AUSTRALIAN SOCIETY FOR BIOCHEMISTRY AND MOLECULAR BIOLOGY

2021 Education Symposium

SHARING PRACTICE:

A Focus on Assessment and Academic Integrity

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Book of Abstracts

Keynote address #1

Cheating and online learning.

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COVID-19 triggered a rapid international shift toward online assessment, which has been accompanied by concerns about student cheating. If we aren't physically with students, how can we be sure they are completing tasks in the circumstances we require - and how can we verify their identity? Add into the mix the range of new technology tools that are being used to cheat and unprecedented resource constraints, and it seems that assessment has become much more challenging over pandemic.

This presentation explores what educators are doing to detect and deter cheating in online assessment. It argues that addressing cheating will require an uneasy balance between positive 'academic integrity' (1) and adversarial 'assessment security' (2) approaches. Examples are provided from a range of disciplines, connected to the research into their effectiveness at addressing cheating.

References

[1]Fishman T. *The fundamental values of academic integrity*. 2nd edition: International Center for Academic Integrity, Clemson University; 2014.

[2]Dawson P. *Defending assessment security in a digital world: preventing e-cheating and supporting academic integrity in higher education*. Abingdon, Oxon: Routledge; 2021.

Keynote address #2

"Shifts in student behaviours during COVID19: Impacts of social interaction on academic integrity"

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Institutional data management of academic integrity cases and types can reveal patterns of both reporting and student academic integrity related behaviour. Previous institutional reporting from 2017-2019 demonstrated that cases of poor academic practice identified in the early years of higher education can be remedied by targeted and structured intervention programs [1].

Results from cases logged during 2020 which were impacted by the switch to remote delivery teaching and local lockdowns revealed some differences in student behaviour when compared to academic misconduct cases from previous years. Of particular note is the reduction observed in cases from first year undergraduate students, and a marked increase in instances of collusion by students in other years. Collusion cases primarily fell into two categories – those influenced by technology and others as a result of students gathering, studying and taking exams in the same location as lockdown restrictions eased.
In trying to determine the reasons for the reduction, initial investigations indicate that it was a consequence of first year students having little opportunity to form and build the new social connections that can influence cheating behaviours. There could also be the influence of shifting teaching to remote formats. What was recognised is that for large cohorts it is difficult to manage large groups of students with varying degrees of poor academic practice in a process that is designed to manage a smaller number of individual cases. As a result of this recognition, our institution is introducing newer and simpler reporting for cases of poor academic practice as a way of addressing behaviour through interventions that have been demonstrated to work.

With students beyond the first year of study there was a marked shift from purchased materials to instances of collusion. This involved the effects of sharing site use such as Chegg [2] in addition to the use of gaming networks to communicate with other students during online assessment tasks. Further collusion cases became evident as lockdown restrictions eased in the Spring session (July-November 2020) where students gathered together in small numbers permitted under the COVID restrictions to undertake study or assessment tasks. This resulted in higher levels of similarity of content, and errors identified through the use of text matching available through services such as Turnitin®.

The COVID-19 pandemic has resulted in changes to teaching but also requires reconsideration of the way we teach and assess work and manage cases of academic misconduct [2]. As educators we also need to reconsider that how we are explaining academic integrity and in particular the influence of social connections on collusion and sharing behaviours in light of the evidence now available on cheating behaviours that have arisen via the global pandemic.

References

[1] Rogerson, A.M. (2019), *"Centralised electronic systems for managing student academic misconduct: Evidence from Australia"*, European Network for Academic Integrity (ENAI), Vilnius, 19-21 June, 2019.

[2] Lancaster, T., Cotarlan, C. (2021) *"Contract cheating by STEM students through a file sharing website: a Covid-19 pandemic perspective".* International Journal for Educational Integrity 17,3, 1-16.

Session 1: 'Achieving Academic Integrity'

Avoid a Collision with Collusion: A Subject-Specific (Cell Biology) Module to Develop First-Year Student Knowledge of Academic Integrity

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Many students commence university lacking knowledge and skills in academic integrity, and this can contribute to them unwittingly engaging in behaviours deemed as dishonest. Academic integrity is important, not just in the university setting but beyond, as students graduate and move into professional fields.

We aimed to improve students' understanding of academic integrity and empower them to make appropriate decisions in situations that could arise during their undergraduate studies. Three sequential online academic integrity modules were presented in a large first-year science subject, LFS100 Cell Biology (n=631). Modules consisted of subject-specific scenarios related to examples of academic dishonesty which linked to assessment, including online quizzes and graphing assignments. Students received feedback on each module before submitting assessment, including links to real world examples. This highlighted the importance of integrity in their future professions. Students also completed an anonymous survey at the end of semester.

