

EFFECTIVE TEACHING IS INSPIRING, MOTIVATING AND RESEARCH INFORMED

THIS EXEMPLAR IS DESIGNED BY THE GOOD PRACTICE PROJECT WITH DR PAUL NELSON, A SENIOR LECTURER IN THE FACULTY OF SCIENCE AND ENGINEERING

JCU's Learning, Teaching and Assessment Policy contains nine core principles informing our learning and teaching practices. The sixth core principle states that 'effective teaching is inspiring, motivating and research informed.' The focus of this exemplar is on the second year Applied Soil Science program wherein the lecturer's approach to the teaching and learning process values a focus on discovery and successful student engagement to encourage deep learning. This exemplar is about engaging university learners in meaningful ways to enrich their intellectual lives. Evidence of student engagement in this program is exemplary, showing a student satisfaction score of 94% and a response rate of 70% (SFS EA2007, 2011).

Dr Paul Nelson is a Senior Lecturer with the School of Earth and Environmental Sciences. Earlier this year, Dr Nelson accepted the JCU Citation Award for Outstanding Contributions to Student Learning over a sustained period of time. Dr Nelson outlines his approach to learning and teaching in his Faculty Citation 'Enthusing students about soil science through a focus on discovery, critical environmental issues and the application of contemporary teaching and learning principles.' Dr Nelson employs a range of teaching strategies to engage and motivate students to pursue independent inquiry; these include in-lecture discussions with a focus on enhancing critical thinking, and peer-learning. The senior lecturer explains that 'it is important to maintain a productive level of discussion and debate around environmental issues, and a scientific approach is invaluable for informing debates and helping us move forward in a way that optimises benefits to people and the environment.' For this reason, an enquiring approach in the learning and teaching about soil science is considered best practice.

The applied soil science program focuses on soil properties and processes, and engages private and government sector environmental professionals in the teaching to foster students' intellectual curiosity, involvement and analytic skills development. The program values social and academic inclusivity and is thus purposefully interactive, recognising that students have diverse backgrounds and aspirations, and that most students enrolled in the program have special interest in the environmental challenges facing mankind. Teaching is delivered internally across two campuses at the same time - although lectures are mostly delivered from Cairns with a video-conference link to Townsville. In addition to the weekly theory based 2-hr lecture, students participate in a 3-hr practical session wherein regular attendance is required to pass the program.

The program is research-led and designed to challenge students to deep learning processes as a way to promote effective student learning experiences. So in lectures, Dr Nelson draws on examples from his own research in Papua New Guinea, Indonesia and Queensland, including Indigenous perspectives on the use of soil, as well as examples from other tropical regions to inform in-lecture discussions. Given that this approach is combined with an emphasis on current research questions, learning is driven by a process of enquiry.

Practical work is carried out in teams and provides an opportunity for students to learn valuable skills and apply the knowledge that they have gained to practical issues, with locally relevant examples. 'The student learning experience is enriched, Dr Nelson claims – 'by the wonderful natural laboratory surrounding us.' Since the program is hands-on and interactive, stringent workplace health and safety rules are in place to ensure the student learning environment is as safe as it can possibly be. [\[VIEW Citation\]](#) [\[View Q & A\]](#)

FOR MORE: JCU Learning, Teaching and Assessment Policy

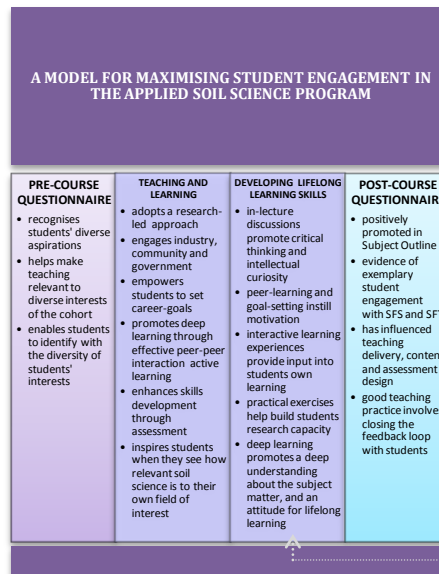


Diagram 1: The Applied Soil Science program maximises student engagement as a way to empower students to more meaningful learning experiences.

