

EFFECTIVE TEACHING IS INSPIRING, MOTIVATING AND RESEARCH INFORMED

THIS EXEMPLAR IS DESIGNED BY THE GOOD PRACTICE PROJECT WITH PROFESSOR JIM BURNELL, A LECTURER IN THE FACULTY OF MEDICINE, HEALTH AND MOLECULAR SCIENCES

JCU's Learning, Teaching and Assessment Policy contains nine Core Principles, the fourth and sixth of which respectively, state that 'courses and subjects are designed with clear learning outcomes and coherent structure' and 'that effective teaching is inspiring, motivating and research informed'. The focus of this exemplar is on the *Molecules to Cells* module undertaken by first year medicine students within the *Introduction to Integrated Medical Studies* subject. More specifically, it is about the exemplary teaching practices of Professor Jim Burnell who is driven by a desire to help students achieve their academic and life potential. Evidence of student engagement with 'The Text' a textbook written by Professor Jim Burnell to aid in the teaching delivery of first year medical students' learning about *Molecules to Cells* is exemplary. This is evidenced by student feedback scores of 98.2% for subject satisfaction, 93.3% for good teaching and 92.7% for clear goals and standards with a response rate of 30% (SFS MD1010, 2012). Professor Jim Burnell's excellence in teaching and support of learning is further evidenced within the following student comments 'Jim easily engages my interest'; 'The lecturer was fantastic and went out of his way to ensure that all of the content was understood. In addition to this the amount of content taught was appropriate for the timeframe of the lectures and the GLS'; 'The Text' provides a thorough explanation of the topics covered and makes it much easier to gauge what depth of knowledge is required in this subject'; and 'The subject coordinator was selfless and committed to the students. He clearly discerned what was required of us and ensured he taught this in a manner that was easily understood and related to the clinical aspects of medicine'.

Jim Burnell is Professor of Biochemistry and Molecular Biology within the Discipline of Biochemistry and Molecular Biology in the School of Pharmacy and Molecular Sciences. Jim is heavily involved in teaching biochemistry and molecular biology across a broad range of degree programs. He co-ordinates and presents almost all the course material in *Molecules to Cells*, a first year module in Medicine which is designed to, in an integrated fashion using themes including puberty, menopause and death as major milestones in the human life cycle - provide the foundation for the development of molecular and cellular processes in the normal human body. Jim also co-ordinates and delivers lectures in *Introductory Biochemistry and Microbiology*, a subject undertaken by first year pharmacy, veterinary science, biomedical science and science students, many of whom come with no formal education in biology. He delivers lectures on metabolic biochemistry to second year biochemistry and pharmacy students in Principles of Biochemistry and makes a significant contribution to the third year Biotechnology course. In 2011 Jim was awarded Australia's Lecturer of the Year by Unijobs.com.au - an achievement that continues to resonate with university students and peers across Australia who nominated Jim as their favourite Lecturer. The award aims to reward the efforts of diligent academic staff that have helped to enrich the lives of students and colleagues. Over 4000 lecturers across Australia were nominated for this award and more than 70 000 votes were cast online.

The Text

An attempt to simplify Molecules to Cells

The structure of the first three years of the medicine program allows for a logical development of knowledge that is relevant to different levels of organisation within an organism - with *Molecules to Cells* covering the most basic level of organisation. Within the *Molecules to Cells* module students are introduced to the molecular structure of compounds that make up living organisms, transport mechanisms employed by cells to take up compounds required for survival, and the metabolic pathways used by living cells to harvest energy from organic compounds. In essence, students see how healthy cells survive and reproduce.

Given his general discontent with prescribed textbooks which can impart too much medical information and not enough biochemistry content, as well as in response to Student Feedback about Teaching (SFT) and Student Feedback about Subjects (SFS), Jim invested four months in writing *The Text*. His intention was to try to improve the standard of teaching and lecture content within the *Molecules to Cells* module. Jim envisioned students understanding metabolic pathways in such a way as to be able to calculate the amount of ATP (adenosine triphosphate) that would be generated when a compound is broken down and how much ATP is required to synthesize a compound - and be able to defend the numbers they calculate. Jim believed this would encourage students to actually use the information they have learnt and apply this knowledge to their understanding of how different metabolic pathways integrate.