Whilst students could clearly identify examples of cheating, fraud and contract cheating, they did not understand what constituted collusion. Students did not recognise collusion when it happened with close and social contacts, including friends, peers and family. Most students felt confident that they could apply their newly acquired knowledge of academic integrity in their future studies and professions.

We recommend subject-specific modules that present contextual scenarios to identify any misconceptions around collusion are embedded into the subject's curriculum prior to submission of assessment. It is important to make explicit to students what is and isn't acceptable collaboration with respect to individual assessment items.

Considerations for Online Proctored and Open-Book Exams – Student and Staff Perspectives.

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The adoption of online exams at most universities has transformed the final exam experience for both students and staff. We will present the range of options available for online exams and the pros and cons for each, including our insights into the use of online proctoring to invigilate both open and closed book exams. We present our experiences from a range of perspectives. Firstly, from a unit of study coordinator managing the exams process for a large second year biochemistry and molecular biology unit (n = 800 students). Secondly, we highlight the key feedback from students before, during and after sitting their online proctored exams. Finally, from a professional staff member supporting the quality assurance and setup of online exams.

Standardised instructions were used for each exam type. However, for proctored exams, many students were concerned about what the AI was detecting, and what materials were permitted for the open book exam. Students were also reminded to prepare and test the compatibility of their computers before the exam, but many still experienced issues in getting started for their first proctored exam, or during exam.

Aside from technical issues related to the proctoring software, most online exams in the faculty ran smoothly. However, there was a substantial academic and professional staff workload behind the scenes to achieve this.

We will conclude by reflecting on these challenges, limitations and successes of online exams as we plan for 2022 and beyond.

What used to be academic misconduct is now authentic work-ready assessment.

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Remember that time in the workplace when you had to answer a series of MCQs while being watched to ensure you didn't look up the answers or ask anyone else for their views? Obviously not; but this is the most common way we assess our students in preparation for the workforce. Arguably, a more authentic method of assessment would not only allow but encourage students to research and collaborate with their peers to arrive at the most appropriate solution. Given that assessment drives behaviour, this would also require reconsideration of our expectations and learning outcomes. This reconsideration was accelerated by the transition to wholly online learning.

Human Physiology is a second-year subject available to BSc students at the University of Melbourne with an average yearly enrolment of ~1000 students. Pre-pandemic, tests and exams were all MCQs, timed, and invigilated. In the transition to online learning, rather than finding ways to prevent students from breaking the rules, we eliminated the rules. The test became short and long answer questions, open collaboration, open resource, open 24 hours. Student submissions had to be in their own words, and they couldn't discuss answers on large public forums. This effectively created a hybrid test/assignment.

Students were collaborating, researching, debating, and even teaching each other. The assessment had turned into a learning experience, and their written answers clearly showed how well they understood the content. While not appropriate for all content, this is a more authentic assessment method and I hope never to return to MCQs.

Session 2: Student Panel

'The Student Perspective'

Eleanor Lawton-Wade[1], Ella Scott[2], Takudzwa Chitambo[3]

Facilitated by Amber Willems-Jones[1] and Tracey Kuit[4]

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Panel discussion by three undergraduate students relating their perspectives on assessment and academic integrity. The students were posed the following series of questions before opening up for general discussion.

1. Do you think that online assessments are equivalent to in-person assessments? And can you describe any specific (online) assessments that were either a good/bad demonstration of your understanding on the associated topic?
2. How do you uphold academic integrity as a student? How do you do this specifically with group work online?
3. Do you have any specific concerns about academic integrity in online assessments and is academic misconduct openly discussed by the student body?
4. What was your experience with proctored exams this year? What feedback would you like to give subject coordinators when they are considering using proctored exams in a unit of study?
5. If you could design an online assessment what would it look like?

Session 3 Concurrent A:

'Agile assessment: enhancing academic skills & academic integrity'

Individualized Online Assessments to Mitigate Cheating

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A potential solution to tackle cheating in online assessments is to individualize them so that every student gets a different assessment task. This means that answers to the assessment will vary from student to student – blindly copying answers from someone else will not yield any mark. In addition, since the solutions are individual, instructors have the ability to detect the source of a copied solution. Similarly, if a student posted their individualized assessment online (for example, at contract-cheating facilitators such as *Chegg*) soliciting answers, instructors can find out who this student is. Moreover, individualization has a positive pedagogy – it encourages students to collaborate on concepts rather than sharing solutions.

Unfortunately, individualized assessments don't scale to large classes. We will demonstrate how automation can help to create scalable individualized assessments and solutions. We automatically create question banks with many hundreds of question variants which can then be uploaded to learning management systems (such as *Moodle* and *Canvas*) and digital assessment platforms (such as *Inspera*). This approach not only scales to large classes but also has the ability to deter and detect cheating.