THE PRE-COURSE QUESTIONNAIRE

The Soil Science Curriculum is taught into a variety of degrees at JCU. A pre-course questionnaire helps facilitate delivering the course with as much relevance to the student cohort as possible. Students access the questionnaire on LearnJCU when they access the subject. Three questions are presented and students are encouraged to participate: Previous to starting this degree, have you worked or studied in a field related to land resource science and management? If yes, for how long? What is the major field(s) of your degree? What are you thinking of doing when you finish the degree? Student's answers are collated and the qualitative information is shared in the first lecture. This helps students identify with the diversity of students' interests. Dr Nelson uses this approach to help make things relevant to the diverse interests of each cohort of students he teaches, and this 'tends to demonstrate to students that the lecturer values their individual backgrounds and aspirations.'

TEACHING AND LEARNING

Dr Paul Nelson explains that the applied soil science program is interdisciplinary and value driven. It is also applicable to many fields of interests; this the hook by which students become engaged. To ensure learning is most effective a diverse range of tools and resources are used in the delivery of teaching and learning. Teaching strategies and practices are designed to engage students in authentic problems and active learning experiences with peers and environmental professionals. This inspires students to pursue independent inquiry beyond the classroom and take responsibility for their own learning. For example, students contact with professionals helps deliver learning and helps students to set career goals that are meaningful, thus motivating students to excel in their studies.

Within lectures, students' understanding about soil and related topics is enhanced and reaffirmed through in-lecture discussions which, by the very nature of the subject, are complex and require advanced critical thinking and reasoning skills. The purpose of in-lecture discussions enables students to exercise peer learning, develop critical thinking skills and deep learning, and raise the motivation to pursue independent inquiry. Discussions are prompted by a carefully prepared question or proposition directed to the whole class. Students are given time to collect their thoughts, and

the lecturer then elicits responses from students at random. This tends to develop a large-group discussion within the lecture session involving peer-peer and lecturer-student interaction, benefiting all students as they reflect on and synthesise new ideas and information, enhancing their curiosity and stimulating enquiry. In-lecture discussions also raise awareness of issues which are sometimes controversial, helping to maintain students' attention and provide input into their own learning and sense of purpose.

Fieldwork provides students with an opportunity to ask questions to professionals currently at work in the community and this informs students' independent enquiry. The authentic experience of fieldwork promotes a sense of belonging within the professional community that students aspire to join, and inspires goal-setting. The practical exercises help build students' research capacity by giving them practice in formulating hypotheses, collecting data to test the hypotheses and interpreting the results. This is done in the field and in the laboratory, using a range of tools for measuring and analysing; tools that are commonly used in soil-related research.

Assessment items are designed to enhance deep learning, skills development and students' capacity for lifelong learning. Practical reports and academic essays promote independent thought and it is expected that reports demonstrate students' ability to accurately describe and interpret their observations. For example, students measure hydraulic properties, strength, fertility and biological activity of local soils that have been subjected to different management practices.

Dr Nelson empowers students to consider future areas of discovery by highlighting the unknown – for example, there are millions of species yet to be discovered in the soil. In Peer-review of Teaching, a colleague made this formal observation 'the fact that he [the lecturer] is prepared to discuss a diverse range of social and cultural issues enhances their [students] learning experience.'

THE POST-COURSE QUESTIONNAIRE

The importance of giving and receiving constructive feedback is emphasised throughout this program, enhancing students' capacity to engage in self-directed learning, observation and reflection. Dr Nelson attributes students' increasing satisfaction and retention in the program to a number of changes he has made in his teaching practice over time, largely in response to Student Feedback about Subject (SFS) and Student Feedback about Teaching (SFT).

The Subject Outline promotes special recognition of the importance of student feedback which is reinforced online with the inclusion of a post-course questionnaire with a link to SFS. Instructions for providing student feedback are explicit as is the motivation for doing so noting that 'EES staff value and appreciate student feedback as a source of evidence about the quality of our teaching and courses so you are strongly encouraged to provide considered feedback for each of your subjects.'

SFS has influenced the way Dr Nelson teaches. For example, he has changed the form and availability of learning material online and the nature of assessment in response to student comments and ratings. In addition, lectures are recorded and the podcast for each lecture is available to facilitate understanding and to aid in revision or prepare for assessments. Another useful thing about feedback is 'gaining a sense of how interesting and relevant the students find the content.' The next student cohort is informed about any changes that are made to enhance the quality of the program and students learning experiences - as a result of what the previous student cohort had said in SFS and SFT.

For further information about any aspect of this exemplar, please email Dr Paul Nelson at paul.nelson@jcu.edu.au