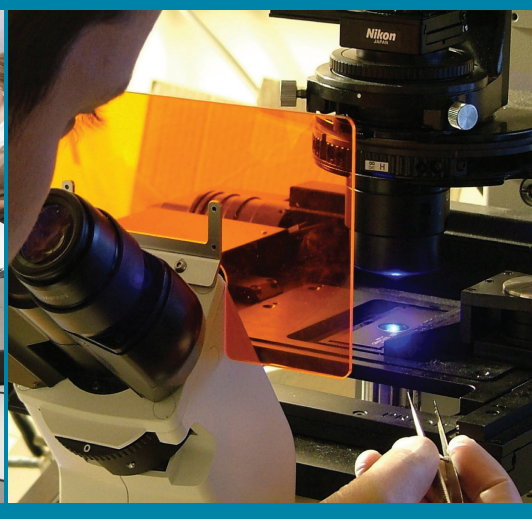
Proceedings of the Effective Learning in the Biosciences Conference

Equipping students for the 21st Century





30 June – 1 July 2011

John McIntyre Conference Centre

Edinburgh, UK

The Higher Education Academy

UK CENTRE FOR bioscience

Preface

Welcome to the UK Centre for Bioscience's first International Conference on Bioscience Learning and Teaching. We are delighted that colleagues from several countries have come to Edinburgh to consider some of the key educational issues and challenges of our times.

We deliberately chose diverse but topical themes for the conference and, as this book of abstracts demonstrates, we received a very positive response from bioscientists both within and outwith the UK. Inspiring First Year Students attracted a great deal of interest and this theme will be led by the first of our keynote speakers, Dr Todd Zakrajsek, who will show us how to overcome apathy and create excitement in the bioscience classroom. The Engaging Students in the Laboratory and Field theme inspired a range of interesting contributions that consider how we can deliver effective practical teaching as we face the double whammy of increasing student numbers and diminishing resources.

This is a period of remarkable change for the biosciences and emerging subjects such as nanobiology and bioinformatics bring with them new opportunities to engage with colleagues from other disciplines. The spirit of collaboration is captured in the theme Biologists Working with Others – Interdisciplinary & Multidisciplinary Learning and Teaching is extended in the final theme that involves Students and Academics Working Together to Improve the Student Learning Experience. The many academics who work very hard to maintain the excellent standard of bioscience teaching and learning deserve reward and recognition and this issue will be considered by our second keynote speaker, Professor Annette Cashmore.

A conference like this one requires considerable effort on the part of a number of individuals and I should like to thank my colleagues in the UK Centre for Bioscience and, in particular, Chris Taylor and Gill Sayers, for all their hard work. Many of you will be aware that the UK Centre for Bioscience will close at the end of 2011. This will therefore be the first and last Bioscience international conference staged by the Centre. However, this gathering demonstrates the real strength and enthusiasm for bioscience education in UK universities and beyond and we hope you will continue to work closely with colleagues in the Higher Education Academy to ensure that events of this nature will continue into the future. Thank you for participating in our conference. We hope you return to your institutions inspired and enthusiastic about the new academic year!

David Adams, June 2011

on behalf of the UK Centre for Bioscience

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Bioscience Teacher of the Year 2011

Supported by the UK Centre for Bioscience and sponsored by Oxford University Press (OUP), the Bioscience Teacher of the Year Award recognises outstanding learning and teaching practice in the biosciences. The scheme rewards lecturers in the UK who:

- Excel at engaging, motivating and inspiring their students
- Go the extra mile to support their students' development as individuals
- Have influenced and enhanced students' achievements and colleagues' practices within and beyond their own institution

The scheme contributes to the Centre's efforts to raise the status of learning and teaching and enhance the professional development and recognition of bioscience staff.

Our 2011 finalists are: **Phil Langton** (University of Bristol), **Richard Milne** (University of Edinburgh), **Jon Scott** (University of Leicester) and **Carol Wakeford** (University of Manchester). We are delighted Phil, Jon and Carol are able to join us to share aspects of their practice during this conference. The abstracts for their contributions can be found on pages 84, 78 and 46, respectively.

Over the last few months, the UK Centre for Bioscience has been working with each finalist to develop a case study surrounding an aspect of his or her teaching. The case studies were based on observation of teaching, interviews with the finalists and student feedback. They immediately follow this page and will be available at *www.bioscience.heacademy.ac.uk/funding/recognition/award.aspx* and *www.oxfordtextbooks.co.uk/bioscienceteacher*. OUP have also visited candidates to film them delivering a teaching session. The individual's application, together with the film, case study and observer's comments were used by the panel of judges when selecting a winner.

The winner will be announced at a presentation ceremony at the Conference Dinner. He/she will receive the *Ed Wood Memorial Prize*: £1,000 to spend as they wish and a year's subscription to an OUP journal. The remaining finalists will each receive a £150 prize.

The *Ed Wood Memorial Prize* is named in honour of Professor Edward J. Wood who established and became the first Director of the Learning and Teaching Support Network for Bioscience, now the UK Centre for Bioscience. Ed dedicated himself to the international promotion of biochemistry and molecular biology education.

The UK Centre for Bioscience and Oxford University Press would like to acknowledge and thank this year's panel members: Annette Cashmore, Chris Butcher, Jonathan Crowe and David Adams.

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Enhancing practical learning using pre practical quizzes

Award Nominee: Phil Langton, University of Bristol
Centre Contact: Julian Park
Subject Area: Physiology

This case study has been developed from data gathered through observations of the teaching component, interviews with the tutor, conversations with students and their evaluations of the activity.

Background

This case study reports on the practice of using pre-practical quizzes (PPQs) to enhance learning in first year physiology (includes medical, veterinary, dental science and physiological science students). In many institutions increased numbers of students, pressure on staff and competing activities has led to a reduction in the number of practical assessments (i.e. lab reports) that students are required to produce which in turn has led to a reduction in the number of opportunities for practice and for formative feedback. There were several related aims for the quizzes, including increasing awareness of experimental design, methodology, data presentation and analysis, numeracy and problem solving, plus familiarity with the practical schedule. As the quizzes were completed in advance of the practical they served to link theory and practice.

Developed and trialled in 2006-7, the PPQs were launched at the University of Bristol for the Physiological Sciences first year Unit. Using Questionmark Perception, PPQs were constructed for nine laboratory practicals (LPs) as well as two quizzes that focussed on general laboratory skills, numeracy and experimental design. Each PPQ contains 12 questions and a text box that students can use to provide feedback to tutors. The quizzes employ a variety of question types, including single correct response, multiple responses, numerical entry, ranking, true/false, matching (drop down) and drag and drop. Some questions test knowledge of the practical schedule, to encourage students to read the schedule in advance; something that the instruction for each quiz recommends. Students are instructed to allow about 40 minutes to complete each quiz, although many undertake additional reading. Students receive an automated email confirming their score on completion of each quiz and those who fail to submit two or more quizzes during their first term are contacted by the head of year to remind them of the mandatory nature of the quizzes. Attempts and marks are automatically recorded on the system and can be accessed by tutors. At the end of the series of PPQs students are provided with an overall feedback document containing a frequency distribution histogram of marks for the year and can access a record of their own marks so that each student can reflect on their performance relative to that of their peers.

In practical terms, PPQs are available for one week, becoming unavailable an hour before each LP. Importantly, students have unlimited access to each PPQ over the course of the week, allowing students time to reflect and learn from the formative feedback and repeat the quizzes as often as they wish (Bull and Stephens, 1999). However, students are repeatedly made aware that the score from their first attempt is the one used to calculate their running average. Up to the 2010-11 session, PPQs were a mandatory component of course work with an overall average of 40% required in order to ‘satisfactorily’ complete the Unit. Our data suggests that this strategy is effective with completion rates for six first and second year Units being consistently above 90% (n >900 students over 5 years). The median score per cohort has been approximately 70% (range 64 to 76%). In 2010-11 the physiological science unit included the PPQs within practical unit summative assessment and they now count for 20% of the Unit mark.

Reasons for introducing this teaching method

PPQs were introduced to encourage students to undertake preparatory work prior to their LPs. The PPQs also encourage students to make clear linkages between the lectures and the related laboratory work. The large class size (i.e. average cohort is 160; range 75 to 260) meant that it was essential that the quizzes were accessed on-line using a system that authenticated each user and recorded details of each attempt. As LPs are key elements of student learning in the unit, *the glue between theory and practice*, students are able to repeat the PPQs several times, thus learning from the feedback as they do so. The PPQs are also made available for revision purposes from Easter to the end of the academic session.

Lecturer perspective

The tutor is passionate about the value of experimental and practical work to the development of the knowledge, skills and attitudes that are characteristic of 'science'. The inspiration for the pre-practical quizzes came in 1998 following an overheard conversation between students before a laboratory practical which suggested they normally did little or no preparation for practical classes. The tutor is very clear about the benefit of preparation. The practical schedules are a bit like a whodunit in the sense that one must to read to the end and reflect to recognize the significance of the steps along the way.

Only recently did the University of Bristol have a system that could host on-line pre-practical quizzes and it took the tutor several years to persuade colleagues that the benefits would outweigh the costs. The tutor is equally clear that the PPQs have been effective, students are more engaged, and had more knowledge of what they are doing and why. This has been evident in the questions that students ask; more commonly about the science and less about the process.

Students' perspective

Students suggested they found the PPQs an extremely useful tool in preparing for their LPs. They commented positively on the tutor's ability to put materials across in more formal lectures and how the quizzes helped to assimilate knowledge that could then be utilized in subsequent practical classes, "*They [quizzes] provide a good way of preparing us for the practicals and give us chance to think about the concepts that we need for the practicals".*

In some cases the quizzes encouraged students to undertake additional reading in preparation for the practical classes, which would probably not ordinarily have taken place. *"They [PPQs] were very relevant to the practical and required reading of the practical in order to obtain more information" and "[quizzes] did encourage me to read the schedule before the experiment when otherwise I wouldn't have, in all honesty".*

Another popular feature was the provision of immediate and constructive feedback on completion of the PPQ as students reported their satisfaction with, *"being given the correct answers at the end" and the "mathematical workings provided". Students appeared to find the experience very useful..., "just the right amount of questions, did not take too much time – no boredom" and "good format and balance of knowledge and calculation problems".*

Issues

When designing the PPQs some colleagues were concerned about the time required to design questions but in many cases most time was spent ensuring that the on-line feedback was high quality and useable. When designing the quizzes student focus groups were used to ensure that the interface and layout of the PPQs were user-friendly. Compliance was a huge concern as it has been shown that educationally sound activities that are 'optional' or peripheral to the unit tend not to be completed by the majority of students. This has lead to the adoption of measures to motivate, *e.g.* contribution towards coursework marks, despite evidence that unsupervised, on-line quizzes can be defrauded (Kibble 2007).

Benefits

Students are better prepared for their practical classes and appear to make better linkages between theory and practice. Anecdotal evidence from teaching staff is that students need less support in practical classes and ask more questions related to the science than to the practical schedule itself. This interpretation has been supported by feedback from students. There has been no significant increase in marks in the end of year examinations although there is a significant positive correlation between the PPQ scores and the end of year marks (Pearson; $p<0.0001$, r 0.52, r^2 0.27), which is consistent with research findings (Dobson, 2008).

Reflections

This is a practice that could easily be adopted by other institutions to optimise learning from laboratory practicals (Langton *et al*, 2009). To date no colleague has challenged the interpretation that PPQs benefit students' engagement and learning although some remain wary of the investment of time required. The time has come to find ways to more effectively share resources like practicals and quizzes; something that initiatives such as Creative Commons[1] and reusable learning objects[2] may solve. Guests can access the PPQs throughout 2011 at via the University of Bristol website[3].

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1 See http://creativecommons.org/
2 See http://www.jisc.ac.uk/whatwedo/programmes/elearningpedagogy/sharingtheload.aspx
3 See http://qmp.bris.ac.uk [select 'login as guest' and use username *1abc* and password *2xyz*].

Engaging students

Award nominee: Richard Milne
Centre contact: Steve Maw
Subject area: Inspiring Lectures, Plant Identification Skills

This case study has been developed from data gathered through observations of the teaching component, interviews with the tutor, and a student focus group.

Background

This case study reports on two aspects: firstly the tutor's approach of maximising the use of visual aids to get his points across and secondly a unique approach he has developed to teach plant identification. He comes from the standpoint that in order to learn students need first to be engaged with the topic. Within science there are a number of foundational topics that are frequently perceived by students to be boring. The lecturer does everything he can to inject energy, excitement and most of all enthusiasm into his teaching and where possible approach topics form a novel perspective, for example he uses evolutionary history to make plant anatomy more engaging. The theme of engagement also comes through with the plant identification materials he has produced. Plant identification is an essential skill for field biologists, yet rarely taught effectively at school or university.

Reasons for introducing this teaching method

Plant identification is often taught via botanical keys. Unfortunately for beginners this approach is slow and leaves the impression that even the identification of a common plant is a slow and painstaking process. Using an approach that starts with the recognition of plant families allows faster identification, builds confidence in the beginner and has the added bonus that botanical keys become less intimidating.

Lecturer perspective

The tutor has a long-standing interest in engaging students in plant sciences. Besides his personal passion for the topic, he also believes that scientists trained in plant sciences will be absolutely vital to meeting future challenges regarding food security and threats to our environment, and that the current unfashionability of the topic makes it all the more essential to promote it among students.

A vital component of plant science teaching is in field skills: how plants interact with their environment, and what they can tell us about it. The cornerstone of such skills is identification, yet effective use of botanical keys requires knowledge and experience: they are not a suitable starting point for beginners. Moreover, it is essential that students go away with the confidence to keep using and improving their identification skills once a taught course has finished. A new means of teaching identification was needed: one that would work within a very short timeframe, and which taught student to identify plants quickly and without the need for a tutor to keep popping up to give hints.

Students' perspective

One thing that came across very strongly from the students is that here we have a lecturer who wants to be there [in contrast to the impression given by some of his colleagues]. He was described as the complete "opposite of dull" and able to not only attract attention but explain complex topics in a structured way. His approach works and key concepts are planted visually in his audience's head. For example, the students in the group will always remember the basics of orchid pollination thanks to much running about and the judicious use of the OHP and a banana!

"He makes you interested in unexpected things" was a typical student comment and this engagement also manifests itself in consistently high lecture attendance. In fact, students not enrolled on the course come to his lectures to learn. It was also clear that the students like their lecturer and because of this work harder — "because you like him you want to impress by doing good work".

Issues

The lecturer has a strong focus on the use of diagrams, pictures and animations to get his point across and this may not appeal to all types of learner. However, these are not the sole components of his teaching style. He harnesses the power of the narrative through careful use of anecdotes and he also adds humour to the mix, although he always ties jokes tightly to specific teaching points that he wants students to remember. Perhaps very few people will have the personality to directly mimic what he does but that is not to say they cannot adopt an enthusiastic approach, make their examples relevant to students and their lives and in doing so reap the benefits.

The plant ID workshop comprises an exercise in sorting families, and a then training in using an innovative and beginner-friendly family finding key. The latter is easily organised, but the former involves a big effort to set up, requiring collection of 60 or more species of wild plants (often in quadruplicate if the class is big), all of which need to be brought into a lab together, and in good condition. For this to work the teacher must know the British flora fairly well, and also be aware of which plants it is OK to pick. The last is less of a problem than it seems, because weedy species are easily accessible in urban areas and most are introduced and/or quite common. One further problem is that the workshop must be run in the summer months (mid May-mid September) to get enough plants, and this is often outside of normal teaching periods, especially in fully semesterised universities.

Benefits

The students benefit via a more enjoyable learning experience and also from having their pre-conceptions challenged — "he makes plants interesting". The subject benefits from having young, talented individuals working in the field the number of students taking Plant Science honours has doubled since the lecturer began teaching in this area. Finally the lecturer benefits from having engaged students and the satisfaction of watching them develop as questioning scientists. For example one student listed "The ability to scrutinize scientific writing with respect to any ulterior motive of the author and understand the political and motivation behind certain published scientific texts" as a key skill gained from the lectures.