The Text draws on ten-plus years of Jim's contributions to *Molecules to Cells* and is designed to supplement the lectures and guided learning sessions and so material covered in each of the chapters does not work in the absence of face-to-face teaching. This textbook is divided into eleven individual chapters which align with the weekly topics to be covered throughout the study period and includes [JB's Metabolic Map](#) as a visual aide to help students conceptualise the learning of biochemical pathways. JB's metabolic map can be dissected into individual pathways covered each week and then reassembled to show how they integrate with each other. At the end of each chapter, additional resources such as links to websites that visual learners in particular find useful including YouTube video's and quizzes are provided.

Medical students have found the best way to use *The Text* is to follow the sequence of study which is synchronised and designed to make the delivery of material relevant and interesting. The sequence of study requires students to read the weekly relevant chapter prior to the Introductory Lecture on a Friday, and then

attend the Introductory Lecture, the Guided Learning Session (GLS) and Synthesis Session relevant to that week. According to Jim this helps better prepare the students to raise questions during lectures and sessions in which the material is covered.

THE ART OF GETTING THROUGH TO STUDENTS ACCORDING TO JIM BURNELL

With teaching experiences that span across more than ten years in Medicine, Jim claims to have learned some lessons which have shaped his [approach to teaching](#) and support of learning, enabling him to teach effectively across large student numbers. Jim was recently invited to share his wisdom with teaching staff at JCU's 2012 First Year Conference and his rich insights were very well received. Recognising that teaching staff have a limited amount of time to deliver lecture material, Jim explains that it is important to make the very most of that time - this can be achieved by doing a number of things including getting to lectures ahead of time to ensure that all teaching equipment is working, the air conditioner is on, and if electronic devices are to be used - that they are connected and operational.

Effective teaching is about 'helping students to help themselves'. One way this is achieved is by providing students with a continuous stream of questions that are directly relevant to material they have covered each week, then making sure that the answers are available to those interested in doing the questions. Jim explains that he occasionally inserts an incorrect answer to ensure that the students are not just memorising the answers without a genuine effort to attempt each question. The students are informed that there may be an incorrect answer included - so students actually compete to identify any incorrect answers and at the same time are consolidating their understanding of the subject material. Jim suggests that one of the most important lessons is never read material directly from notes or from the overhead slides - 'know your subject material'.

The best aspect about the subject according to one student is 'Metabolic pathways. Really awesome how everything just links together. No one would ever have thought that we would actually learn everything on the big metabolic pathway that Jim gave us at the start of the semester. But one by one we took it down and I find that really fun' (SFS, MD1010 2012).

BEST PRACTICE IN TEACHING AND LEARNING

The student bodies are fairly large encompassing around two hundred students in *Molecules to Cells* and nearly three hundred students in *Introductory Biochemistry and Microbiology*. First year medical students come from a diverse range of backgrounds ranging from school leavers to mature age students from within metropolitan or country areas, as well as a cross section of overseas students. Jim takes a very informal lecturing style with these students, encouraging them to interact during all types of teaching exercises. Teaching weeks are organised into a one-hour *Introductory Lecture* (L), a three-hour *Guided Learning Session* (GLS) and a one-hour *Synthesising Session* (SS) totalling five-hours per week face-to-face contact time.

The content theme for each module to be covered and concepts to be covered each week are clearly outlined in the Introductory Lecture. These concepts are developed and described in the Introductory Lecture in addition to a lecture delivered in the first hour of the Guided Learning Session. Students then progress through a series of questions directly related to understanding the weekly concepts during the second two hours of the Guided Learning Session and the students are tested on their understanding of the concepts during the Synthesis Session. The flexibility to work within these teaching sessions facilitates the structured delivery of material to the students.

During the delivery of subject material in lectures, every effort is made to maintain the concentration of the students on the material being delivered. Jim tells us he is a 'chalk and talk person' and so tends to draw the metabolic pathway in the lecture using an overhead projector and coloured markers. Throughout the lecture Jim draws diagrams, offers verbal explanations and inserts text. At the end of the lecture he tidies up the diagrams he has drawn, scans these and uploads these on the same day on LearnJCU. In so doing, students have a figure that they can, three months later, picture what was drawn during a lecture with his and the students' own annotations that directly relate to *The Text*.