The approach is based on programmatically specifying fair questions and it can work well for computational biochemistry and computational molecular biology, and has been successfully used to create hundreds of variants of questions in science and engineering subjects ranging from year 1 to year 3. We will demonstrate our online application that enables creating individualized question banks. We will share our experience using this approach in large classes, show how the approach helps us combat cheating, and share our current work on non-programmatic specification of questions.

How to Conduct Group Assessments Effectively in Fully Online Courses.

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With fully online courses assessment design is a priority to avoid academic dishonesty. Online proctoring is not possible or recommended at large scale so there is a need to move away from assessment tasks such as exams and come up with other ways of assessing students' knowledge that is more effective. Due to the asynchronous nature, fully online courses can also make students feel isolated and unmotivated.

Big Fat Myths is a first-year biochemistry based online general education course offered by the Faculty of Science at UNSW with enrolments over 400 students. It is offered to students from all year levels and Faculties and consists of large cohort of international students. To address the issues of academic integrity and to allow students to have interactions with their peers in the course, a group assessment was introduced in 2021. Group-based activities can help students form connections with each other and be a good foundation for fostering ongoing online learning communities. As a group, the students were required to produce a video to evaluate and critique the scientific basis of two popular diets. All the students were required to show their face and speak in the video, and this ensured the work submitted had to be completed by the student themselves.

To help navigate groupwork in an online environment, students were given weekly challenges to complete together. This allowed them to get to know each other before beginning the main project. To understand the effectiveness of the assessment design an optional survey was given to the students. Out of 80 responses, 78% of students agreed that they learned how to work effectively in a group and 83% of students agreed that they felt this was an appropriate assessment to understand the course content. Qualitative feedback indicated that group-based learning can be highly effective as students achieve better results when they master a skill together than individually.

An Individualised Peptide Assignment for Enhanced Learning and Academic Integrity in First-Year Biochemistry.

Christopher Love[1]

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Designing authentic assessment tasks and maintaining academic integrity can be extremely difficult in large first-year classes. An individualised assignment was designed with two aims:

1. To replace an assignment which used textbook resources as these are easily obtained via the internet; and 2. To prevent student's from copying each other's work.

The goal was to design a problem-based assignment personalised to each student without dramatically increasing the workload associated with marking. A peptide assignment was developed for first-year biochemistry with approximately 350 students to addresses competencies and concepts associated peptide structure, titration curves, pH and charge. The assignment was individualised to each student, as they derived their peptide from the first 6 letters of their name that corresponded to amino acid one letter codes. Students were required to draw the structure of their peptide, calculate the charge at different pH values, draw the titration curve of their peptide and calculate the isoelectric point. Although all students have a different peptide, the marking load did not significantly increase as calculations, chemical structures, and graphs, are more easily marked in comparison to written assignments.

Using individualised assessment required students to apply their knowledge and understanding to their own problem. This prevented students from directly copying from each other, promoting their critical thinking skills and improving learning.

Using peer review to support molecular biology student's reflection on employability skill development, on a large scale.

Tracey Kuit[1]

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Every university aims to develop graduates that are highly sought after by industry. Programs of study aim for graduates to develop key employability skills - often called transferable skills or graduate capabilities in higher education - such as communication and teamwork. Employability skills are typically demonstrated to employees through selection criteria, requiring student self-reflection on their skill development alongside evidence to support their claims.

A review of curricula at the University of Wollongong (NSW, Australia), showed that our science undergraduate students have little opportunity to engage in self-reflection. One way to effect change is to encourage students to develop and maintain an e-Portfolio - a collection of digital evidence that validates learning and development through a process of self-reflection. E-portfolios can enhance the meaning of students' work and encourage insight and higher learning, while at the same, providing a framework within which students are able to address future selection criteria for employment.

In this presentation, I will share how a reflective e-Portfolio task was used for students to consider their skills in teamwork and communication as they undertook a semester-long teamwork research project. Importantly, I will share how peer-review was incorporated into the task in a subject of >850 first year molecular biology students; sharing tips and tricks learned along the way. The process of peer-review provided an enhanced reflective experience and promoted skill development in giving and receiving feedback, another key transferable skill.

Session 3 Concurrent B:

'Agile assessment: enhancing academic skills & academic integrity'

Assessment Design as a Pandemic Response: Authenticity, Integrity and Sustainability of On-line Assessment of Biochemistry.

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Authentic assessment in Biochemistry has traditionally centred on formative or low stakes assessments. During the pandemic, high stakes summative assessment was moved on-line without invigilation leading to questions around how to maintain the validity, reliability, and integrity of the assessment process.

In response, staff used new assessment design and explored new tools either within the pre-existing on-line learning management system or other centrally procured assessment platforms. A new authentic protein chemistry/enzyme kinetics assessment task emerged requiring deep critical thinking while applying content to practical data and use of professional data bases. The task was scaffolded such that students directly engaged in process learning during the semester and used multiple streams of evidence and data to construct knowledge. This allowed them to complete a personalised, part-seen, end-of-semester task delivered on-line as part of the final assessment.

