number of learners in their second or third year of a double degree. The feedback design in this subject has been shaped by the need to support learners in their transition to university study, while catering to a range of learner understandings.

The assessment and feedback design for the subject has been led by the Senior Tutor in the School of Biological Sciences, who also oversees a team of twenty educators for the subject. Feedback in the subject is designed to meet first-year learners' needs for specific, individualised feedback information in the first four weeks of the semester. The teaching team are conscious that they are providing feedback which not only addresses subject content knowledge, but also assists learners to form positive learning processes as they transition to higher education. This is achieved by 'front-loading' tasks to provide multiple low-risk opportunities for learners to receive feedback comments. Learners from this subject commented that, while "getting used to the whole uni process and how everything works" can be challenging, this subject was "actually very structured … you knew what you had to do and it wasn't scattered all over the place like some of my other [subjects] were".

> ## Context
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> **Discipline**   Biology
> **Faculty**   Science
> **Institution**   Monash University
> **Level**   First year
> **Class size**   Overall enrolment of 1400 learners in Semester 1 and 1100 learners in Semester 2. Laboratory classes are conducted with groups of 16 learners to one educator
> **Contact hours**
>   Each week, learners attend a one-hour lecture and alternate between a three-hour practical class and online activities
> **Assessment types**
> - Practical assessment and online activities worth 50%
>   o Weekly online quizzes
>   o In-class clicker quizzes
>   o End of class tests
>   o Formal lab report
>   o Group presentation
> - 2.5 hour end-of-semester multiple choice examination worth 50%

Learners participate in six fortnightly laboratory sessions, which offer learners a number of opportunities to access feedback information, and weekly online quizzes are also used to assess learners' content knowledge. Seven optional face-to-face feedback sessions with the Senior Tutor are also available following each laboratory session. An online multiple choice quiz of 100 questions, which mirrors the format of the subject's final exam, is also made available to learners in the lead-up to the exam.

For each of the laboratory sessions during the semester, learners are provided with three different modes of feedback: in-class clickers; face-to-face conversations with educators; and an end-of-class short answer test. At the beginning of each class, learners use clickers to complete a four-question quiz which assesses their knowledge of material set as pre-reading. This quiz is worth a small amount of marks, and is designed to ensure that learners "come into class having done something, because if you come into class without doing anything you are going to waste so much time", as the Senior Tutor explains.

Following the clicker quiz, learners conduct, and receive feedback information on, an in-class experiment. During the laboratory sessions, around six educators are present in the room to observe, assist and provide feedback to learners. The educators offer face-to-face comments to

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learners as they work, with an experienced educator explaining that "a lot of the time it really comes down to the [educator] just observing and analysing the situation, and figuring out what it is in that moment that the learner particularly needs". The feedback information during the laboratory sessions is carefully structured to provide learners with assistance to arrive at their solutions. An experienced educator notes, "we help them explore it, but [try] not to give them direct answers". The laboratory sessions also form a learning opportunity for less experienced educators. The Senior Tutor ensures that less experienced educators are placed with an experienced educator, to allow them to observe, learn from and model in-class behaviours. As one of these experienced educators observes, "we are trying to teach as a team, not as individuals in the one space".

After completing their experiment, learners complete a written short-answer test to gauge what they've understood from the in-class activity. The educators then mark and provide a small number of feedback comments on each short-answer test, with the tests returned to learners by the end of the fortnightly laboratory rotation. The marking and feedback for the short-answer test is carefully overseen by the subject's Senior Tutor, who provides educators with an "extremely prescriptive" marking guide. As the Senior Tutor explains, "I break down every mark to a half-mark, and I indicate exactly what sort of comment is acceptable, and [which] are not". The marking guide ensures feedback is of a consistent standard across the unit, which is particularly important when working with the large number of learners and educators involved in this subject.