Guided Learning Sessions take a variety of forms depending on the content being addressed in a given week and so may include computer activities, workbook activities, class discussions, formative quizzes, lab activities and so on. Students work through a series of problems in their respective Home Groups with the answers to these problems posted on LearnJCU at the end of each session. A few days later during the Synthesis Session, each of the questions and answers are more closely examined. Prac classes provide an ideal opportunity for the lecturer to go around and talk to students individually enabling that one-on-one time with the student. By doing this 'students will recognise that you are genuinely interested in helping them understand the material'.

Synthesis Sessions take a number of forms in a lecture theatre setting and are intended to review and wrap up the topic for the week. Towards the end of each Synthesis Session, the lecturer goes through a series of multi-choice questions that students have not seen. Jim suggests that if there is a general belief that the students know the answers to the questions then the answers are

released on LearnJCU. This not only aids as a checkpoint for the lecturer to ensure that all material that was been planned to be covered was covered, but it helps students in their study revision.

Students are encouraged to revise the material covered each day at the end of each day; to read through their lecture notes and insert diagrams that may have been drawn during the lecture and annotate the diagrams with important information. At the end of each week it is anticipated that students will revise the materials that has been covered during that week. They find it useful to make a weekly summary that can be used to revise the material that they are accumulating weekly and at the end of the semester.

INSPIRING STUDENTS TO SUCCEED

Students are encouraged to interact during all types of teaching exercises and to raise questions as often as they like. Jim explains that the challenge is making sure to answer all students' questions while being mindful not to say 'you are thinking too far ahead - you don't need that'. Also, it is important to ensure that an equal amount of time is devoted to stimulate the interests of 'stronger' students while at the same time educating the 'weaker' students.

Lectures are split into two twenty five minute sessions, with a short break in between providing an opportunity to engage students' in discussion on a topic in the news that relates to the material and getting them to think about how the subject matter relates to everyday life. Jim believes in interweaving social skills development within the learning and teaching experience as this helps to develop within students a capacity to share important information with others.

Students have commented 'the Lecturers depth of knowledge and passion for subject materials made it great. He also has a very animated way of lecturing that encourages participation without forcing it on you'; and 'He was able to make biochemistry understandable and interesting, relating it to aspects of real life and showing us why things that seemed irrelevant were actually relevant to the eventual practice of medicine'.

LearnJCU is used extensively by the students. It is a blank sheet at the beginning of the semester and then together with the students, Jim populates the site with all the material referred to in the semester. Often student's access this material on their Smartphone's that may account for the 150 or more emails he receives overnight. To Jim this demonstrates that students are going over their materials and so he makes a point of responding to the emails first thing in the morning, therein assuring the students of his interest in their studies.

REFINING THE MOLECULES TO CELLS MODULE

In both the *Introductory Biochemistry and Microbiology* and *Principles of Biochemistry* students are encouraged to attend at least one tutorial session per week. Over the last four years Jim has also run an open-ended tutorial session on Friday afternoons that is open to all students. This session has been particularly useful for those students who feel they are struggling or are falling behind everybody else. Important concepts introduced in the week are revisited and students are encouraged to ask questions.

The School of Medicine provides the organisation and weekly structure of materials to be covered on a week to week basis. This enables the lecturer to identify what needs to be put into weekly summaries or important concepts which they want to get across each week. The high level of support provided by the School of Medicine's assessment office, which is not only responsible for putting the exams together but also providing lecturers with feedback on assessment exercises, is commendable. Jim spends a fair amount of time analysing the subject breakdown and charts provided by the assessment office and has used the data to inform his teaching practice and subject materials in successive years. Each year *The Text* is revised to incorporate most of the additional information and annotations, or chapter revisions that came out of the previous year's lectures. The next cohort of commencing students is informed about the changes made to enhance the quality of teaching and lecture content - in part as a result of what the previous student cohort had said in SFS and SFT. Also, the medical program provides opportunities for direct input into decisions made regarding the course and module content and how modules are run, assessed and reviewed.

By keeping things simple and trying to make life easy by providing students with routine within the challenging first year - students are able to comfortably set into a work ethic that supports them in their learning. Jim likes to keep lectures in blocks and can see the value in having all teaching material delivered by one person or as few individuals as possible. This helps students develop a rapport with the lecturer - helping them communicate more confidently and ask relevant questions. Also, the use of templates to present subject materials allows for consistency which students respond well to.

For further information about any aspect of this exemplar please email Professor Jim Burnell at james.burnell@jcu.edu.au

[View Video](#) - Students celebrate their Lecturer of the Year
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