Reflections

In the modern world, information is readily available and answers to most questions are just a few clicks away on the Internet. University lecturers need to adapt to this and teach students to navigate this sea of information. That means supplying clarity and showing how everything fits together. The lecturer believes his role should be to first tell students which questions to ask and then train them to formulate even better questions themselves. Equally, he believes all lecturers need to engage and excite students within a chosen topic, telling them why they should want to learn more about it. For him teaching is far more exciting than research because he is contributing to the development of the next generation of scientists, some of whom (if he does his job well!) will surpass his own achievements. Equally, however, field skills seem to be dwindling from one generation to the next, with fewer and fewer scientists able to recognise even the commonest plants, while most amateur botanists are past retirement age. A new generation of scientifically trained field botanists is badly needed and in his unique way the lecturer hopes to help meet that need.

Institutional broker of feedback

Award nominee: Jon Scott
Centre contact: Sheryl Meskin
Subject area: Feedback, Student Engagement, Bioscience

This case study has been developed from observations of the teaching component; data from a university wide survey on how feedback is used by students; interviews with colleagues and the Students' Union; and a tutor interview.

Background

This case study brings together the vision and persuasive abilities of one biology tutor's journey with students engaging with feedback. The tutor has made use of his quiet authority and vast expertise with the student experience and the topic of feedback to become a leader in his School of Biological Sciences (SBS). The approaches used from SBS to improve his students' engagement with feedback were then put into practice incrementally in other schools across the University to ultimately bring about institutional change.

In 2006, National Student Survey (NSS) and internal survey results for SBS were reasons for the tutor to begin this journey. As the student experience is at the heart of everything for him (and not in a superficial way) his approach was to bring about long lasting and far reaching improvements to the student learning experience which were informed by his attendance at a Centre workshop on feedback. His approach involved targeting a problem worth attempting to solve, identifying different approaches, carefully articulating its merit to bring about a positive change, and campaigning the importance of the work in order to enlist others first within his own School and then across the University to inform institutional change. To better his students' experiences whilst in SBS he identified and worked on a number of issues, one mainly involving, but not limited to, concerns about how students interacted with the feedback they received.

Specifically this body of work began with students in his SBS module (BS1020: Study & Communication Skills in the Biosciences) to positively improve his own teaching and student learning. But, the tutor did not stop here. He successfully took the message and lessons learnt to share and inform colleagues across his School. Again, he continued to share these collective practices and outcomes more broadly across the University with other schools, relying on his non-threatening, convincing manner and approach. Eventually an institutional transformation across the University occurred which convincingly improved the student learning experience changing how students use and engage with their own feedback as evidenced from 600 student surveys.

Reasons for introducing this teaching method

Student dissatisfaction with feedback is a common area of concern across higher education, as highlighted by its prominence in NSS data. As such it has been a topic of discussion and served as a theme for numerous higher education projects, programmes and events to improve both internal and NSS feedback. It was at one such event where this tutor began his journey to improve and increase student engagement with feedback. He understood he was working alongside an institution motivated to improve its NSS scores and alongside academic colleagues sometimes ambivalent on the issue but driven by student satisfaction. Over time his colleagues came to appreciate the practices which do impact on how students experience learning and are successful within the institution. While many students had been asked about satisfaction with the feedback received, this tutor sensed his academic counterparts had an important, different voice and a different set of frustrations to contribute to the feedback dilemma.

With this in mind he captured both the students' and the academics' perceptions on the feedback process to improve the appreciation of both parties interactions with feedback (Bevan *et al*. 2008; Scott *et al*. 2009). He shared his experiences first with his own colleagues on ways to improve student engagement with feedback and then more broadly with academic staff across different schools in a series of 'roadshow' sessions. The purpose and intent of the sessions was to share a set of nine 'quick wins' aimed at improving the feedback provided by lecturers e.g. work on the timing of assessments and planned marking time, manage expectation and consistency of practice, and encourage students to reflect on previous feedback. Each school adopted 3-4 of the quick wins, often resulting in less tutor time spent on marking as well as improving the students' experience of feedback. The tutor then successfully trialed, and adopted in his own School, a staff peer observation scheme on the feedback given by lecturers. The scheme was adopted by Senate and implemented university wide with support workshops designed and led by the tutor. The tutor next set out to further improve the student engagement with feedback in a joint project with the Student Union (SU) with an institutional student survey, 'How Do You Use Feedback?'.

Lecturer perspective

The tutor realised early on the benefit in bringing on board individuals and groups across the University who best understood the issues for those involved in the feedback process. Once he had the practices identified and tested within his own school and further afield across the university, he began a broader survey of students. The programme's success was in part due to inclusion of the staff and students working within the SU to develop the campaign, targeted and developed at students by students, solicited examples of student experiences with feedback and evaluated how students do indeed interact with the feedback received. The SU colleagues appreciated the tutor's vision and request for help to improve how students engage with feedback across the whole university as he 'came to them to work together not just to ask for their help.' They felt this approach significantly enhanced the impact of his work.

Students' perspective

In an observed voluntary session of BS1020, approximately 60 students were involved in a very interactive session to discuss student engagement with feedback and examine staff perceptions on the feedback process. Students answered numerous questions using a Personalised Response System (PRS), paired discussions, group discussions and whole class discussions. The majority of students in the class who responded (66%) had participated in the on-going institutional survey on student feedback. Students were asked in class: "how do you use the feedback you receive?", and "how is your engagement with feedback different at university compared to that in the schools setting?" Students suggested the independence required at university led them to become more involved with the feedback they receive. Through a series of such questions students were involved in a lively discussion of their engagement with the feedback process.

At the School level improvements in satisfaction with feedback were seen in NSS returns for Biological Science students (~600) from 58% at the start of the project in 2006 to 74% in the 2010 NSS. Additionally the university wide led campaign, 'How Do You Use Feedback?', was undertaken to inform the level of practice in 2010 by students with the feedback process. Students were asked three questions (responses were on-line & postcards). Over 50% of the 600 responses stated the 5 different types of feedback they received were: written comments on assignments, verbal, coursework marks/grades, and seminar/tutorial/workshop/problem. Students reported the 5 most useful pieces of feedback received were: better structuring of assignments, ways to improve, identification of strengths and weaknesses, advice on referencing, and critical feedback. When asked for one way they have used feedback to improve their learning over 50% of students named: reflecting on feedback (e.g. feedforward), and improved writing skills. In all cases there were variations between different year groups in the responses suggesting an increase in engagement and understanding of feedback as educational experience at university progressed.

Issues

Many staff expressed frustration in finding the time to mark. The tutor had difficulties coming to terms with this. He believed a lecturer knows when the papers/exams will be coming in to be assessed, and it was therefore a matter of setting aside the time just as one does for other aspects of their role. He experienced a lot of resistance with this and felt he might have come across as more patronising than he had intended or wanted.

Results from the perceptions survey work found students wanting positive feedback on well received work because the students weren't certain as to why they had received that mark and, more importantly, would not be able to replicate the work again. This showed the importance of providing both positive feedback, as well as negative, and more constructive feedback. Some students revealed misunderstanding of what defines types of feedback and this will form the basis for a new campaign planned for autumn 2011.

Benefits

This lecturer has very successfully brought together both students and colleagues from across his institution to inform university wide adoption of improvements with assessment and feedback. In doing so he increased student engagement with the feedback received to inform future work, decreased lecturers' time marking, helped all parties better understand the connections between feedback and teaching and its importance, and provided a feedback review process for lecturers. He also enhanced the co-operative relationship with the student body. This project work will continue with the production of guidelines and further training sessions for staff and students.

Reflections

Improvements to student engagement with feedback for an entire institution have come as a result of development of strong working partnerships between one lecturer and all levels of university life (students, SU representatives, Heads of Academic Practice, and Pro-Vice Chancellors). The successes outlined in this case study have come about through a dedication and commitment to students by acting as the voice and champion for undergraduate students across a whole university. The successes of the work were widely shared and disseminated through numerous publications (articles, book chapters, books), presentations (national and international), institutional visits, committee memberships and professional development events. It is important to appreciate and capitalise on the opportunities to learn along a similar journey in order to inform changes of practice big or small. In so doing, one tutor can serve as a model for not only his/her own students but also for his/her colleagues. In this case study, improvements to assessment and feedback practices as a part of the learning cycle have led to increased student engagement with the feedback they have received, but along the journey it also led to increased interactions of the tutors with the topic across an entire institution which is phenomenal. To develop a far reaching, long-term programme as outlined here requires a considered approach reflecting on the viewpoints and buy-in of all parties involved. Most importantly the vision and actions of one academic can truly make a difference.

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Final year eLearning projects

Award nominee: Carol Wakeford
Centre contact: Jackie Wilson
Subject area: Final year research projects, eLearning

This case study has been developed from data gathered through observations of the teaching component, interviews with the tutor, and a student focus group.

Background

This case study reports on the practice of eLearning Projects (ELPs) offered for the last 5 or 6 years as a research project option for 30-40 final year students on a wide range of degree programmes in the Faculty of Life Sciences at the University of Manchester. Over their final year, students learn the skills associated with ELPs – how to plan, design and develop online resources for learning. They design and develop an e-learning resource – e.g. a virtual experiment, online tutorial or a problem based case history or scenario for a selected target group. A key feature of ELPs is that students determine an evaluation strategy, possibly related to a hypothesis based on the potential effectiveness of the resource, and design an 'experiment' to conduct this evaluation – e.g. on test/control groups, thereby gathering qualitative and quantitative feedback for analysis. Students submit a project report with a similar format to lab-based project students. The project counts for 30 credits and the assessment is linked to both the performance of students during their project (20%), as well as the resource they develop (20%) and their final report (60%).

Prior to developing their project resource the students undertake and submit a 10 credit literature review to provide scientific depth to their research. Further background and training is provided through a training course in project skills covering learning design and evaluation, the use of specialist software applications, questionnaire design, and aspects of elearning and educational theory. This is currently delivered via a series of two hour workshops in a computer-cluster, run twice-weekly over 14 weeks, led by the Course tutor and the elearning manager. The face-to-face taught component is complemented by supporting materials and online tasks in Blackboard that provide practise in skills and integrate peer support and interaction. This group interaction is intended to mimic the social interactions other project students may experience in the laboratory and helps the students form social networks for mutual support (Topping, 2005). Each student is allocated a project supervisor to provide academic advice and guidance on scientific content, and mark and provide feedback on their work. A small elearning team provides students with support for software applications.

Reasons for introducing this teaching method

In common with universities elsewhere, a significant minority of students are attracted by the opportunity to carry out research in a non-laboratory setting. ELPs were introduced to provide students with an interest in the communication of science and the application of technology to teaching and learning the opportunity to undertake an alternative form of project. ELPs are designed to enhance and demonstrate students' problem solving and critical thinking skills (and those of their target audience) and aim to provide them with a similar and rigorous research experience to their laboratory counterparts. Experience has shown that marks for ELPs are comparable with those for other project types.

Lecturer perspective

The tutor has a long-standing interest in engaging students in problem solving, enquiry and data handling, and the application of the scientific method, particularly regarding practical and project work. With funding from the University's CETL, the Centre for Excellence in Enquiry-Based Learning (CEEBL)[1], she sought to combine e-Learning and Enquiry-Based Learning (EBL) in ELPs. The ELP course framework is purposefully designed with an enquiry-driven focus based on the 'language of inquiry' model (Justice *et al.*, 2002) – with the aim of promoting flexible and student-directed learning, critical thinking and collaborative learning. In the early years the tutor observed a tendency for project students to focus on conveying maximum content via their resource and difficulty in concentrating on the learning design aim of stimulating enquiry in their target group of learners. This led her to modify the 'active-learning' training course, incorporating additional sessions to nurture students' creativity; students work in groups and are encouraged to experiment with a range of creativity tools to generate ideas for their learning designs (Wakeford, 2009). For the tutor the module is enjoyable and rewarding; students do well and many succeed in producing high quality learning resources which are adopted in the undergraduate curriculum.

Students' perspective

Students clearly felt they had benefitted from undertaking ELPs and identified several aspects of their design as superior to the laboratory projects undertaken by their peers. For example, the student peer-review and peer-support element in the online discussion environment "helped improve critical analysis and evaluation skills". Students used "*each other to get advice and feedback"* in class and via the discussion boards, and noted using the discussion boards because they found this valuable rather than simply because their contribution to them was assessed. They greatly appreciated the flexibility of ELPs and the ability to access materials remotely that allowed them to study at a time and place to suit them. This meant they spent more time on their projects and found it easier to fit their project work around other aspects of their study/ life: "[you] c*an just sit down and do it when you want... online ... [making it] "enjoyable... Do more as a result"*. While they valued the opportunity and independence of directing their project work students found the training course and workshop sessions "*really important*", helping them to plan and organise their work successfully. Students identified ELPs as enabling them to develop a range of technical, communication, learning design and self-management skills, e.g. they gained an "*understanding of how to effectively communicate*" and "*apply science in a way that stimulates*". Many also identified having developed knowledge of their scientific topic: 27/31 students (87%) strongly agreed or agreed that completing the literature review had helped in this respect. One student noted having chosen a topic thinking they knew it well; in reality they had identified gaps in their knowledge, "fundamental gaps", which they had plugged. Students expressed a sense of responsibility and desire to generate quality resources, which they saw positively as their legacy to future students; projects were "more rewarding, having an impact on other people". Students had actively chosen an ELP, viewing them as an opportunity to learn new skills rather than simply a way to escape the lab.

Issues

Students identified the project experience as having been enjoyable and valuable but intense. They expressed a preference for being able to select their final year project earlier i.e. in the second semester of their final year so that literature search and writing of the literature review could take place over the summer/prior to the final year of study. Such changes to the scheduling of projects in the Faculty of Life Sciences are already planned for the subsequent cohort of students. Gaining access to, and feedback from, target groups for evaluation of their resources (the data generation aspect of their research) had also proved challenging for some students. It was felt this situation could best be improved via individual project supervisors, possibly with the participation (feedback) of other students being made compulsory; new guidelines for supervisors clarifying their responsibility for advising students regarding target group recruitment have been issued for next year.

1 http://www.campus.manchester.ac.uk/ceebl/

Benefits

Students are able to pursue project work that is challenging, self-directed and of interest to them, they research a bioscience topic in depth and gain experience of communicating bioscience effectively by delivering information or concepts to a particular target audience. At the same time they develop a range of technical and transferable skills, which they recognise as enhancing their future employability – *"this is really useful... [I] can make a website for anything now... [project experience has] lots of applications"*.

The quality of the e-resources produced by students is frequently high, as evidenced by the increasing number of these hosted by supervisors in their teaching materials; two students to date have had their work published in *Bioscience Horizons*[2] and a third has had an article published in *Anatomical Sciences Education*[3]. Examples of student projects are available online[4]. Many aspects of the design of ELPs have been used successfully in the development of the Education Project option also available to students locally.

Reflections

The ELP format provides a popular, valuable, intensive research project experience, enabling students to develop valuable technical and transferable skills. It could provide a rigorous and workable research project option for bioscience departments elsewhere. The only issue for other departments may be the availability of technical staff for the provision of student support. In addition to providing a valuable project experience for students, the generation of quality elearning resources for use in teaching represents a useful outcome for staff supervising the project students, and other students.

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3 http://onlinelibrary.wiley.com/doi/10.1002/ase.214/abstract
4 http://www.ls.manchester.ac.uk/undergraduate/teachingandlearningresources/elearning/elearningprojects/

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Keynote / Workshop:
Overcoming apathy and creating excitement in the bioscience classroom

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Todd Zakrajsek, Ph.D., is the Executive Director of the Center for Faculty Excellence at UNC at Chapel Hill, North Carolina, USA. He was previously the inaugural Director of the Faculty Center for Innovative Teaching at Central Michigan University and the founding Director of the Center for Teaching and Learning at Southern Oregon University, where he also taught as a tenured Associate Professor of Psychology. Dr. Zakrajsek received his Ph.D. in Industrial/Organizational Psychology and publishes and presents widely on the topic of student learning.