Following each laboratory session, learners are also offered the opportunity to participate in an optional face-to-face feedback session with the subject's Senior Tutor. In these sessions, learners are invited to bring their completed short-answer test and work through their answers alongside the Senior Tutor, giving learners the opportunity to ask questions and clarify points of uncertainty. In addition, the Senior Tutor provides learners with feedback and advice on appropriate learning strategies. The sessions also offer first-year learners an opportunity to engage in conversations around their transition to university and to the subject, and demand for these feedback sessions is higher in the four-week transition period at the beginning of the semester. In order to manage demand, the Senior Tutor offers seven of these sessions per fortnightly laboratory rotation.
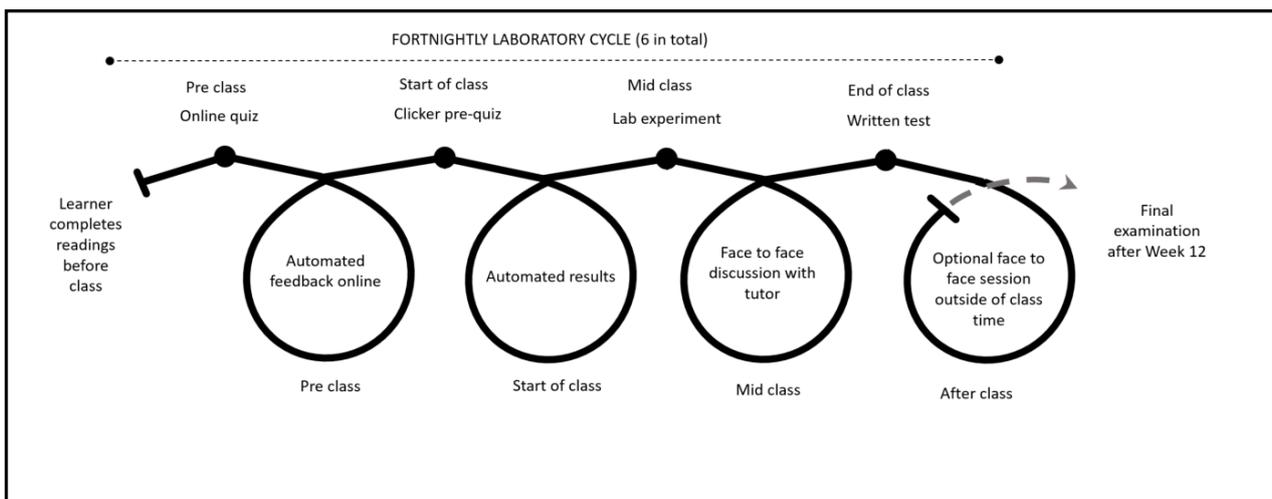
Linked assessment and feedback loops used in fortnightly laboratory sessions

In the lead up to the final exam, learners are provided with a "super quiz" rather than past exam papers. The super quiz is provided online, through the learning management system, and each quiz is automatically generated from a set of 100 multiple choice questions which mirror the format of the subject's final exam. Each time learners attempt the quiz, they are provided with a different set of questions; this allows learners to undertake the super quiz as many times as they wish. If learners are having difficulty with a question, they are encouraged to post the question in an online discussion forum; the Senior Tutor observes that "most of the time other learners will answer the problem before I need to do anything, so it's a really effective way to get learners engaged with problem-solving in that way".

Why it worked

The design

In this case, feedback was considered to be successful particularly because of the following key elements:

- **Learners are provided with multiple opportunities to gain feedback on their performance, in a range of modalities:** as the Senior Tutor comments, "we reach our learners through a number of mediums", including in-class feedback information, feedback comments on short-answer tests, and optional face-to-face feedback sessions with the Senior Tutor. These varied sources of feedback provide first-year learners with the opportunity to receive feedback information early in the semester, for tasks that contribute a low number of marks to the overall subject grade. This allows learners the chance to correct any errors on subsequent, higher-value tasks. Learners also commented on the variety and the level of detailed feedback comments which these different sources provide.
- **Educators provide learners with instant feedback as they work:** while in-class feedback information during the laboratory sessions is relatively informal, the educators we spoke to indicate that this feedback is a powerful learning opportunity for learners. The relatively high ratio of learners and educators during the laboratory sessions (one educator to every sixteen learners) allows staff to intervene and instantly correct learner misconceptions as they occur. However, educators are careful to ensure that these learning opportunities are not didactic, instead encouraging learners to explore alternative methods and find their own solutions. As an educator notes, "it's very important that you don't step in too early and basically take everything away from them … [so that they] actually haven't experienced it or learnt it from their own discovery".
- **Feedback practices are consistent across the teaching subject:** the subject's Senior Tutor has a series of measures in place to ensure consistency across her team of twenty educators. All educators are provided with a detailed marking guide, and the Senior Tutor clearly articulates the standard of comments expected on marked work. The teaching team meets fortnightly to discuss upcoming content and the associated feedback opportunities. In addition, less experienced educators are paired with more experienced educators during laboratory sessions; this allows less experienced educators to learn through observation and modelling, and also ensures more senior educators can monitor and comment on the feedback provided by less experienced educators.
- **Learners are provided with assessment opportunities early in the semester:** in contrast to many subjects, which only provide feedback to learners after their first substantive assessment task is submitted – often not until midway through a semester – the feedback design of this subject ensures learners are exposed to frequent opportunities to gain feedback information, on their performance and content knowledge, from the beginning of the semester. This early feedback information is particularly important for the many first-year learners in the subject, as it offers them a chance to gauge the effectiveness of their study techniques early in the semester. The teaching staff we spoke to acknowledge that this approach can be "more stressful for [learners] … and it's something they have to adjust to", but report that "at the end, when they come to sit their exam … they go in with a better understanding of where they're at".