After three semesters of using this task, analytics and subsequence analyses have revealed the engagement profiles of students with the scaffolded learning activities, the robustness and validity of the final task and how the assessment design successfully mitigated academic integrity issues. When outcomes for the questions were assessed using Item Analysis software available in Blackboard, average scores and discrimination values revealed that compared with questions examining other content, better discrimination of the level of learning aligned to outcomes was achieved. The final assessment results have also been consistent over the three semesters.

This task is now a central element in the assessment of the subject where it scaffolds student learning via integration of content and its application resulting in an authentic task central for the work of a protein chemist.

On the Fly: A Rubric Balancing the Need for Speed and Provision of Feedback - The Oral Presentation.

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Creating well-constructed assessment rubrics is time consuming, conceptually difficult and an iterative process.[1] We use short (<5 min) oral presentations by students in post-laboratory classes to develop student presentation skills. A rubric is used to assess presentation content and delivery in a second-year undergraduate biochemistry unit (BIOC2001). One drawback of the existing rubric was a lack of performance descriptors, leading to open interpretation between assessors and marking variation. Further, this rubric did not provide students concrete information on how to achieve the highest level of performance, or feedback on performance against assessed criteria.

We reconstructed a rubric to be a useful measure and support student learning.[1] The rubric refocused on learning outcomes, i.e., key skills in delivery, audience engagement, organisation, and content; designed to feedforward summative judgements about student work via clear criteria and carefully constructed descriptions at each achievement level;[2] along with providing feedback via the learning management website. Balancing learner-centred approach with functionality, descriptions were stripped back, simplified to improve interpretation and distinction of achievement so enhancing marking consistency; mark distribution of 2021 cohort of 68 students was less skewed than the 2019 cohort of 114 students, but median scores were not statistically significant. The design employed enabled easy to use 'on the fly', optimising academic time and minimising marking.

(1) Ragupathi, K. & Lee, *A. Beyond Fairness and Consistency in Grading: The Role of Rubrics in Higher Education*. in Diversity and Inclusion in Global Higher Education (eds. Sanger, C. & Gleason, N.) 73–95.

(2) Jonsson, A. *Facilitating productive use of feedback in Higher Education*. Active Learning in Higher Education **14**, 63–76 (2012).

Can the Problems of Online Practicals be Overcome? Using Software to Build Student Troubleshooting and Interpretation Skills.

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The new normal for university teaching presents several novel challenges in terms of both the delivery and assessment of classes. In Sydney we have experienced several lockdowns and period of tightened restrictions throughout the COVID19 pandemic, and there is an ongoing need to deliver practical experience and assessments to students studying remotely. At The University of Sydney, for our second-year subjects of 'Drug Design and Discovery' and 'Biochemistry and Molecular Biology' we made use of Lab Archives as the platform for managing student notebooks and delivering assessments.

Typically, practical classes for remote students involve instructional videos and manually generated datasets for student analysis and interpretation. These datasets are often idealised with expected experimental outcomes and matching what students see in textbooks and lecture slides. This limits the opportunity for experimental troubleshooting, problem solving, discussion of underlying concepts, critical evaluation and understanding. The Lab Archives platform allows course coordinators to draw on thousands of past student notebooks, complete with real datasets gathered by students in actual experiments by previous cohorts which can be assigned to remote students for their lab reports and assessment tasks. Lab Archives also enables demonstrators to provide real time feedback and interactions with students, further improving the remote learning experience. Course coordinators can monitor these exchanges to resolve any issues and to standardise marking.

Improving Academic Skills & Academic Achievement in a Diverse Student Cohort.

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The development of communication skills into an assessment of a second-year genetics unit with approximately 80 students at Edith Cowan University was achieved by taking an assessment online using the Cadmus platform. All students performed the same laboratory activities over several weeks then wrote a scientific report in the Cadmus platform. The students have three such reports over the course of the semester, the marks are scaffolded with each being worth more allowing for a more rounded learning intense environment.

The change in platform and scaffolding resulted in 73 of 75 students improving their overall laboratory grades (combined report marks before Cadmus ~62% after Cadmus ~75%), worth 30% overall. When surveys were conducted 78% of the students liked the format of the reports, 95% liked the educator feedback, 81% of students rated their experience using Cadmus for scientific reports as good to excellent and 72% of students would like to use Cadmus in other assessments.

The Cadmus platform and scaffolding are an enormous benefit for embedding academic skills into assessments. It is particularly relevant for students with English as a second language or/and a constant problem with plagiarism. Using the platform gives targeted support to students to develop their communication skills in a discipline-specific context. This is particularly important where student entry skills are highly variable, as each student receives support at their point of need.