Abstract

This workshop will investigate what instructors can do to facilitate learning when they encounter students who seem uninterested and even apathetic toward course content and assignments. Part of the responsibility for learning certainly belongs to students, but as faculty we can find new ways to motivate, inspire, and maybe even cajole students to learn. This workshop will demonstrate and explain how instructors can make classroom learning, perhaps one of the most artificial learning settings, a more meaningful experience for students. The presenter uses theories of learning and motivation as a basis for creating strategies to increase student engagement in course content and class sessions. Participants will have an opportunity to try out and experience some of these techniques, and also learn how these same techniques may be used in bioscience classes.

W1: Ethics and Bioethics – an interdisciplinary approach to critical thinking

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Theme(s): Biologists working with others; Students and academics working together to improve the learning experience

Abstract

The QAA Benchmark Statement for the Biosciences contains several explicit references to the necessity/desirability of teaching ethics within bioscience degree programmes (QAA, 2002, 2007). The reaction to this across a range of life science departments has been varied (Willmott *et al*., 2004; Bryant and Morgan, 2007) and it remains true that some degree programmes still lack any ethics teaching. However, wherever ethics teaching has been introduced, there have been pedagogical benefits that extend beyond subject-specific knowledge. Particular examples include (a) the collaboration between academics from different disciplines (and in some institutions between students from different disciplines), (b) the participation of biologists from across a very broad range of sub-disciplines (Bryant and la Velle, 2003), (c) the use of teaching methods (e.g. role play, debate; Bryant and la Velle, 2003) that engage the students in different ways from those generally used in the life sciences and (d) the development of critical thinking and analytical skills in an area where there may not be an academically 'right' or 'wrong' answer (Pearce, 2008 and 2009). Critical thinking is a key transferable skill. It involves not only deciding what inputs are relevant to the decision but also constructing logical arguments that lead to a specific conclusion. Specifically in respect of ethics/bioethics for example, a student may know what they think about an issue but they need also to understand why they think that way.

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IP1: Serious (but fun) games for effective learning in genetics

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Theme(s): Inspiring first year students

Abstract

Engagement with a subject is often a critical component to its successful learning. We report here on the development and use of the 'Mutation Game' - a simple, yet engaging, interactive board game. The game is a successful teaching tool which facilitates students' understanding of *a* great number of biological definitions and concepts, such as speciation and natural selection. The game (originally designed to enhance public engagement with EU-funded life sciences research) was primarily aimed at secondary schools across Europe and as such won an international Science Communication Award in 2010. From the onset it was very clear that the versatility and flexibility of the game created an array of opportunities to inspire students of any age. We have taken the game as a teaching tool into places of Further and Higher Education. So far, we have successfully inspired high quality scientific debate on a variety of genetics topics among first year undergraduate students in the Biological Sciences and Medicine, as well as Biology A-level students. The original version of the game is based on 'Mutation and Evolution'. It is set on an alien planet and shows 'evolution in action' in a very short time for a number of imaginary species. It does this using a simple board game, a number of straightforward rules and a set of mutation cards and events cards. By changing the set of cards, both in scientific content and 'level of communication', different aspects of DNA mutation can be easily drawn to the attention of different audiences. A second version of the game, based on 'Mutation and Disease', has been successfully piloted with first year Medical students to encourage discussion on inheritance patterns and the ethical aspects associated with genetic screening. It is clear that this serious board game concept can be used throughout HE Biosciences.

IP2: SWIFT: Second World ImmersiveFuture Teaching

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Theme(s): Engaging students in the laboratory and field

Abstract

In the biosciences, as in other fields, there is a growing need for new approaches to effective laboratory-based learning. Constraints of space, time and resources, lead to pedagogical limitations in the use of practical classes that involve student engagement in pre-designed experiments. For biomedical sciences, we have developed a range of problem-solving, group-work activities and these have helped with some of these issues (www.le.ac.uk/genetics/genie). However, our research has shown that there remains a need for approaches that help students develop skills such as experimental design and teamwork whilst effectively combining theoretical and practical aspects. We are developing exciting, innovative approaches to address these problems using Multi-User Virtual Environments (MUVEs). These computer-based simulated laboratories allow users to 'inhabit' and interact via motional avatars (representations of the computer users in the form of three-dimensional models). Avatars can move around, carry out activities, and interact at the will of the user, participating in group situations. The use of such virtual environments is growing and there is a need to research their effectiveness as teaching and learning tools. We are developing and evaluating immersive learning activities for laboratory-based work for undergraduates using SecondLife (SL), a popular MUVE. Such activities in the virtual lab would not replace, but rather enhance the effectiveness of real-life laboratory work. Throughout the project we are developing and evaluating three types of activities; induction to health and safety and the laboratory environment, use of replica SL equipment and technologies to utilise case studies for genetic testing and SL activities based around our existing real-life problem-based learning packages. The latter is aimed at developing decision-making and experimental design skills. We will demonstrate the SL laboratory facilities and present our research into how useful such approaches are as effective learning tools.

The work is funded through the National Teaching Fellow Project Strand.

W2: Using digital media to enhance the staff and student experience of feedback: does it work?

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Theme(s): Students and academics working together to improve the learning experience

Abstract

'Good' feedback is central to learning but it is widely recognised that providing such feedback can often be challenging for staff. Furthermore student engagement with feedback can sometimes be less than satisfactory. When staff and students are asked to comment on this area of their university life the following comments are commonplace: "I don't receive feedback in time"; "They don't ever read my feedback or listen to what I'm saying"; "I can't even read the handwriting"; "I'm always saying the same things". Against a backdrop of a sector facing numerous challenges and likely calls for there to be significant enhancements to teaching quality and the student learning experience, it is timely to consider whether or not existing and emerging technologies have a role to play in enhancing the feedback experiences of students and staff.

The aim of this workshop is therefore to illustrate practical ways in which feedback-related staff/student interactions and feedback provision itself may be enhanced through the use of digital media. This will be a highly participative session based around three themes:

1. What's right and what's wrong with how I currently provide feedback to students?
2. What technologies exist to support feedback and how easy are they to implement?
3. What do students think about the use of different technologies to support feedback provision?

The objective of the session is to provide participants with opportunities to see why and how bioscience staff use and implement different technologies and to hear what students think about the different modes of receiving feedback.

IP3: Ethics in schools: enhancing student employability through the creation and delivery of ethics-based outreach activities and open education resources

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Theme(s): Inspiring first year students; Engaging students in the laboratory and field; Biologists working with others; Students and academics working together to improve the learning experience

Abstract

Ethics is now an integral part of the mainstream science GCSE curricula. Whilst teachers may understand the science, they struggle with teaching the underlying ethical issues. There is also a shortage of suitable resources. In addition, the numbers of students taking STEM subjects at school is falling and *there is* therefore a need for scientists to engage in outreach activities in order to encourage young people to consider science-based careers. To address these issues, I have developed *Science and Society* projects, where students create and deliver ethics-themed teaching sessions for local school pupils, evaluating and reporting on this exercise as their final-year research project. First year interns then further develop these resources into open access resources for use by the schools themselves.

This presentation will showcase examples of sessions that students have created and delivered, with delegates participating in part of a session. There will also be the opportunity to discuss the practicalities and advantages / disadvantages of such projects compared to other types of final-year project. To capitalise on the excellent resources that the students have developed and to address the shortage of ethics-based teaching materials within the GCSE/A-Level curricula, the project now offers internships to first year students; their brief to develop interactive lesson plans using these resources, provide accompanying teachers notes and links to supplementary open educational resources (OERs). Examples of these lesson plans will be showcased.

Both the *Science and Society* projects and the first year internships enhance student employability. They encourage students to be enterprising, innovative and to develop key non-research based transferable skills. They are a valuable tool in developing partnerships with local schools, promoting your faculty and encouraging school pupils to consider careers in the biological sciences.

SP1: Using mobile phones to encourage interaction in large lectures

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Theme(s): Inspiring first year students

Abstract

Students entering the first year at university may be in for a shock when they find themselves in a class of 200 or more, being taught in a large lecture theatre with people they hardly know. Asking a question can be particularly daunting for students in this setting. In an attempt to make this easier for students, we have made use of a “text wall” in a first year module, Introductory Physiology. This system allows students to text questions to a given mobile phone number and the questions immediately appear on the text wall which can be projected onto the screen. The lecturer can then answer the questions during the lecture. Students avoid the embarrassment of asking a question in public, but all can benefit from seeing the questions and hearing the response. The text wall has also been used to allow the class to find out something about their colleagues, by getting students to answer a question. Participation has been enthusiastic and feedback from students has been very positive.

This presentation will give examples of how the text wall has been used in this module, and the feedback that students have given us. It will also involve use of a text wall with delegates, allowing them to use their own mobile phones to respond to, and to ask questions.

SP2: Promoting enquiry and active learning through project work

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Theme(s): Inspiring first year students; Engaging students in the laboratory and field; Students and academics working together to improve the learning experience

Abstract

Students in early years of their undergraduate training can hone their research skills by undertaking short investigative projects. A project inventory is now available (http://sbsweb2.bio.ed.ac.uk/group_projects/), which contains 60 different project ideas.

This presentation will demonstrate how the website can be used directly and discuss how it can be adapted to the needs of other educators. It will also describe the philosophy behind this approach, our experiences with the logistics of running the projects for a large undergraduate class, set out the assessment criteria, and evaluate the students' and instructors' feedback and reactions.

SP3: Using student reflections to inform teaching practice

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Theme(s): Students and academics working together to improve the learning experience

Abstract

This currently-running project focuses on student engagement with learning. Using on-line tools we are collecting 'data' from Bioscience students as to the type of learning and teaching activities which they find engaging / non-engaging. It involves students who are studying Bioscience-related courses from four different institutions (Birmingham, Central Lancashire, Hull, Myerscough College); their 'brief' is simply that during semester 2 (2011), they document and share their thoughts about the different types of teaching they experience and their resulting engagement with learning. At each location we have discussed and decided on the particular reflective and on-line social networking tools to use (e.g. video diaries, blogs, Twitter, Facebook) to allow them to express and share their experiences of teaching and learning.

The data collection will have been completed by May 2011, and will provide a valuable source of information about how effective different approaches to teaching are in achieving engagement. A second aspect of this project is that by providing their reactions in this way, students are participating in a community of practice through shared on-line networking and reflection. At the end of the project we will, with the students, review and reflect both on the aspect of engagement with learning, and on this experience of sharing in a 'community of practice'.

Both of these aspects will be presented in the session, with two of the students from the project involved in the presentation, recalling their experiences.

IP4: Enhancing the impact of fieldwork on student learning: understanding the diversity of experience

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Theme(s): Engaging students in the laboratory and field

Abstract

Fieldwork in the biosciences has a positive influence on learning across the three learning domains: cognitive, psychomotor and affective and encourages 'deep learning'. It is clearly recognised however that the impact that this type of activity will have on the student experience is dependent on the quality of delivery and the fit of its design to the previous experiences of and diversity within the student group. We propose that quality of delivery is partly dependent on the way in which fieldwork is developed as part of a coherent strand through the programme curriculum.

We conducted a research project at Roehampton University aimed to evaluate and enhance the role that fieldwork plays in learning. The first part of the study demonstrates that whilst fieldwork is embedded throughout the 3 years of the various undergraduate Biosciences programmes further work could be done to build more directly on the previous experience and skills of the students. Data drawn from questionnaire work with students entering university highlights the varied nature of prior experience gained and questionnaire data collected from students at the university pre- and post-field work indicates the positive nature of the experience. There was a gender difference in attitudes, with males being more relaxed and females more apprehensive pre-work. 83% of students wrote that after fieldwork their relationships within the group had improved and that they had made new friends.

These findings are being used by the team in reflecting upon how we can ensure that all students engage effectively in fieldwork. This session will provide an opportunity for participants to compare our findings with their experience of fieldwork and discuss considerations that need to be made when developing a fieldwork curriculum.

SP4: Peer-learning on the move: online and mobile access to revision questions written by students

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Theme(s): Students and academics working together to improve the learning experience

Abstract

Demand by our students for “practice questions” is high, particularly from first year students. Whilst practice questions allow the students to test their knowledge and understanding of course material, writing such questions places a significant demand on staff time. There is also concern that students become ever more dependent upon the academic as the source of information, rather than engaging in independent learning. To address this we have introduced an assignment in which students are asked to each submit their own multiple-choice style question, on a given topic, to an online database thereby generating a bank of ~300 revision questions. Students were advised that the answers would NOT be checked by staff and the value of peer-learning was emphasised in the introduction to the assignment. The bank of questions was used to generate question sheets for a “pub-quiz” style seminar and the students were also able to access the database online and via mobile access. About 7000 questions were downloaded from the database in the two days prior to the module exam. Initial evaluation of the exercise revealed positive student feedback, although with some misgivings about the lack of question-checking by staff. When running the exercise for a second year the question proforma was modified to include a “feedback” box, in which students were required to write a short explanation of their correct answer and provide a text book or journal reference supporting the explanation. This aimed to give question-users more confidence in the answer whilst also encouraging additional reading.

In summary, this exercise has allowed us to work together with students to build up an extensive revision database, whilst encouraging peer learning and independence. The option to access the database via mobile technology has proved popular and has added flexibility to the delivery of the resource.

SP5: Enhanced engagement in the undergraduate laboratory practical experience

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Theme(s): Engaging students in the laboratory and field

Abstract

Our aims are to: Improve the level of undergraduate student preparation for laboratory practicals; Engage students in the appreciation of the numerical skills needed to prepare chemical reagents and design effective assays; Identify areas of weakness in experimental comprehension and numeracy; and Respond with increased support.

Online pre-practical quizzes, hosted in the Moodle virtual learning environment, were devised to assist students in their comprehension of a laboratory exercise. Questions relate to background, experimental process and numeracy associated with each practical. Each quiz has to be completed at least an hour prior to the start of the session. This is monitored through Moodle submissions. Participation in a quiz is compulsory and a pass mark of above 60% is required. Support for background and experimental process is provided in the course materials. Support for numeracy is provided in the form of worked examples and practice quizzes provided online. Answers to numerical questions are posted on the course Moodle site after the practical has begun.

The quizzes provide the students the ability to assess their own knowledge, to engage better in the laboratory practical and have greater confidence in experimental manipulations. The continued practice of numeracy and its application has demonstrated greater knowledge retention as evidenced by exam performance in numerical exercises. The initial project concentrated on year 2 Life Science students. The improved performance encouraged us to extend this practice to year 1 and other Departments and Faculties have now adopted pre-practical testing using an online environment. An ongoing aspect of this project is the transferability of improved numerical skills to year 3 research projects.

A crucial aspect is for staff to quickly identify problem areas in comprehension of experimental process and numeracy and to reflect and respond by providing appropriate additional support materials. This reflective element is ongoing with each cohort.

SP6: Histology labs for science students: encouraging engagement

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Theme(s): Engaging students in the laboratory and field

Abstract

Traditionally students studied histology using microscopes and making many detailed drawings of prepared slides. Nowadays this method is no longer practical due to lack of staff and high student numbers, together with financial, space and time constraints. Consequently an alternative method was employed using photomicrographs mounted on poster boards. Initially these were not as effective as we hoped and the students complained that the labs were boring. In an attempt to improve the situation we introduced some technology-based innovations. First we set up a pre-lab session giving the students a concise set of guidelines on tissue analysis. The session was made interactive by the use of an electronic handset voting system (Smith and Cogdell, 2006). Second we produced a web-based resource so the students could review the photomicrographs. Included in this resource were several formative assessment tasks and the information from the pre-lab session.

We carefully evaluated the outcomes. Both the innovations were received very favourably by the students. The students reported that they spent longer looking at images when they had the opportunity to view them both on the web and the posters as opposed to just the posters.

An interesting outcome was that the students who spent time making sketch drawings of the photomicrographs got better scores in the subsequent class tests. It was strongly recommended in both the pre-lab session and web resource that the students should make sketches, as it was thought that the students would look more thoroughly at the photomicrographs if they did. This seems to be the case and suggests that making drawings promotes active engagement with visual material. It also illustrates that although introducing new technology may be beneficial, traditional teaching methods should not always be rejected.