To watch Senior Tutor Tova Crossman explain what worked in this
subject and why, visit https://youtu.be/kM4NZwotpVY

Enablers

Some of the enabling factors for this feedback design included:

- **Diversification of leadership roles:** in contrast to common leadership models in which an academic staff member directs the design of a subject, this case highlights an alternative model whereby the subject's Senior Tutor has been afforded a range of opportunities to design and modify the assessment and feedback of the subject. While the educator-in-charge, and the teaching coordinator at a School level, have maintained control of lecture content, the diversification of leadership roles in this subject has allowed the Senior Tutor to quickly implement changes "in reaction to what's working and what's not, which otherwise might take a full year to be instituted". This capacity to respond in such an agile manner has significantly benefited this subject, by allowing the learner voice to be heard and acted on in a timely manner.

- **Teaching staff meet regularly to promote shared understandings of the subject:** the subject's Senior Tutor, and the majority of the educators, teach only this subject each semester. This enables the teaching team to focus significant attention on the design and provision of feedback in the laboratory sessions and online discussion forums, and also allows the Senior Tutor to offer seven optional feedback sessions each laboratory rotation. Significantly, this focused approach helps the teaching team to develop a unified vision for, and ownership of, the subject. Educators are also able to meet and interact more regularly, providing opportunities for the Senior Tutor to ensure that all staff have a common understanding of expected feedback standards. This ensures that feedback provision becomes a shared practice amongst the teaching team, and informally moderates the feedback being provided to learners.

- **Automated quizzes provides learners with personalised feedback while freeing staff time:** the software used to provide the super-quizzes in this subject designs customised follow-up quizzes for each learner, based on questions they have previously answered incorrectly. This provides learners with a form of personalised, instantaneous feedback which is not dependent on the teaching team marking and returning quizzes. The teaching team are therefore able to provide more detailed and personalised feedback information for other written tasks, and engage in extended face-to-face conversations to clarify any learner misconceptions.

Challenges

Some of the challenges for this feedback design included:

- **Balancing feedback aspirations with time pressures may require compromise:** the teaching team for this subject recognise that providing learners with open-ended questions enables them to better represent their developing content knowledge; however, the allocated marking time for the subject would not be sufficient to provide feedback on short-answer tests, laboratory reports and a final exam. As a result, the decision was made to use multiple choice questions for the majority of the subject's assessment, as the marking of this assessment mode is a better fit for the School's labour model. Similarly, the teaching team feels they would be able to provide learners with more detailed feedback if they were able to work with learners in weekly laboratory sessions. However, the available infrastructure and timetabling constraints only allow for practical classes to run fortnightly.
- **Subject leadership focused solely on one subject may become isolated from current practice:** an educator-in-charge and a teaching team committed solely to running one subject may be at risk of growing isolated from other subjects within the School, and from pressures that shape feedback designs and practices across the Faculty. This siloed approach may lead to learning objectives and feedback practices that are not in concert with other subjects that learners are engaged in, which could potentially result in learners receiving inconsistent and confusing information.
- **Ensuring quality written and verbal feedback across a large teaching team requires a focused, coordinated approach:** consistent feedback information across this subject's team of twenty educators is achieved through the leadership of the Senior Tutor. However, current labour models in many tertiary settings do not provide the flexibility or resources for this approach.