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SP7: Introduction of a transitional pedagogy for first year students

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Theme(s): Inspiring first year students

Abstract

Second level student learning is highly managed, very closely monitored and very focused. There is less opportunity for developing the skills of independent study associated with university and enabling students to take responsibility for their own learning. Students bring to Higher Education the learning strategies associated with their previous learning experiences. Formerly our first year university module was taught through lectures and practicals and assessed at the end of each semester with an unseen final examination containing practical and written elements. Problems associated with the module were low attendance, high failure rates, low average pass marks and low retention rates. The first year in university is acknowledged as a transitional year which we feel should be accompanied by a transition pedagogy that tailors the curriculum in the changeover from second to third level education. Results of questionnaires show that 65% of our students prefer a passive learning style. Importantly, while 68% of students felt they had prepared well for their examinations, 62% confirmed that this preparation was not reflected in their examination results, which were much lower than school.

To incorporate a transition pedagogy, we reduced the number of lectures and introduced enquiry-based tutorials to enhance active learning. We also piloted podcasts and video clips. We radically changed the practical assessment by introducing continuous (formative and summative) assessment and timely feedback. Weekly worksheets were specifically designed so students had to organise, interpret, critically analyse and present raw data obtained from practicals. Students received individual feedback specific to their own efforts detailing what their misunderstanding was and how they could improve in the future. The final overall mark from 2007-08 was 45.53% ± 1.62 which significantly increased to 54.61% ± 1.02 in 2009-10. This highlights the need to incorporate a hybrid teaching approach and structure modules to support self-directed learning.

SP8: Improving essay-writing skills in undergraduates

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Theme(s): Inspiring first year students; Students and academics working together to improve the learning experience

Abstract

It has been noted that there is confusion amongst students about what is “really wanted” when given essay-writing assignments (Lillis and Turner, 2001). This leads to a gap between staff expectations and student interpretations (Lea and Street, 1997). Thus First Year students were asked, over a two year period, what their normal practice was when faced with an essay-writing task and what resources they thought they needed to improve their writing skills. Student replies were mapped against a skills matrix devised by Krause (2001).

Krause posited specific skills as being important for essay-writing with the initial writing experience being an influential vehicle for academic integration of first year students. She noted difficulty in the transition from school to university especially in the level of detail needed at university level.

1. The skills advanced by Krause were:
2. Finding relevant references – computers
3. What to include and what to omit
4. Assembling ideas from different sources
5. Finding relevant references – books
6. Identifying relevant points amongst students’ reading
7. Understanding references found
8. Organising points into paragraphs

Student responses indicated some agreement about needing these skills, however there were some areas of non-congruence. Therefore, in an effort to improve essay-writing skills, students were given additional tutor support in an essay-writing task. This comprised a workshop session to find suitable resources for the essay and an iterative feedback/drafting policy to enable students to improve their work before formal submission of the essay. As found previously for Third Year students (Freestone, 2009) this intervention significantly improved student exam performance ($p > 0.001$).

Although this type of intervention is very labour-intensive, given the increases in student performance documented here and elsewhere, it is difficult to argue against providing the resources to enable such an intervention to be more generally applied.

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SP9: Identifying and developing student aspirations: the role of the personal tutor

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Theme(s): Inspiring first year students

Abstract

Student numbers and student diversity are growing at a time of economic uncertainty and rising fees. The result is a mismatch between universities' assumptions and the expectations of first-year students. For many entrants a degree programme and an institution represent their first career decision, and they come to university with an expectation that this decision will be recognized and developed. To fully inspire first-year students, programmes and teachers must engage with the motivations that brought them to higher education in the first place. This is crucial as their initial experiences will affect retention, the decisions made at the transition to the second year, and a successful and rewarding educational experience in the longer term.

This presentation will describe a simple and transferrable approach to investigating – and developing – the aspirations of new entrants to higher education. It will detail a pilot study with bioscience students at the University of Leicester, funded by the *UK* Centre for Bioscience, and show how the results have been used as part of a wider project to develop the role of the personal tutor. Early, consistent and informed support from personal tutors is essential to inspire and enthuse first-years through a process that involves identifying their interests, exploring the options that are open to them, and starting the important process of helping them to implement their preliminary decisions by acquiring the skills and experiences necessary to move through a degree programme into work or further study.

The key lesson is that inspiring first-years is not just a matter of academic support with the transition from secondary to higher education. A key aspect is providing focused resources to assist personal tutors in enthusing students by helping them to explore their options, and to identify ambitious – but realistic – goals at the start, not the end, of the university experience.

SP10: To investigate the potential of extending and enhancing the use of museum specimens in Biology teaching and learning

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Theme(s): Inspiring first year students; Engaging students in the laboratory and field

Abstract

In 2006 a revised Animal Kingdom course for new students was developed by two members of staff (now involving five) from the School of Biology. In that and subsequent years, the course feedback questionnaires returned, in particular, positive, general comments concerning the use of museum specimens. These had been used to teach comparative anatomy in an evolutionary context and, in particular, reinforce the notion of homology. A study was then initiated to determine how effective this material was as a teaching aid as the School of Biology still has a large, diverse and unique collection of valuable animal and plant material. Does this have a significant potential to enhance teaching (and research) in Biology?

Through the development of this resource, the project aimed to:

1. Evaluate how the student experience of using museum specimens relates to their learning.
2. Extend opportunities for student self-directed experiential learning via individual problem based learning groups.
3. To explore the impact of this special resource on student learning with a view to developing its uses across the curriculum.

For the last two years students were asked to fill in a questionnaire concerning the use of video, live animals and museum exhibits. More than 50% of the two cohorts of first year students responded (145 replies) and the analysis revealed that access to such material was highly regarded. The students also offered comments about why such material was preferable to on-screen displays, pictures or videos. Many students offered to volunteer for activities to learn to curate, classify, prepare and display museum exhibits.

As a result of this, the School will be looking to increase the use of this resource and widen participation with other departments (Archaeology, the Vet School and Geography).

IP5: Bioscience degrees in the work place: the challenges of employer engagement

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Theme(s): Biologists working with others

Abstract

The University of Chester's history of work related studying has been embraced by the Department of Biological Sciences in providing programmes for companies, charities and public bodies. Working with employers we build bespoke undergraduate (BSc and FdSc) programmes, accredit training and validate credit bearing short courses. Our experiences provide case studies of the benefits and pitfalls for biologists working with external agencies.

There are several significant factors in course production. The most important is ensuring sustainability of the programme so that employees can be reassured it will be available for several years. Sustainability requires viable numbers of students in each cohort which can be challenging. A single employer is unlikely to guarantee viable cohorts over a period of years. Mechanisms for ensuring viability include making the programme as generic as possible, mix and match modules, block and blended-learning delivery and breaking modules into bite-sized units.

HEFCE expects employers to make a contribution in addition to the student fee. Most employers consider they make contributions through taxation. However they can provide in-kind practical training particularly suited to a bioscience programme. Additionally, the employer's own training can be accredited, either as an entry qualification or as prior learning. One entirely new development is accrediting training delivered by industry on the use of its goods and services. This has multiple benefits for the student, the business and the University as long as robust QA procedures are in place.

Many issues are encountered in devising this academic provision. It can be difficult to reconcile university QA procedures with the requirements from the employers. The employees are not like other undergraduates and the employers are wary of HE bureaucracy. However, while failure is costly in time and resources, success is rewarding.

SP11: Engaging international students in biotechnology and enterprise

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Theme(s): Engaging students in the laboratory and field

Abstract

International students enhance the diversity of university populations. However, the value this diversity can provide is dependent on the transition experience of these students as a whole (McInnes, 2001). This study describes how internationalisation of the curriculum can be used to engage students from India. An MSc Biotechnology & Enterprise programme was introduced in collaboration with St. Xavier's College, Mumbai, India. Students completed a 3-month taught component in India (which included setting the foundations in biotechnology and an introduction to fundamental principles of management), followed by a 3-month exposure to research projects and taught units at the University of Bath, UK. The lab skills learnt at Bath were applied in the 6-month placement at a biotechnology company in India.

Taught elements learnt in India were applied in the UK through a unit on Industrial Biotechnology & Enterprise. Teams were partially self-selected based on their Belbin profiles, but were also directed to ensure a mix of international and UK students. Indian students worked together with UK students on a team business plan. Lectures by entrepreneurs were run in parallel with business development workshops. Teams were expected to come up with a novel biotech idea, and learning outcome assessments included a team pitch in a 'Dragon's Den' format, a detailed business plan and peer assessment of the team performance.

This presentation will explore the value of this collaborative mode of learning in engaging students from India, especially in relation to specific cultural contexts. It will highlight some of the student commentary on their perceptions of learning in these two cultural contexts. It will conclude by raising some questions concerning how we may best meet the needs of international students through inclusive approaches to our teaching.

References

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SP12: Developing a pre-university skills course

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Theme(s): Inspiring first year students

Abstract

There is a steep learning curve for first year undergraduates because pre-university teaching is very different to the university teaching environment. In an HEA-funded project, looking at perceptions pre-University students had of university teaching, it was found that students expected much more personal attention than they would receive at university. In a second *UK Centre* for Bioscience-funded project[1], first year undergraduates' writing skills were assessed on arrival and this highlighted the huge gap in ability between skills the students had and what was expected of them. A similar study showed this to be the case for maths too.

Universities have to lay on specially designed skills modules which, by necessity, have to replace other more inspiring modules. What if these skills could be taught to students before they arrived at university? A project was set up, funded by Excellence East, which explored skills lacking in bioscience undergraduates, and how these could be taught at school by teachers within existing school timetables. A team was assembled which included a school teacher, a PGCE tutor, a transition officer, a learning enhancement tutor and lecturers from biosciences and literature. There was also a consultant who advised on primary school learning.

The result was a seven-lesson course which was piloted at two secondary schools. Students readily engaged with the material and were found to benefit from the course, not only in their awareness of what would be expected of them at university, but also in their approach to their school coursework. To be more accessible to schools, however, the course needed to become generic to all subjects. This turned out to be fairly easy because the skills lacking in undergraduates turned out to be similar in whatever discipline they chose to study. Teachers across the country are now being trained to teach their students 'Pre-University Skills'.

1 www.bioscience.heacademy.ac.uk/resources/projects/jones.aspx

IP6: The art of using Personal Response Systems ('clickers') in Biological Science Higher Education

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Theme(s): Students and academics working together to improve the learning experience

Abstract

Biological Higher Education (HE) now faces the biggest challenge of providing excellent education within the QAA framework to rising student numbers against a background of increased student fees and a diverse student population who have a wide range of expectations. In addition, student learning must be aligned to the IBMS framework to ensure that we produce graduates with skilled specialism in diagnosis. In teaching audiences of >200, how do we accommodate inclusive yet individualised student learning?

Aim

To assess the value of using interactive personal response systems ('clickers') for in-lecture student assessment, formative feedback and deeper student engagement in large class sizes.

Methods

Interactive response systems are used with TurningPoint software in PowerPoint presentations in a range of modules across Bioscience Programmes at the University of Salford. Clicker methods will be used with conference delegates in an interactive session to demonstrate their wide range of applications.

Clickers were used in a wide range of applications to interactively engage large student classes including:

- Formative assessment and timely feedback of factual understanding,
- Assessment of assimilation and data interpretation skills in higher stages of learning[1] ,
- In-class/workshop summative assessment of peer set learning, and
- Student evaluation and feedback on module content and clicker usage; engaging with students as a useful partners in the business of providing higher education.

Clicker success in HE will rely on; creativity with clicker applications and appropriate timing of use. Consistency of answers if the question is rephrased will reveal true student engagement and learning. Importantly, clickers should enhance staff evaluation of student needs; e.g. does one cohort of students engage better to the same delivery content than another? Do students appreciate the value of benchmarking their performance against their peers? Should clickers be a significant part of future technology enhanced learning? Provisionally, our customer opinion says yes!

1 Bloom, B.S. *et al*, (1956) *Taxonomy of Educational Objectives: Cognitive Domain.* New York: McKay.

IP7: Engaging postgraduates in teaching and learning – networking events

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Theme(s): Engaging students in the laboratory and field; Students and academics working together to improve the learning experience

Abstract

The role of postgraduates is increasingly important in undergraduate teaching. In the biosciences, this most commonly takes the form of graduate teaching assistants (GTAs) in laboratory practicals, but GTAs may be called upon to take on a number of teaching responsibilities from tutorials to project supervision. As the role of the GTA becomes more complex, it is vital to offer comprehensive support. This may take the form of training within the individuals' institution, or may come from outside.

In 2008, it was identified that there was very little contact or interaction between the Higher Education Academy UK Centre for Bioscience and postgraduates. As the Centre for Bioscience offers high quality advice and resources for staff involved in learning and teaching in Higher Education, it was proposed that this should be extended to include postgraduates involved in teaching. A questionnaire was sent out to gauge interest, and in 2009/10 the first events were held in Glasgow and Manchester, followed in 2010/11 by events in Aberdeen, Belfast and Reading.

Based on the results of the questionnaire, and addressing the issues that are important to the GTAs themselves, the networking events aim to raise awareness of the help that is on offer to support GTAs in bioscience teaching. Interactive sessions include the identity of a teacher, small group and laboratory teaching, and assessment and feedback. The sessions offer a relaxed atmosphere in which GTAs from institutions in the local area can get together, network, and share experiences with one another.

SP13: Creative arts meet biology – a collaborative project between arts and science

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Theme(s): Biologists working with others

Abstract

Every time I look down a microscope, I am fascinated by the beauty and elegance with which living organisms present themselves to us. But it is not only this incredible diversity of aesthetic shapes and forms that fills me with awe, it also gives me an appreciation of the enormous complexity of processes that eventually lead life itself. As a lecturer in Biosciences I always wanted to transmit this fascination for life, its beauty and richness, to my students, but never had the means to present accurate science in a way that does full justice to the greatest artists of all – nature.

In a collaborative project between Phil Gomm, University of Creative Arts (UCA), his students and me, we aim to bridge the gap between capturing the elegance of life and scientific knowledge by making computer-generated animations (CGA) of biological processes. These animations are designed to combine scientific accuracy with the aesthetics and beauty of nature. The audience should immerse itself into the magic of life; while at the same time see accurate details of what is happening in nature on a microscopic level.

We hope to establish a new art form in the area of CGI, whilst creating useful teaching resources that make students understand complicated biological processes. All animations are created by first year undergraduate students at UCA under the supervision of Phil Gomm; scientific accuracy and appropriateness for teaching is overseen by me. Our close collaboration therefore makes this project truly interdisciplinary.

We are planning to make our animations available for teachers and students to be used in the classroom for biology teaching. Currently we are preparing CGAs for a wide range of audience levels, e.g. from primary school level to undergraduate HE level. Each animation lasts about 4 – 6 minutes and contains 3D animations and sound.

SP14: Using student feedback to improve design of content delivery, improves attitudes and outcomes

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Theme(s): Students and academics working together to improve the learning experience

Abstract

This study sought to evaluate and respond to 2nd year student experiences of a new online delivery of core science course materials (pathophysiology). In 2007, all content of the Bachelor of Nursing and Midwifery Programme at the University of South Australia was made available online to students (700 annually) enrolled on- or off-campus following curriculum review. Many of these students are from non-traditional backgrounds (a third are of low socioeconomic status or over 35 years of age) and with limited recent study in science. Previous studies indicate that such students struggle to succeed in science study (Andrew, 1989).

The new coursework had been delivered online as lecture notes and podcasts, MCQs paired with feedback podcasts, video explanations of important concepts, comprehensive topic outlines, and tutorial materials. An action research model (Avison *et al*., 1999), (survey, evaluate, change course, survey etc.) was employed annually over four years and allowed student responses to inform changes and subsequent iterations. Anonymous surveys of free response questions (e.g. 'can the course be improved?) were utilised to investigate study attitudes. Likert and free text responses after the first year (2007) revealed that 'workload' was a major theme. Further analysis of student responses indicated that initial content organisation impeded their study and motivation rather than enhancing it. The materials were reflectively redesigned according to Brunner's approach that "students learn what students care about and remember what they understand" (Ericksen, 1984) and Biggs' constructive alignment theory (1999). Objectives were reduced and closely aligned to the lecture and tutorial content and core clinical concepts. Changes were made and assessed annually against student responses. Without substantial loss of content student perceptions of the workload significantly diminished over the 4 year period, and increased academic success (student grades) were taken as a measure of improved student engagement with the science content.

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SP15: Inspiring the YouTube generation with reflective videos of practical classes

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Theme(s): Inspiring first year students

Abstract

For the past three academic years we have provided first-year undergraduate students on bioscience courses the opportunity to make short (about 10 minutes duration) reflective video logs of their experience in chemistry practical classes. Three practical groups per session are provided with a video camera and brief instruction on its use. Each group must reflect on particular aspects of the practical when making the video, highlighting anything they found difficult and offering advice to someone who may be repeating the experiment at a later time. In so doing this promotes engagement with practical work during the session and thought towards how the material relates to lectures and other parts of the course. The videos are then uploaded to a video sharing website (YouTestTube.com) hosted on university servers and shared with everyone enrolled on the module. Students may view and rate their colleagues' videos as well as 'making friends' with other members of the group. This has provided a collaborative and inclusive peer-learning environment for bioscience students in a subject that is often perceived as difficult.

In response to student comments in evaluation of the practice we have in this academic year made selected videos from the previous year's cohort available to students prior to laboratory sessions taking place. This affords students unfamiliar with laboratory chemistry a preview of how the experiment should be conducted, what the equipment looks like and how it should be assembled. The videos while primarily for reflective purposes therefore also become reusable learning objects. Students have commented favourably on this approach and have found it a useful means of preparation for laboratory classes.

The practice described in the YouTestTube project has been evaluated and disseminated as a case study by the UK Centre for Bioscience (www.bioscience.heacademy.ac.uk/ftp/teachaward/mcclean.pdf).

IP8: Evolution of eLearning projects

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Theme(s): Students and academics working together to improve the learning experience; Biologists working with others

Abstract

eLearning Projects (ELPs) involve production of online teaching and learning resources by final year students. They have evolved from the writing of basic web pages, to the development of interactive learning objects that focus on design rather than technology. This evolution was underpinned by a blended training course, based on pedagogy, to encourage student engagement and participation. Subsequent modifications of the course largely grew out of feedback from students and staff. For example, qualitative and quantitative evaluation of resources was introduced in response to concerns about parity of ELPs with lab projects; students use the scientific method to test a hypothesis relating to the effectiveness of their resource using a particular target group. Moreover, in order to provide students with an experience of project work similar to lab-based students, online groups were set up for peer review of project materials; this facilitates peer support as well as troubleshooting design and usability issues. Most recently, an elab book was introduced for students to record their ideas and reflect on their progress, and creative thinking tools were piloted in an effort to help students develop more imaginative learning designs. The emphasis on design is facilitated by easy-to-use web authoring applications such as Opus and Softchalk. Of particular interest is scenario-based learning interactive, SBLi, which enables construction of online scenarios; it was adopted by the Faculty for construction of a genetics scenario for the Open Educational Resources (OER) project. This year, we are encouraging students to modify and/or reuse components of OERs in their own resources. Further initiatives include staff training using ELP course materials, and discussions with other Faculties interested in adopting this format for student projects.

Please see the following websites for more information:

OPUS: www.digitalworkshop.com/products/index.shtml

Softchalk: www.softchalk.com

Scenario-based learning interactive (SBLI): www.sblinteractive.org

Open Educational Resources project: www.bioscience.heacademy.ac.uk/resources/oer

SP16: Enhancing the student experience of the application of scientific techniques in practice

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Theme(s): Engaging students in the laboratory and field

Abstract

This project was designed to enhance the experience of undergraduate science students on programmes within School of Health Sciences at Queen Margaret University, which predominantly teaches Allied Health Professional courses that include a clinical placement. Students on the Human Biology and Applied Pharmacology programmes, however, do not currently have the opportunity to go on a practical placement and experience science techniques in the workplace. It was felt that offering these students the opportunity for short-term placements would increase their employability by allowing them to engage in the application of scientific techniques in practice. A structured approach was set up to arrange one week placements in industry, other universities, the NHS and other stakeholders who routinely employ practical scientific techniques and who ultimately create career opportunities for many of our graduates. The aim was to incorporate the placements into the curriculum to enhance understanding of theoretical scientific and technical concepts. Despite a range of logistical difficulties and a muted response from some stakeholders, final year students were given valuable insight into how theoretical science is used in practice. In addition, the project encountered various issues that will serve to inform academic staff on how to ensure effective science placements in the future. Benefits for the wider science community were assured through the development of a toolkit to assist academic staff, students and placement providers, as well as through various internal and national dissemination activities.

SP17: The effectiveness of video in developing ecological and laboratory skills in biological science students

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Theme(s): Engaging students in the laboratory and field

Abstract

The use of video demonstrations of practical techniques prior to laboratory or fieldwork classes may better prepare students for teaching sessions. The literature, however, indicates that the benefits to learning from realistic dynamic visualisations are dependent on the nature of the task being learnt and on the level of prior understanding of the learner. In this study the benefits perceived by second year university students of video demonstrations of a) fieldwork and b) laboratory techniques will be considered and compared. This presentation therefore brings together two studies. One concerned a module entitled Marine Zoology where videos of ecological sampling techniques where used prior to a residential field trip and students' perceptions were collected in focus groups. The other study concerned a module entitled Biomedical Analysis where videos of the use of laboratory analysers were made available to students via a virtual learning environment prior to laboratory practical sessions and students' perceptions were collected by questionnaires. In both modules the enthusiasm of students for practical work was evident. Student concerns regarding the implementation of practical techniques were overshadowed by their worries with experimental design and data analysis. In Marine Zoology it seemed that prior practical experience and peer discussion had a greater impact on learning than the videos whereas in Biomedical Analysis 72% of respondents stated that they found the videos helpful. The different results obtained for the two modules may reflect the different complexity of the practical procedures supported by the videos in the two settings suggesting that video is a more effective learning tool for technically complex procedures. Furthermore, students' concerns regarding data handling merits further investigation particularly as this may lead them to choose safe, less challenging options for their 3rd year projects.

SP18: The Whole Box n' Dice: inspiring first year nursing and midwifery undergraduates studying the biosciences by developing and implementing innovative learning initiatives that significantly contribute to a supportive learning environment and positive learning experience

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Theme(s): Inspiring first year students; Engaging students in the laboratory and field; Students and academics working together to improve the learning experience

Abstract

Nursing and Midwifery students studying bioscience courses (Anatomy and Physiology) on-campus (internally) and off-campus (externally) at the University of South Australia (UniSA), Adelaide, Australia come from a particularly diverse cultural, linguistic and educational background (King and Thalluri, 2006). For many nursing students the academic demands of the Biosciences courses can prove particularly challenging. In addition, our students' feedback suggests that students studying externally, with no face-face contact with academics, report feelings of social isolation studying in an electronic environment. This can lead to a negative student experience which ultimately may impact on student engagement and increase first year attrition rates (Abbot-Chapman *et al*., 1992).

In order to overcome these challenges and inspire our first year Biosciences students to learn and succeed a number of innovative learning initiatives have been developed and introduced into our Bioscience courses over a number of years. These initiatives will be discussed at the conference and include:

Developing and implementing flexible, supportive online resources utilising the Moodle Course Management System (Topic overviews, learning outcomes, power point lectures and lecture recordings, podcast feedback of assessment items, videos, interactive activities, simulated practical exercises, academic and social discussion forums);

Encouraging self–directed learning by developing a) case studies based on real world nursing concepts to enhance student's engagement and retention and b) course tailored topic online formative quizzes which also provide students with instant feedback on their progress;

Engaging students in the laboratory with the novel use of audience response systems ('clickers'); and

Recognising student achievement and providing student academic supports through a Student Coaching Scheme.

References

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NOTES

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POSTERS

P1: Working together to reduce plagiarism and promote academic integrity: a collaborative initiative

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Theme(s): Students and academics working together to improve the learning experience

Abstract

When a student is introduced to plagiarism in their early days of higher education, the induction is often a very negative one, including strict warnings and information about the range of punishments and dire consequences of committing plagiarism.

There is an alternative approach. Over the past few decades a growing number of US institutions have been adopting an honour code system, which has been reported to have a positive effect on the level of academic misconduct among their students. This value-based system places campus-wide emphasis on academic integrity, student involvement and mutual responsibility of staff and students for adhering to academic values and maintaining academic standards. Collaboration between staff and students and student-led initiatives, therefore, are instrumental to this model's success.

At Leicester, we are exploring how to change our approach to plagiarism (and academic dishonesty in general) to enable students make the most of their academic potential through embracing core academic values and mastering correct academic conventions. There is little existing research on whether this approach would work in the UK. An exploratory study in 2006 reported that while participants appreciated the idea of a positive value-based approach to their academic practice, they felt that honour codes might not be easily adopted in the UK setting because of their 'too American' tone and style (Clarke and Aiello, 2006). A series of focus groups with staff and students exploring what aspects of an honour code system may be acceptable in the UK was conducted. The poster will outline the project and the results from the focus groups.

References

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P2: Delivering innovative undergraduate programmes for industry

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Theme(s): Biologists working with others

Abstract

The University of Chester (UoC) is one of the UK's leading providers of work-based learning within Higher Education with a proven delivery model based on blended-learning. In conjunction with the North West Development Agency and support from the North West Universities Association, UoC has developed a Foundation Degree in Biomedical Processing Technology through the Higher Level Skills Partnership.

This innovative degree takes its lead from Industry to meet the priority needs of increasing skills and qualifications within the Processing Industries. Targeting the chemical, pharmaceutical and medical technology companies and aimed at maximising employee potential, this degree is developed with employers specifically aimed at encouraging careers in the skill shortage areas of biomedical processing thereby addressing the scientific and technical needs of industry.

In conjunction with UoC New Technology Initiative, the course includes programmes in leadership and management that can lead to professional accreditation.

This degree incorporates a flexible framework allowing academic credit for work-based learning. Additionally, developing bespoke courses for specific business needs has proved an attractive option and these can be timed to suit employer needs and requirements. This novel approach has enabled the University of Chester to promote and provide a responsive system for the generation of short one day 'bitesize' courses worth 5 credits, tailored to individual employer needs. These short courses can be used to gain academic credit towards Certificates of Professional Development or a Foundation Degree, providing a skills escalator for learners with clear career progression pathways for continuous professional development.

This innovative and unique course is designed to engender enthusiasm for life-long learning, reinforce the vital role of Applied Sciences and to address the skills deficit in these areas.

Expanding and developing networks between employers and providers of education is seen as a key element for future expansion of the employment skill base.

P3: Providing instant feedback during large practical classes to enhance the student learning experience

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Theme(s): Engaging students in the laboratory and field

Abstract

In the Faculty of Life Sciences (FLS), first and second year practicals are delivered as stand-alone units that are based on laboratory and experimental design skills. Providing feedback to students on experimental choices made during practical sessions or critiquing generated results can be challenging during the practical session due to the time required to observe individual students. This is particularly evident in departments with a large student cohort (approx. 550 students), leading to large practical classes. In order to help address this issue, Personal Response Systems (PRS) were used during a new second year unit, 'Experimental Design Module', to facilitate feedback during the practical session. The use of the Personal Response System (PRS) is widely used in universities to supplement lectures, however they are sparsely used to facilitate laboratory practicals. This system allows multiple-choice based questions to be asked during the practical session and students are able to respond via a hand-held wireless transmitter. The results are aggregated using specialist computer software allowing students to view their results on projected/ large screens. Practical sessions involved testing student understanding of the principles and reasoning behind the science and methodologies carried out in the practical session. Students completed evaluation questionnaires at the end of the semester and preliminary analysis showed that 89% of students on the EDM unit felt they had developed useful skills, over 65% of students found they had enjoyed the practical and 79% found the practical intellectually stimulating. This system enables 'real-time' discussion, guided student thinking and enhanced feedback during the practical. Student responses could also be used to drive the practical with students making strategic decisions at various points during the practical. The system has capabilities to be linked to student personal ID numbers for recording answers and so can be used for the provision of formative or summative assessment.

P4: Hit the ground running- easing the transition from school / college to university by using a 3 week induction programme

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Theme(s): Inspiring first year students

Abstract

There appears to be a link between attrition rates and the first year experience, with many new first year students finding it hard to make the transition to the university environment, especially those with non-traditional qualifications. We have adopted a condensed 3 week induction programme consisting of group work, laboratory sessions, critical thinking, and icebreaking activities. These activities then link into a skills-based double module which runs through the whole of the first year.

As part of a full day of induction, the students are allocated a personal tutor, and get to know other students in their tutor group by compiling a tutor group book by interviewing each other, and their tutors. All members of the course team are involved in this.

During the next week, another group work task is carried out, which involves them working with students they may not have met before. They are then asked to plan a lab task, producing a poster of the outcome. The students in each group peer assess each other, and are asked to reflect on this later on in the module.

These sessions are run in parallel with normal lectures, so that by the end of the 3rd week they know many of their fellow students, the staff, and are familiar with the laboratories and teaching rooms.

A detailed evaluation was undertaken after 3 weeks. Students commented favourably on how they were able to meet other students and their tutors during the induction. Although group work appears to polarise them (they either love it or hate it) the majority of students said the module helped them improve their skills. Since adopting this approach attrition rates have fallen to single figures, and those students from non-traditional backgrounds, such as access courses appear to be much more confident about their abilities.

P5: Design and development of online group assessments through collaboration between students and staff

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Theme(s): Students and academics working together to improve the learning experience

Abstract

Educational research has long since acknowledged the powerful role of different forms of assessment in student learning. Assessments can be used in various contexts to provide assessment of learning and assessment for learning. Online group assessments were developed for a new undergraduate haematology module at the University of Manchester. Although part of a summative assessment, the assessments were also aimed towards integrating lecture material with real life case study “patient” scenarios.

Assessments were originally designed and developed by staff and included analysis of two scientific papers and three case studies. Each assessment was worth 1% giving a total of 5% towards the final unit mark. At the end of the semester, students were asked to complete evaluation questionnaires commenting on content, format and suitability of assessments. Preliminary analysis indicated that over 80% found the assessments intellectually stimulating, allowed them to apply knowledge gained in lectures and enhanced their learning. A similar percentage felt the assessments would help with their exam revision. The most stimulating assessment was interestingly also most time-consuming. Overall it was felt that analysis of the scientific papers was least stimulating and not suited to online group work. These two assessments will now be individual assessments and will contain an element of self/peer assessment. The final available assessment mark will be increased to 10% as 5% was deemed to be very low considering the workload.

As a result of student feedback, collaborations have been established between staff and students who have completed the haematology module to further develop content and format of these assessments. Combining the knowledge of staff and experience of students is expected to lead to better informed and effective assessments and therefore enhance the student learning experience.

P6: Text messaging for student communication and voting

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Theme(s): Inspiring first year students

Abstract

Text messaging has gained widespread popularity in higher education as a communication tool and as a means of engaging students in the learning process. In this study we report on the use of text messaging in a large year one introductory chemistry module where students were encouraged to send questions and queries to a dedicated text number both during lectures and at other times when support with module material was required. Questions were answered either verbally during the lecture itself, at a subsequent tutorial or via a reply back to the student's mobile phone. This was in addition to broadcast messages being sent from the lecturer to remind students of class tests, deadlines for assignment etc. In an attempt to augment student feedback SMS texting was also used as a rapid system for communicating results of a class test following a peer assessment exercise. With knowledge only of the student's registration number a text message can be sent to a dedicated text number and then forwarded by mail filtering rules to the recipient student's mobile phone. Finally, text messaging was evaluated as an in-class voting system to conduct short multiple choice quizzes on material being covered in a bioanalytical chemistry lecture without the need for bespoke handsets or specialist software. Students commented favourably on the use of text messaging in these contexts. However, while mobile telephony is ubiquitous factors such as ownership of phones, cost to students of sending messages and availability of signal in lecture theatres need to be addressed before the system can be used for summative assessment or as the sole method of communication. Full results of the study have been reported (McClean, *et al*, 2010).