What the literature says

Learners need to be "inducted into the assessment practices and cultures of higher education" (Boud et al., 2010, p.2). In this case, learners were given the opportunity to become independent learners through the development of skills required for learning. Boud et al. (2010, p. 2) emphasise that "early engagement in manageable assessed tasks to build confidence, and the expectation that learning requires not only an investment of effort but also the taking of initiative", are critical to learners attaining the skills needed for independent learning. The feedback loops provided in this case illustrate how this subject engages learners in manageable tasks early in the semester, and provides opportunities for discussions with the teaching team during laboratory sessions or follow-up drop-in sessions. These feedback processes allow learners to take initiative as part of their own learning.

Large teaching teams, such as this subject's team of twenty educators, need careful management. Klenowski and Elwood (2002) and Bloxham (2009, p. 212) highlight that "common standards [in relation to feedback comments] do become established amongst cohesive staff teams, and this is certainly a view frequently declared by tutors". The importance of a consistent, common standard in relation to the written and verbal feedback comments provided by the twenty educators in this subject drove the Senior Tutor's design of meetings and resources provided for each fortnightly cycle of laboratories.

This case study highlights the potential value of automated digital applications which can provide system-facilitated instant feedback; in this subject, this automated feedback took the form of tailored feedback comments on incorrectly-answered online quiz questions. Drawing on earlier work by others such as Jordan and Mitchell (2009), Wong and Yang's (2017) research lends support to the value of providing learners with the opportunity to improve their future performance

by completing automatically generated quizzes, built into a learning management system. Such online quiz systems also allow learners to manage their own learning, an important component of developing independent learning, by taking the quizzes as many (or as few) times as they like.

Moving forwards

Advice for educators

The participants in this case offered several suggestions for educators wishing to trial the feedback design:

- **Feedback information in first-year subjects should pay attention to content knowledge, as well as developing skills to study in higher education contexts:** the practices of educators in this subject provided learners with the opportunity to receive feedback comments on both their content knowledge and their approach to study. As many learners in the subject were in their first semester in a higher education setting, this developmental feedback plays an important role in supporting learner transitions to higher education. Learners commented on the benefit of this approach and its impact on their content knowledge and broader study skills.
- **Provide a range of feedback opportunities for learners:** the feedback design in this case was dependent on a variety of feedback modalities, including face-to-face discussions, clicker questions, written feedback on tests, and online quizzes. The variety of feedback information allowed learners entering a tertiary context to access information in different ways, thereby maximising opportunities for important information to be understood and acted upon.
- **Pair less experienced educators with more experienced educators, so that feedback provision can be modelled and moderated:** ensuring that less experienced educators provide in-class feedback alongside more experienced educators allows the less experienced educators to observe and model the more experienced educators' feedback behaviours. It also allows the more experienced educators to monitor and informally moderate the less experienced educators' feedback processes and content, which supports the provision of consistent feedback to all learners across a large subject.

Advice for institutions

This case offers several useful insights for leaders within institutions wishing to support similar feedback designs:

- **Provide opportunities to develop a stable teaching team:** the stability of the teaching team in this subject allowed for the iterative development of feedback processes over a number of years. In addition, it allowed practices, values and expectations in relation to feedback provision to be refined over time.
- **Consider limitations of physical infrastructure on feedback provision:** in this case, laboratory classes were run over a two-week cycle – a direct result of the limited laboratory infrastructure available. The teaching team felt that they would be able to provide learners with more detailed feedback were they able to work with them in the laboratory setting each week.
- **Explore different labour models to distribute leadership in large subjects:** unlike many units at the University, the day-to-day leadership of this subject was not the responsibility of a tenured, often senior, academic staff member. This case instead highlights the effectiveness of an alternative labour model, which allowed a Senior Tutor to be employed to focus on the development of effective teaching teams and feedback provision in this large subject. Senior academic staff remained involved in leading the subject, but provided direct input on the content to be taught, along with connections to other subjects in the School and Faculty, rather than designing and directing feedback processes.

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