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P7: Enhancing the student experience of the application of scientific techniques in practice

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Theme(s): Engaging students in the laboratory and field

Abstract

This project was designed to enhance the experience of undergraduate science students on programmes within *the* School of Health Sciences at Queen Margaret University, which predominantly teaches Allied Health Professional courses that include a clinical placement. Students on the Human Biology and Applied Pharmacology programmes, however, do not currently have the opportunity to go on a practical placement and experience science techniques in the workplace. It was felt that offering these students the opportunity for short-term placements would increase their employability by allowing them to engage in the application of scientific techniques in practice. A structured approach was set up to arrange one week placements in industry, other universities, the NHS and other stakeholders who routinely employ practical scientific techniques and who ultimately create career opportunities for many of our graduates. The aim was to incorporate the placements into the curriculum to enhance understanding of theoretical scientific and technical concepts. Despite a range of logistical difficulties and a muted response from some stakeholders, final year students were given valuable insight into how theoretical science is used in practice. In addition, the project encountered various issues that will serve to inform academic staff on how to ensure effective science placements in the future. Benefits for the wider science community were assured through the development of a Toolkit to assist academic staff, students and placement providers, as well as through various internal and National dissemination activities.

P8: Development of a PBL Resource Centre (pbLRC) to support and promote PBL in different disciplines

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Theme(s): Students and academics working together to improve the learning experience

Abstract

Problem based learning (PBL) is an educational strategy that helps foster and strengthen the reasoning and communication skills necessary for graduate employment. As the transition from traditional instruction to a problem based approach to learning requires many changes for educators and for students, the aim of this project was to develop an online learning centre (pbLRC - http://samsara.scic.ulst.ac.uk/~kay/pbl/) to provide staff with resources to embed problem solving and creative thinking in their curriculum design. At the initiation of the project, development was informed by meetings with students and a staff web-based questionnaire to audit current PBL activity in the University. This project has resulted in the development of an interactive pbLRC for staff to obtain guidance and information on designing PBL activities appropriate for the delivery of their own subject. Within the pbLRC there are links to student-centred e-learning technologies such as e-portfolios; an on-line peer assessment tool; a creative thinking tool; feedback tools for staff and students; a searchable database of case studies and a facility for users to add their own case studies. Workshops and a conference were organised to demonstrate the use of the pbLRC and other embedded tools, and comments from staff have included 'the website as a resource was excellent' and it is 'an excellent opportunity to identify the benefits and possible pitfalls of this approach'. To ensure currency and sustainability the team continues to review and modify the pbLRC, with changes in practice and feedback from staff and students. The resources have been presented in a logical manner, recognising the needs of different educators. This initiative provides a management and support facility to promote and foster creativity in curriculum design and delivery, and provides developmental tools to facilitate the different pedagogic approaches to PBL that may exist in different disciplines.

P9: Engage for learning

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Theme(s): Students and academics working together to improve the learning experience

Abstract

This poster will showcase three online resources developed at the University of Reading under the “Engage” brand, but available internationally as an open and free resource to support learning. These resources have been developed to provide learning support to both staff and students. The poster will showcase:

Engage in Bioscience Research, a website developed to help students better understand and engage with the scientific process;

www.engageinresearch.ac.uk/

Engage in Feedback, a website developed to help staff improve the quality and timeliness of feedback to staff, showcasing good practice and providing a range of tools, tips and resources to improve feed-forward, feedback and dialogue with students;

www.reading.ac.uk/internal/engageinfeedback/EFB-Home.aspx and

Engage in Assessment, a website developed to provide staff with pedagogic support in terms of the assessment methods they use, providing a range of ideas on using assessment for learning.

P10: Student perceptions of the value of formative assessment in their academic development

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Theme(s): Inspiring first year students; Students and academics working together to improve the learning experience

Abstract

Formative assessment plays a crucial role in supporting learning and understanding for first year students at Writtle College. There is a high level of engagement and strong support for the process from students from a diverse entry profile. The approaches designed to aid transition to higher education, were found to be of value when they were explicitly coupled to, and underpinned, summatively assessed work. Students engaged with voluntary formative assessment opportunities as it was perceived to accrue benefits, particularly with regard to academic expectations and learning enhancement.

The use of formative feedback is overtly used to establish an important dialogue between student and tutor, personalising the first year to help support transition at a critical point early within a programme of study. The immediacy of formative feedback plays a valuable role in meeting individual learner needs particularly for mature students, those progressing from the FE sector and students from non-traditional science backgrounds. Moreover, the feedback mechanisms allow students to reflect and evaluate their own work in the context of learning outcomes and assessment criteria and set improvement targets linked to their personal development plans. Within a formative framework, the use of small group work also encourages discussion and interaction establishing a network of peer support for collaborative learning.

This two year study reinforces the view that curricula and assessment design must be responsive to the needs of different learner groups, in particular within the first semester and first year of study. Student perceptions, especially those who have experienced these approaches and are now studying at Level 5 and 6, are being captured and their reflective thoughts will be used to evaluate the first year learning experience.

P11: Graduates for the 21st Century: promoting the Scottish Enhancement Themes in the Biosciences

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Theme(s): Inspiring first year students; Students and academics working together to improve the learning experience

Abstract

Although clearly grounded within the Scottish higher education system, the majority of the findings and resources developed from the QAA Enhancement Themes are applicable to the whole of the UK. Likewise there are many resources and publications developed in other parts of the UK that are directly applicable to the Enhancement Themes. With this in mind and thanks to some small-scale funding from the Academy Scotland Practitioners' Forum, the UK Centre for Bioscience has developed a resource pack to disseminate the work of the QAA Enhancement Theme approach, both within Scotland and the UK as a whole. This resource pack draws attention to the Centre's resources relevant to each theme. The pack provides background information and showcases a range of key learning, teaching and assessment resources, both generic and bioscience-specific, for each of the following Scottish Enhancement Themes:

- Assessment (including integrative assessment)
- Employability
- Flexible delivery
- Responding to students' needs
- Research-Teaching linkages: enhancing graduate attributes
- The first year: engagement and empowerment

The resource pack also aims to draw attention to some fresh perspectives for each of the previous themes under the current Enhancement Theme, Graduates for the 21st Century: Integrating the Enhancement Themes. This poster provides an overview of the enhancement flyers developed for the bioscience resource pack and links with the Effective Learning in the Biosciences Conference themes of: students and academics working together to improve the learning experience and inspiring first year students.

P12: Are multimedia resources effective in bioscience education?

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Theme(s): Engaging students in the laboratory and field

Abstract

Multimedia resources including animation, video and audio are widely used in higher education, but are they worth the time and financial investment they take to prepare? A systematic review was conducted to answer the question *"*are multimedia resources effective in bioscience education"?

The systematic review followed the Cochrane guidelines and included stringent criteria for identifying and selecting studies; in short, participants were studying undergraduate-level biosciences, and performance outcomes included test and examination results. Data underwent meta-analysis using "RevMan 5" software.

The searches identified 233 studies overall, and 216 were excluded leaving 17 articles for data-extraction. Table 1 greatly summarises the study outcomes with a "+" favouring a multimedia solution and a "-" favouring a conventional / control approach.

Table 1: Summary of Meta-Analysis Results

Comparison	Outcome	p
eLearning vs Practical – short term retention eLearning vs Practical – long term retention	- +	p=0.07 p<0.001
eLearning vs Lecture – short term retention eLearning vs Lecture – long term retention	+ -	p<0.05 p>0.05
eLearning vs Blended Learning – long term retention	-	p>0.05
eLearning vs Text Book – short term retention eLearning vs Text Book – long term retention	+ -	p<0.001 p>0.05
Static vs Interactive Webpages – short term retention	+	p<0.05
Graphic vs animation – short view – short term retention Graphic vs animation – repeat viewing – short term retention	- +	p<0.05 p>0.01

In conclusion, multimedia resources were beneficial as a substitute for laboratory practicals, and also improved short-term knowledge retention compared to a lecture or text book. Levels of interactivity and access to the resources were also important factors. Further research is needed to continue evaluating the effect of multimedia resources in the biosciences, and this review also highlighted the need for improved study quality and design, and accurate reporting of methodologies and numerical data.

P13: Developing a pedagogic research support group in the biosciences

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Theme(s): Biologists working with others

Abstract

Bioscientists are becoming increasingly engaged in educational research. This reflects a number of drivers, including the desire to improve the student learning experience and an increasing focus on teaching activities by some staff who were previously engaged in scientific research.

The initial moves can feel unsettling: we are familiar with conducting experimental science but the design and dissemination of educational projects can seem alien to us and the education literature often seems very difficult to approach. Additionally, scientists moving into education research can feel isolated within their home department.

Since 2006, the School of Biological Sciences at the University of Leicester has sought to counter these difficulties via its pedagogic research group, which has significantly raised the profile of research into learning and teaching among academic staff. Although the membership primarily comprises bioscientists, key contributors are the members from other subject areas including education, the arts, social sciences and the Student Learning Centre. The group meets once a month at lunchtime for a 2 hr period and activities have included:

- Update reports on ongoing research projects, including exploration of ideas for new projects
- Sharing of funding sources and abstract submission dates
- Discussion/critiquing of published educational works
- Outside speakers giving presentations on projects they are involved with
- Practice of conference presentations
- Development of teaching practices

Key features of the group dynamic include:

- Acting as supportive critical friends
- Open discussions
- Colleagues from other disciplines who bring their own, very helpful perspectives
- Cake…

There are some caveats:

- The group needs active management to keep it going
- It is important to maintain a focus and avoid it becoming an adjunct to a board of studies
- The meetings need to be themed

P14: Can psychological principles be applied to improve the value of feedback opportunities?

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Theme(s): Biologists working with others

Abstract

Improving the value of feedback, and creating useful opportunities for students to benefit from the formative aspects of assessment is a clearly stated objective for those involved in bioscience teaching. A significant driver for this is the realisation that students entering a bioscience degree programme are faced with significant challenges as they make the transition to a learning environment that encourages reflective practice. At Birmingham solutions based soundly on educational research and shared good practice have been applied, and these initiatives are yielding positive results. As a complementary approach we are exploring the notion that psychological principles of memory and learning may be applied to improve the value of feedback and academic performance. A pilot study undertaken by a vacation project student investigated how psychological principles are, or could be applied to teaching, learning and assessment on the BMedSc course run by the College of Medical and Dental Sciences at Birmingham University. Student mindset was one of the key factors that emerged as being likely to influence approach to learning, and appreciation and use of feedback. In collaboration with Jesse Martin in the School of Psychology at Bangor University this project aims to follow through on some of the suggestions arising from the pilot study. With informed consent, volunteers from the current first year BMedSc cohort have been assessed on entry to the course to determine whether they fall into the mindset category of either a) entity theorist, or b) incremental theorist. By following the progress of these students it will be possible to look for any relationships between mindset and for example improvement in performance, progress and engagement with the opportunities provided by the course. Preliminary findings from this ongoing project will be presented.

P15: Biology students building computer simulations using StarLogo TNG, a graphical programming environment

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Theme(s): Biologists working with others

Abstract

Complexity science is key for understanding collective phenomena in animal behaviour, such as insect swarms, bird flocks, and ungulate herds. However, many biology students are not equipped with the computational skills to apply a main research tool of complexity science, computer simulation. In this presentation, I describe use of StarLogo TNG, a freely-available graphical programming environment, to enable biology students to rapidly learn programming fundamentals and develop their own simulations of collective animal behaviour. StarLogo TNG was developed by MIT's Teaching Labs as an easy-to-use interface introducing students to concepts in complexity science such as self-organisation and emergence. Agent-based simulations are developed using graphical programming "blocks", each corresponding to a programming command, to control the behaviour of various "breeds" of agents – such as "Ants" – which the students then view performing programmed behaviour in high-quality 3D rendition. The blocks represent a fully functional programming language. Students are introduced to concepts such as variable types, assignment, procedures, and flow control (e.g., if-then statements, loops). I developed a practical (two two-hour sessions) using StarLogo TNG for the Senior Honours module "Complex Systems in Animal Behaviour". In the first session, students are guided through the process of building a computer simulation representing simplified ant-nest construction. Students do not follow a cookbook of linking commands, but instead are led through a stepwise and debugging process, required to periodically view the output of their code and consider the next elements. In the second session, students modify this simulation on their own to perform an experiment exploring effects on emergent properties of the system. I report preliminary results of a study of the impact of this practical on the students' ability to understand computer code (text-based and graphical), their confidence in their understanding, and their perceptions of computer programming.

P16: From Petri dish to print: growing undergraduate researchers

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Theme(s): Engaging students in the laboratory and field; Students and academics working together to improve the learning experience

Abstract

Background: The last decade has seen a surge of interest in the role of undergraduate research in relation to the 21st century employability agenda, and inquiry-based learning in particular – a process that requires students to engage in authentic research experiences (Healey and Jenkins, 2009).

Summary of work:

The Royal Veterinary College offers a 3-year BSc in Bioveterinary Sciences, which is heavily research-based. Students conduct a 6-week laboratory-based research project in year 2, and a more substantial hypothesis-based 12-week laboratory project culminating in a 10,000-word dissertation in year 3. Encouraged by a senior academic 'student research champion' and with the provision of internal funds, students are able to present their findings at national and international conferences and subsequently publish in peer-reviewed journals. A questionnaire and focus group study was carried out with graduates from 2005-2008 to identify the impact of the course on immediate career destinations (Dale *et al.*, 2010). Information has since been gathered about subsequent cohorts.

Summary of results:

Students' active participation in laboratory research – under the leadership of academics acting as role models and mentors – inspired a number of students to abandon their original intentions to become veterinary surgeons to pursue an alternative career in bioscience (Dale *et al.*, 2010). In the most recent graduating cohort, 45% of graduates chose to pursue a career in science, either through employment, a Masters degree or a PhD. This represents a significant increase on previous years, indicating the growing success of the course in preparing graduates for bioscience careers. This is reflected in the number of student external-presentations and publications in 2010.

Conclusions:

A research-oriented BSc in Bioveterinary Sciences influences career choice and produces graduates with published evidence of their knowledge and skills, further legitimising their participation in the science community of practice.

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Wildman and Dale contributed equally to this work.

P17: Exploring the barriers to transnational education in biosciences students

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Theme(s): Biologists working with others

Abstract

It is widely accepted that international experience adds value to undergraduate degree programmes in offering enhanced opportunities for personal development. The opportunity to live and work in another country has been suggested to provide numerous benefits: to enhance the development of resourcefulness, self-confidence and interpersonal skills; to increase awareness of one's own ethnocentrism and cultural awareness; to improve employability and to provide motivation towards an international career.

In spite of these advantages the proportion of UK science students benefiting from international exchange programmes is disappointingly low. This is exemplified at Newcastle University by the fact that only 2% of outgoing Erasmus programme students are from the Faculty of Medical Sciences or the Faculty of Science, Agriculture and Engineering.

We have explored the attitudes of our bioscience students to a period of study overseas. A questionnaire was sent to BSc students from biomedically-related programmes to ascertain the perceived benefits of and barriers to study abroad. The results indicate that the majority of our students would be interested in a period of study abroad with most saying they would prefer to study at a university in the USA or Canada. There seems to be no clear picture as to the time they would prefer to be away with students saying they would be happy going on a vacation placement or having a semester or year abroad. Students perceive a wide range of benefits from a period of study abroad, including increased self-confidence and only a small minority could see no advantage. The major perceived barrier is the expense of the placement.

The results of the study will allow us to develop new exchange opportunities in the light of this improved understanding of our student's attitudes to study abroad.

P18: Two-tier multiple choice questions – an alternative method of formative assessment for first year biology students

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Theme(s): Inspiring first year students

Abstract

Formative assessment is a very appropriate and practical method of monitoring student progress, which has shown to significantly improve student learning by allowing them the opportunity to gain a better understanding, and therefore promoting Assessment for Learning (Black and Wiliam, 1998; OECD, 2005). However research has reported that formative assessment methods are rarely used in both second and third level classrooms (Angelo and Cross, 1993; Black and Wiliam, 1998; Keeley, 2008). With increasingly large class groups, it is becoming more and more difficult for third level lecturers to record student progress and learning (Angelo and Cross, 1993).

In this research study a method of formative assessment called Two-Tier Multiple Choice Questions (MCQs) in Biology were designed, developed and evaluated by First Year Students of Biology at the University of Limerick, Ireland. Two-Tier MCQs have proven to be very successful in educational settings (Williams, 2006) and research has shown that not only do they (1) help to test student understanding, but they also (2) aim to test student higher level of cognitive thinking and (3) help to identify misconceptions students may have (Haladyna and Downing, 1989; Nicol, 2007; Scouller, 1998; Treagust 2006). Two-Tier MCQs are not intended to be a sole method of assessment but are intended to be used at intervals to monitor student understanding of the material being covered during lectures.

In this study, the developed Two-Tier MCQs in Biology were introduced to First Year Undergraduate Science Students, which they then evaluated. This paper will present the results of this evaluation and the attitudes of the students towards the Two-Tier MCQ assessment tool. Preliminary results from this study show that the students responded very positively to this method of assessment, stating that they would benefit greatly from using this tool in their biology lectures and laboratory sessions.

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P19: A sequenced library of human DNA fragments for molecular genetics teaching

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Theme(s): Engaging students in the laboratory and field

Abstract

This resource was developed to teach the principles of DNA cloning in an integrated fashion, providing students with exposure to both traditional “wet lab” experiments and to techniques in bioinformatics. The experiments encourage the students to compare and contrast the information that can be gleaned from the two approaches.

We have constructed a mini library of around 80 random segments of human DNA. Size-selected DNAs were ligated into a commonly used plasmid cloning vector and transformed into E. coli. Recombinant DNAs were characterised by sequencing each end of the human DNA insert using primers located far enough into the vector to ensure that the sequence of the junction between the vector and the insert is easy to read.

Students prepare plasmid DNA from their assigned clone and analyse it using various standard laboratory techniques such as restriction enzyme digestion, agarose gel electrophoresis, polymerase chain reaction (PCR) amplification, and Southern blotting followed by hybridisation with a probe specific for a repetitive DNA element.

The DNA sequence data also allows the students to analyse their plasmids using freely available software tools. First, the students analyse the DNA sequences to determine whether or not the ligation process at each end of the insert has re-created the restriction enzyme site into which the human DNA was ligated. The sequence data are then aligned with the current human genome assembly using the UCSC Genome Browser (http://genome.ucsc.edu/cgi-bin/hgBlat), allowing students to determine the chromosomal location of their segment of DNA and an accurate measurement of its size which is compared with that determined by gel electrophoresis.

Anonymised feedback from students indicates that they enjoy being assigned their “own” individual plasmids, making the practicals “more interesting and challenging”.

The library of cloned DNAs and the associated sequencing data are available on request. (see www2.le.ac.uk/departments/genetics/genie/projects/undergradresources)

P20: Stretching the most able: an update

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Theme(s): Students and academics working together to improve the learning experience

Abstract

In 2007 the UK Centre for Bioscience published a report entitled: “Differentiated Learning: Stretching the Most Able” (www.bioscience.heacademy.ac.uk/ftp/resources/shortguides/difflearn.pdf). This suggested that universities, whilst justifiably seeking to widen student participation, might be in danger of neglecting more able students “due to special provisions being almost always made available [only] to weaker students”.

In order to address the possible inequity inherent in this situation the following strategy was adopted. Third Year students achieving sufficiently high grades in core physiology/pharmacology modules were allowed to participate in an optional module containing more advanced material. Student attainment in this selective module (~ 30 students per year) was then compared to the attainment of the same students in a core module containing the whole cohort (~140 students). A potential confounding factor in the interpretation of the results was that student performance was being compared over different sized modules. To account for this, performance on the optional module when there was no selection for ability was also recorded. Additionally, the attainment of lower achieving students in the optional module and core module was also compared.

When selected on the grounds of previous academic performance, students (n=20) achieved higher marks ($p = 0.00001$) in the option module (69 ± 2 %) than they did in a core module (58 ± 2 %) in which the whole year cohort participated. When students were not selected by ability there was no increase in performance over two years for the more able students (eg. 69 ± 1 vs 69 ± 2 %; n = 10; $p=0.95$). Furthermore, lower-achieving students saw no improvement in their performance in the options module compared to the core module (48 ± 2 vs 52 ± 4 %; n=10; $p=0.12$).

This suggests that students selected to be academically stretched improve their marks compared to a setting where they are not so targeted.

P21: An investigation into the best assessment practices in the biological sciences to inspire student learning in Irish third level institutions

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Theme(s): Inspiring first year students

Abstract

Assessment practices have a strong influence on how students learn and on the students' ideas about what type of learning techniques are most valued and most highly rewarded (Trigwell and Prosser, 1991; Drew, 2001; Earl, 2003). In the past many research papers have reported that there is a very strong link between students' perceptions about assessment and their approaches to learning (Drew, 2001; Maclellan, 2001; Struyven *et al*., 2002). Therefore there is a very strong relationship between assessment design and the effectiveness of student learning in the Biological Sciences (Boud, 1988; Mc Innis & Devlin, 2002). Devising and introducing new, innovative and different forms of assessment into biology modules are welcomed to inspire students learning.

The aim of this research study was to gain insights and examples of good assessment practices in the biological sciences from third level students. Students' perceptions and ideas on successful methods of assessment and their suggestions on how to change assessment practices provide a valuable insight into how educators can improve assessment methods for learning. This information can then be used to enhance assessment practices by sharing successful methods of assessment with the wider academic community.

Questionnaires were distributed to undergraduate students (1^{st} – 4^{th} year students) studying subjects in the Biological Sciences in different third level institutions to investigate and evaluate assessment practices being used. This paper reports on the students' attitudes towards learning and studying for biology examinations, their perceptions and ideas on successful methods of assessment and suggestions on how to change assessment practices to inspire their learning. The most common assessment methods among academics were also identified and evaluated for their effectiveness by the students.

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P22: Raising the profile of Bioscience Open Educational Resources (OERs) on the web

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Theme(s): Students and academics working together to improve the learning experience

Abstract

OER projects “Virtual Analytical Laboratory” (VAL) (http://tinyurl.com/oerval) (part of the “Bioscience Laboratory Field Work Manual”) and “Sickle Cell Open” (SCOOTER) (www.sicklecellanaemia.org) have released many OERs onto the internet. These resources are for academic use, and are also openly available to students to enhance their educational experience. As OER numbers escalate, those releasing them need to promote discoverability. Search engine optimisation (SEO) is a technique for enhancing website discoverability, and this abstract compares the performances of sites undergoing SEO (SCOOTER) or not (VAL).

There are three sources of web traffic; direct from knowing the URL; visits from a referring site, and organic traffic or people who visit by searching. To gain organic traffic a site needs to rank high in Google and will need regular new content, optimised keywords and back-links. The performances of SCOOTER and VAL were compared from their launches through their first 10 weeks on the web using Google Analytics. Table 1 summarises the SEO techniques and Table 2 summarises the results.

Table 1 *SEO Techniques*

SEO Technique	VAL	SCOOTER
Keyword optimised	No	Yes
Back-links	Random occurrence	Active strategy
New content	Irregular	Weekly
Community building	No online networking	Twitter, Posterous, Facebook, Ezine, Other

Table 2 *Performance Results*

Parameter	VAL	SCOOTER
Time frame	Sept – Nov 2008	Nov – Jan 2011
Direct traffic	92%	34%
Organic traffic	8%	27%
Referrals	0%	39%
Number of visits	150	365
Av. Page views per visit	1.47	3.66
Av. Time on site	32 s	3 mins 35 s

To conclude, using a website and SEO techniques can greatly enhance the discoverability of OERs and thus maximise their use by staff and students. Further research will not only determine the “reach” but also the “impact” that these resources have.

P23: Why do I need to learn this?

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Theme(s): Inspiring first year students

Abstract

A common problem in teaching first year students is engaging their curiosity and stimulating their desire to learn. Many students associate their need to know something with marks which might be earned, which at times can undermine their own learning. Students are not always aware of why they need to know basic physiology before they reach the stage of being able to apply their knowledge. In an attempt to inspire a sense of excitement an enquiry-based learning session was run in order to persuade the students to see what lies beyond their current knowledge and to want to get there. The reproductive system was chosen because all students know something about and have an interest in it, either from their earlier academic studies or via sex education. The session began by attention being drawn to what they all knew and was followed up by some deeper questions and students were encouraged to pose their own questions that they may have wondered about. Students were then asked to pick one or two that aroused their interest and they worked in groups or pairs, using resources of their choice to see if they could find out some answers or, better still, some other questions that will need to be answered before they could answer their question. Students then reconvened for a plenary session. Responses were overwhelmingly positive. Students made comments such as 'I'll need to learn a lot more before I can understand this' and 'I hadn't realised how clever the body is'. The aim was to motivate the students to see how knowing more about basic physiological concepts would help them understand something that they want to know more about, and they left the session primed and ready to engage in the module.

1st July 2011

W3: Invention activities for small group learning in first year biology

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Theme(s): Inspiring first year students

Abstract

Based on a two-year study at the University of British Columbia, Vancouver, Canada, this workshop will present a novel approach to small group activities used in a first year microbiology course designed to illustrate the principles of cell biology. With this approach, students are provided with an Invention problem and asked to devise a solution. Invention activities relate to lecture material, but are attempted prior to presentation of the material and are based on scenarios that are not obviously associated with a cell's biological systems. In groups, students draw from previous knowledge and apply their group experience to the situation. The process encourages active reflection, analysis, and synthesis of information. In principle, these activities focus the students on the fundamental concepts of a particular subject area complementing the course curriculum.

The aim of this workshop will be to introduce educators to Invention activities. Using an experiential learning model, attendees will complete an activity and reflect on their experience. This will include a discussion as to what defines an invention activity and methods for adopting these activities in various types of classroom environments. This process will present educators with a novel way of "teaching students to think like scientists" and additionally we will show how Invention activities can be used to encourage a very high level of student engagement.

SP19: “Here’s one we prepared earlier”: involving former students in careers advice

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Theme(s): Inspiring first year students; Biologists working with others

Abstract

Graduate employability is of major significance to the sector. A tough economic climate and concern that their time at university will translate into a better job (especially in the light of an anticipated rise in tuition fees) are current motivators for the students. Universities, Government, employers and representative organisations are increasingly recognising the importance of providing undergraduates with accurate advice and information about careers.

To address this issue and to promote the wealth of careers available to bioscience students, we have been running an annual series of ‘Careers After Biological Science’ (CABS) seminars. All of the outside speakers graduated from the School of Biological Sciences at Leicester and are therefore ideally positioned to advise our current students about entering the profession they represent. Emphasis throughout is placed upon both Careers *in* Science and Careers *from* Science.

Now in its fifth year, the CABS programme has evolved into a multi-media resource for students. In addition to an annual series of careers seminars, we have experimented with a variety of tools for enhancing dissemination of the material covered, including videos of the talks, and visits to film speakers in their workplace. These videos and the slides from all presentations have been made available via a bespoke website (www.biosciencecareers.wordpress.com).

This presentation will place particular emphasis upon the generic lessons gleaned during the evolution of the CABS programme, including the pivotal role played by a variety of Web 2.0 resources (Facebook, LinkedIn, blogs, etc) in both re-establishing contact with potential speakers and in the dissemination of the careers information to a broader community than those able to attend the events in person. Advice on the organisation of the careers events themselves will also be offered.

SP20: Student engagement with feedback

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Theme(s): Students and academics working together to improve the learning experience

Abstract

The School of Biological Sciences and the Students' Union at the University of Leicester are collaborating in a long-term campaign to improve students' experience of feedback on coursework. During the life of the project to date the proportion of Biological Sciences students expressing satisfaction with feedback provision, in the NSS, has improved from 58 to 74%. Based on findings from research undertaken in the School (Bevan *et al.*, 2008; Scott *et al.*, 2009) the campaign has two elements, the first being a set of ongoing projects and workshops with academic staff which have been focused on enhancing the quality of the feedback provided without increasing the academic workload.

This presentation will focus on the second element, which is an ongoing programme working with students to increase their awareness and utilisation of the different forms of feedback they receive. The programme commenced in autumn 2010 with a two day postcard campaign, fronted by the Students' Union, aimed at getting students to think about the different types of feedback they receive, what they find most useful and how they use it. Over 600 undergraduate students engaged in the campaign across the University and the results are being used to develop a Students' Union website and guidance for students on using feedback, at departmental and university levels, which parallel the guidance being developed for staff. The results are also being fed into the next stages of the staff campaign.

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Funding from the GENIE CETL contributed to the development of this work.

W4: On-line resources to help students maximise their learning in practical classes

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Theme(s): Engaging students in the laboratory and field

Abstract

The aim of this workshop is to introduce and showcase a variety of openly available resources which we have recently developed to support first year students in preparing for biochemistry practical classes.

During the first year of a novel, project-based practical course, it became apparent that students found effective preparation for practicals difficult, often resulting in delayed starts to their practical work, and decreasing the benefit derived from the available laboratory time. To tackle this issue, we have developed a series of on-line multimedia resources for the 2010-11 session, designed to support student preparation for, and performance in practical sessions, available to students via the Blackboard VLE.

These on-line units cover a range of information, including laboratory safety, the theoretical background to experimental techniques, use of equipment, and how to record information effectively both in laboratory notebooks and in written reports. Units include varied multimedia materials, including animations, videos, and quizzes to help students check their understanding prior to the class, and for revision purposes. This material is then tested via summative multiple response tests, linked to Gradebook. The majority of the materials developed are generic, and could be simply adapted to the needs of students on a range of courses. A range of units, covering common techniques including spectrophotometry, protein separation, enzyme assays and molecular biology are now available through JorumOpen (http://open.jorum.ac.uk/)

During the workshop we will describe the background to this project and demonstrate the features of the resources that have been developed. We will share lessons learnt during the development of these resources, report on evaluation of the project by students and staff, and discuss further applications of this approach.

IP9: OeRBITAL: Enhancing the student learning experience through the use of Open Educational Resources

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Theme(s): Inspiring first year students; Engaging students in the laboratory and field; Biologists working with others

Abstract

OeRBITAL (Open educational Resources for Bioscientists Involved in Teaching and Learning, www.bioscience.heacademy.ac.uk/resources/oer), is a UK Centre for Bioscience project, the aims of which are to discover and promote the use of Open Educational Resources (OERs) in the Biosciences. Ten discipline consultants, who collectively have expertise from across the biosciences, have been appointed to search for, evaluate and disseminate, via the project wiki and through professional networks, information on the best open educational resources currently available within their respective disciplines. The benefits of sharing teaching resources include: the enhancement of the student learning experience by giving students access to materials or resources that you are unable to provide; utilising the knowledge and expertise of colleagues, both within the biosciences and in other disciplines, to promote interdisciplinary and multidisciplinary learning and teaching ; the potential for enormous savings in cost and time.

However, the use of OERs is not without problems.

The aims of this interactive presentation are to increase participants' awareness of the availability of OERs within their particular discipline, to highlight the benefits of using OERs in their teaching to enhance the student learning experience and to encourage them to consider developing or using OERs. Thus, we will outline the background to the project and showcase examples of some of the best OERs from across the biosciences that the discipline consultants have discovered. The session will also include group discussions of participants' previous experience of using OERs in their teaching, the benefits and problems associated with OERs and the future development and use of these resources within the Biosciences.

SP21: PLEASE: Enhancing Fieldwork Learning

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Theme(s): Engaging students in the laboratory and field

Abstract

This paper will provide an overview of the research currently *underway* in the NTFS Higher Education Academy funded PLEASE[1] project, enhancing fieldwork learning in the Bio and Geo Sciences.

Fieldwork is a resource intensive and expensive component of a departmental budget within the bioscience and GEES[2] communities. Research conducted by Boyle *et al*. (2007) outlined that fieldwork is successful in 'stimulating effective approaches to learning', thus, it is important to maximise the learning that takes place within this space outside of a traditional lecture theatre.

One of the ways to maximise learning in the field is to enhance current fieldwork practice with emerging technologies (hardware and software). However, often practitioners are disengaged by the term 'technology' and are uncertain about embracing these new software due to their own lack of confidence and experience. "Rather than be threatened by it" (Bradwell, 2009) this project aims to encourage practitioners to connect with both familiar and new technology and think about how they can be used within a field situation. The PLEASE project focuses on taking good practice found in current fieldwork and enhancing this through the use of technology in a way that is accessible to both staff and students. One example of this may be photographing traditional field sketches, uploading them to a photo sharing site such as Flickr and allowing students to share their sketches. One of the major outputs of this project will be a web-based resource filled with easy solutions and ideas for practitioners to apply in their own fieldwork and enhance learning through technology.

This paper will provide an overview of the project and outline the resources developed to date, give an overview of a baseline survey of fieldwork and outline how the PLEASE project will develop in the future.

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1 www.enhancingfieldwork.org.uk/
2 Geography, Earth and Environmental Sciences

SP22: Redesigning induction and transition: engaging bioscience students

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Theme(s): Inspiring first year students; Engaging students in the laboratory and field; Students and academics working together to improve the learning experience

Abstract

The students' early experiences of university life and an effective transition can influence their commitment to their course, their academic engagement, and their willingness to persist (Tinto, 1993; Edward 2003). Use of an induction audit (The STAR Project), and responding to the experiences and perceptions of students, can allow the incorporation of best practice approaches and discipline specific, student-centred activities in induction and transition, and can promote the social and academic integration conducive to student engagement (Carter, 2003).

Following an induction audit, the transition and induction provision in Biosciences at Glasgow Caledonian University was redesigned to focus on pre-entry support and engagement, development of learning communities, peer support, and social and academic integration. Bioscience students perceived subject specific information and lab based activities as far more important than the traditional generic activities, so all induction and transition activities were designed within a discipline specific context.

Pre-entry provision was redesigned to include discipline specific open evenings for applicants, friends and family, with opportunities to participate in laboratory tours, programme specific practical activities, interviews, career information sessions and opportunities to meet and question staff. The design and launch of a peer facilitated pre-entry social network encouraged early social and academic engagement through programme specific resources, peer support and vidcasts.

The week 0 induction programme was redesigned to incorporate "bite size" generic sessions into a three day discipline specific lab based research project, providing students with the opportunity to attain, and appreciate the importance of, generic skills in the context of their discipline, whilst encouraging the early formation of learning communities. This early exposure to lab based activities and the associated social integration was considered by students to be crucial in the early engagement with their subject.

Redesigning induction and transition has resulted in a more discipline focused and student-centred transition experience which as part of wider strategies has had an impact on engagement, retention and progression.

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SP23: Overcoming the chemistry hurdle for first year bioscience students

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Theme(s): Students and academics working together to improve the learning experience

Abstract

Chemistry is an important, underpinning subject for the biosciences particularly biochemistry. It often presents a hurdle to beginning students at third level depending on their chemistry background. Identifying weak students early on and providing targeted help, as outlined in this abstract, would help overcome this problem. The increase in the number of students seeking third level education in Ireland has resulted in many students choosing science programmes for which they do not have an adequate foundation in chemistry. This study aims to increase retention amongst weaker students taking chemistry in undergraduate science programmes. An Intervention Programme was designed for three course groups of students, who have previously been identified as weak. This programme consisted of two semesters of tutorials: Phase 1 focusing on chemistry basics and concepts and Phase 2 focusing on The Mole and chemical calculations. The tutorials utilised various strategies including peer learning and assessment, formative assessment and the use of concept questions. A pre- and post-diagnostic test of chemical concepts and misconceptions was designed and administered in the first and last tutorial session. Students' performance in both the pre- and post-diagnostic tests was measured. The pre-diagnostic tests were used to design the Intervention Programme in order to meet the students' specific needs and address their weaknesses. The results of the Intervention Programme were positive. In both phases, students did significantly better in the post-diagnostic test than in the pre-diagnostic test. Where possible, the performance of students who participated in the Intervention Programme was compared with the performance of students who did not participate in the Intervention Programme in their concurrent chemistry module, and this showed a positive effect. However, while the results are encouraging, poor attendance in both the main module and in the Intervention Programme undoubtedly has an effect on the results.

SP24: Asking questions and listening to the answers. Isn't that how we all learn?

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Theme(s): Engaging students in the laboratory and field

Abstract

Concerned by the willingness of students to arrive for laboratory practicals (LPs) lacking preparation or ambition and mindful that assessment drives learning (Bull *et al.*, 1999; Scouller 1998) we chose to develop an on-line quiz for each LP. Our hypothesis was that completion of a quiz and the associated reading and thinking would improve preparedness, engagement, performance and satisfaction (Entwistle, 2003).

Pre-practical quizzes (PPQs) that incorporated full explanatory feedback were developed in collaboration with staff delivering the lectures and practicals and were designed to test a range of knowledge, understanding and application as well as familiarity with the practical handbook. Using the Perception Questionmark application, PPQs were constructed for nine LPs. Compliance was a concern but we did not award marks (Kibble, 2007) because cheating would be an easy option (Dobson, 2008). Our strategy was to make PPQs mandatory and require a minimum overall average for 'satisfactory' completion of coursework.

Compliance was excellent with completion rates above 90% (four years, n = 874 students. Student feedback was positive; "*[quizzes] provide a good way of preparing us for the practicals and give us chance to think about the concepts that we need for the practicals." and "[quizzes] did encourage me to read the schedule before the experiment when otherwise I wouldn't have, in all honesty".*

Anecdotal evidence from teaching staff was consistent - students were better prepared. A positive correlation exists between the PPQ scores and the end of year marks (Pearson; $p<0.0001$, r 0.52, r^2 0.27), consistent with recent findings (Dobson, 2008).

In conclusion, unsupervised, on-line PPQs can be effective tools to engage and motivate first year students to prepare for LPs.

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SP25: Collaborative experiments on-line in a course presented globally

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Theme(s): Inspiring first year students; Biologists working with others

Abstract

A new module for Level 1 students called 'Science Investigations' provides an introduction to practical work, in an on-line environment. Most of the activities included in the module require observational or experimental work done at home, with only the field work being 'virtual'. The aim of the module is to encourage practical and group work in an era when the amount of laboratory teaching is declining. Students are required to work in groups to collect data sets and are also asked to design biological experiments, as a group. The assessment is computer-based and tailored to the type of experiment that the student has been involved with. Tutorials are provided both synchronously via video/audio conferencing and asynchronously via on-line forums. Students have to meet minimum requirements in order to pass, including entering data from their experiments into on-line databases, achieving a satisfactory level of participation in tutorials and forums, and passing the end of module assessment. This paper will illustrate the innovative features of the module, consider the successes and failures of the first presentation and discuss the problems that arise in providing practical experience in an on-line, globally available course.

SP26: Improving the students' learning experience in research through the teacher's disciplinary research: a case study from Monash University MBBS program

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Theme(s): Students and academics working together to improve the learning experience

Abstract

There is a strong synergistic connection between teaching and research because research fertilises teaching with new topics and methods, provides teachers with personal engagement and guarantees connections with developments in the research arena. In turn, students perceive their courses to be up to date and intellectually stimulating. This paper reports on the results of a study of undergraduate student engagement in a research tutored curriculum based on the current research of the academic.

A unit in the second year medical curriculum of Australia's Monash University incorporates the Student Project Cases (SPC), a teamwork activity that emphasises interdisciplinary learning, where the students research and present a medical disease. The co-topics required for this SPC were specified and the students were required to research into these and prepare a written and an oral presentation as part of the SPC assessment process. At the end of the SPC, students completed a questionnaire which examined their exposure to research and research culture, their experiences on the preparation of this SPC and participated in a focus group. The students stated that the knowledge that the SPC topic being a current research interest of an academic staff member involved with the SPC process had a positive impact on their attitude towards the topic. They stated that being aware that the research was happening now made it exciting to study about the topic and therefore a motivational factor.

Overall, the study confirmed that curriculum designs that engage students, include them in a community of scholars and connect them into the disciplinary research of academics and gives them a greater sense of working with the academic as well as a more rewarding learning experience.

SP27: Switching on the skills for lifelong learning: understanding how programmes and modules contribute to the development of learning autonomy

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Theme(s): Students and academics working together to improve the learning experience

Abstract

The development of learning autonomy to enable lifelong learning is an explicit aim of higher education. There is, however, little evaluation of the extent to which programmes and modules are successful in engendering autonomous learning. This project is exploring the perceptions of learner autonomy held by bioscience students and by the staff who teach them. By interviewing staff and students to explore their views on student learning generally and autonomy specifically, and by analysing the data gathered through student questionnaires exploring attitudes to learning, we have developed an understanding of the level to which staff and student perceptions vary and identified both barriers to autonomous learning and key aspects in our curricula which foster autonomy. It is anticipated that the project will inform a curriculum redesign that will enhance autonomous learning amongst our students and equip our graduates for independent lifelong learning.

IP10: Creativity in bioscience students: a lost opportunity?

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Theme(s): Inspiring first year students; Engaging students in the laboratory and field; Biologists working with others: Students and academics working together to improve the learning experience

Abstract

Most would agree that: (i) progress in the many bioscience disciplines is dependent upon the individual and collective creativity of biochemists, microbiologists, ecologists, pharmacologists etc.; (ii) *when given the opportunity*, bioscience students frequently display the capacity to be highly creative; (iii) we do very little to encourage and develop the creative potential of our undergraduates and postgraduates. This seems strange given that creativity may be seen as a skill that can be acquired, through practice, along with critical, analytical, practical, research and other skills taught during bioscience programmes. This interactive session will explore the various approaches that may be adopted to promote individual and group creativity. Participants will then be asked to consider why it has proved difficult to integrate the promotion of creativity skills into undergraduate and postgraduate degree programmes, and strategies that may be developed to overcome these obstacles.

SP28: PeerWise participation – supporting students in a multiple choice environment

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Theme(s): Inspiring first year students

Abstract

Encouraging students to participate in their learning is a critical element to their success. Although many approaches include active learning techniques in small groups, participation can take form individually and outside the classroom using PeerWise. PeerWise, a website that supports the construction of student authored assessment questions, was used to promote deep, reflective thinking of the course material as students were required to create, answer and evaluate each others' questions on a weekly basis.

At the University of British Columbia, Canada, we examined how *use of* PeerWise in an introductory cell biology course played a role in student success. Biology 112 is a large undergraduate course for life science students with an enrolment of 800 students per term or 1800 per year. Creating opportunities for students to contribute to their own learning outside the classroom benefits both course instructors and students. For students, the use of PeerWise enables them to involve themselves more deeply in their learning but on their own time. This web interface facilitates the collection of data and information related to levels of student participation and allows instructors to easily gauge student progress throughout the course.

This session will explore how PeerWise was used in a large course with minimal administration and present evidence that suggests a trend where students with higher levels of participation exhibited better exam grades. The analysis is meant to provide both instructors and students with a deeper insight as to how participatory learning can take on many forms and invoke a more enriched learning environment.

SP29: Biology students building computer simulations using StarLogo TNG, a graphical programming environment

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Theme(s): Biologists working with others

Abstract

Complexity science is key for understanding collective phenomena in animal behaviour, such as insect swarms, bird flocks, and ungulate herds. However, many biology students are not equipped with the computational skills to apply a main research tool of complexity science, computer simulation. In this presentation, I describe use of StarLogo TNG, a freely-available graphical programming environment, to enable biology students to rapidly learn programming fundamentals and develop their own simulations of collective animal behaviour. StarLogo TNG was developed by MIT's Teaching Labs as an easy-to-use interface introducing students to concepts in complexity science such as self-organisation and emergence. Agent-based simulations are developed using graphical programming "blocks", each corresponding to a programming command, to control the behaviour of various "breeds" of agents—such as "Ants"—which the students then view performing programmed behaviour in high-quality 3D rendition. The blocks represent a fully functional programming language. Students are introduced to concepts such as variable types, assignment, procedures, and flow control (e.g., if-then statements, loops). I developed a practical (two two-hour sessions) using StarLogo TNG for the Senior Honours module "Complex Systems in Animal Behaviour". In the first session, students are guided through the process of building a computer simulation representing simplified ant-nest construction. Students do not follow a cookbook of linking commands, but instead are led through a stepwise and debugging process, required to periodically view the output of their code and consider the next elements. In the second session, students modify this simulation on their own to perform an experiment exploring effects on emergent properties of the system. I report preliminary results of a study of the impact of this practical on the students' ability to understand computer code (text-based and graphical), their confidence in their understanding, and their perceptions of computer programming.

SP30: Diagnosis microbes

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Theme(s): Inspiring First Year students; Engaging students in the laboratory and field; Students and academics working together to improve the learning experience

Abstract

With increasing student numbers, especially in first year undergraduate courses, it can be both demanding and challenging to offer students stimulating laboratory practicals. Often, first year practicals can be like 'recipe books' where students follow a protocol which typically has to be completed in one lab session, with no freedom to explore a topic or design their own experiments. However, it benefits both students and staff to offer the opportunity for a more demanding type of lab, allowing students to research within a defined topic.

In 2010, the opportunity arose to redesign two of the Level One Biology labs at the University of Glasgow. Previously there were two 3-hour lab sessions: one examining immunology, the other examining malaria. These topics were combined and expanded to become a "Diagnosis of Tropical Diseases" lab, which takes place over a two week period.

Students work in groups on a series of 'patients'. Each group of students is given a clinical sample box, which contains samples which students perform a series of diagnostic tests on. These include ELISA (Enzyme-linked Immuno-Sorbant Assay), gram and Giemsa staining, faecal, blood and cerebrospinal fluid samples, bacterial cultures, and helminth egg identification. Students are also given patient symptoms and observations, which helps them to identify the pathogen and come to a diagnosis. While some of the diagnoses are straightforward, others are less clear, therefore students have to work together to come to their conclusions and recommendations for treatment. Students report that they feel much more involved in the lab exercise compared to other exercises, and appreciate being allowed to follow their own lines of enquiry and make their own decisions.

Keynote 2 / Plenary: Incentivising excellent teaching in a research led environment

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Annette Cashmore is a National Teaching Fellow, Professor of Genetics Education, and Director of GENIE (Centre of Excellence in Teaching and Learning in Genetics) at the University of Leicester. She is a keen advocate of the synergy between subject-based research, pedagogic research and teaching and learning practice. Her research into medically important pathogenic fungi and a wide variety of educational topics reflects this. Current projects range from exploring the use of virtual worlds to enhance practical teaching, to a collaboration between the HE Academy and GENIE, investigating promotion in relation to teaching and learning.

Abstract

Excellence and innovation in teaching and learning are key to enhancing the student experience. There are many approaches to making this happen in a biosciences research environment. Ideally there should be a synergy between research and teaching, but are the range of academic endeavours rewarded?

Our collaborative studies with the Higher Education Academy included a survey of 104 institutions and provided data that demonstrated that teaching and learning activities are often not recognised or rewarded in contrast to subject-specific research, and that institutional policies and practice varied widely. We have now collected case studies from academics in a variety of types of institutions, disciplines and at different stages of their careers. The aim has been to identify how teaching and learning activities have contributed to career progression. A range of issues have been highlighted including, the relative importance between teaching compared to subject-specific research, how pedagogic research is recognised and how excellence in teaching and learning is defined. Following on from this we have defined a range of generic criteria by which excellence in teaching and learning can be assessed. This can act as a starting point for the definition of implementable institution-specific criteria. Effective recognition will also require a change in the culture of institutions, and this will include mentoring of academic staff, management (including heads of departments etc.) and promotion panels. I will present work on the development and implementation of a mentorship scheme aimed at making this work!

NOTES

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