SUCCESSFUL IMPLEMENTATION OF MANDATORY ON-LINE PRE-LABORATORY QUIZZES ACROSS SEVERAL FIRST YEAR UNITS

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To be covered........

- Practical Skills
- Problem & Scale
- Objectives
- Demographics

- Feedback
- Results (08_09)

- Strategy & Method
- Development Review & Revision
- Implementation
- Costs & timescales

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2009 European Users Conference ◆ Manchester
Practical Skills

Year 1:
- Approx. 50% of contact time = lab-related activity
- Approx. 38% of end of year mark
  - Extended practical - 4%
  - Practical exam - 10% (new in 2007_8)
  - Proforma reports (peer-marked) - 4%
  - Data interpretation questions ~ 20%

Year 2:
- Approx. 50% of contact time = lab-related activity
- Approx. 20% of end of year mark
  - Extended practical – 10%
  - Data interpretation questions ~ 10%
Laboratory Teaching

- **Problems**
  - Students prepare poorly for Yr 1 laboratory work
  - Students with poor laboratory skills in Yr2

- **Objectives**
  - Better engagement in Yr 1 laboratory practicals
  - More effective development of laboratory skills

- **Demographics**
  - ~180 physiology students (about 120 subsidiary)
  - 11 first year laboratory practicals
What did we want?
Type of comment (ordered by frequency)

- "Made me read practical schedule"  
  Count: 40
- "Obliged me to do preparatory work"  
  Count: 21
- "Useful practice with calculations"  
  Count: 17
- "Ease of use of system and number of questions"  
  Count: 14
- "Good to revise material before practical"  
  Count: 11

Verbatim comments

- "[Quizzes] encouraged me to read the schedule before the experiment when otherwise I wouldn’t have, in all honesty"
- "Got the answers straight away"
- "Very useful because they make you come prepared for the practical"
- "Forced us to read around the subject and be more prepared for the upcoming practical"
- "Good format and balance of knowledge and calculation problems"
- "Helped with maths practice"
- "Meant that we had to thoroughly read methods so we knew what we were doing in the practical"
Minimum 21%
25% Percentile 68%
Median 74%
75% Percentile 79%
Maximum 89%

Number of students = 180
Number of quizzes = 11

- 11 quizzes x 180 students = 1980 data sets
- 1866 data sets recorded (94% of maximum)
- 125 completed all 11 quizzes
- Top mark - 89%
- Two students failed to achieve mean =>40%
Strategy (action from Teaching Committee)
  - On-line [pre-practical] quizzes (PPQs)
    - MUST be complete BEFORE laboratory practical

Method
  - QuestionMark Perception for delivery of PPQs
  - Quiz questions developed by all relevant staff
The devil is in the detail

- Development
  - Paper phase
    - Drafting
    - Discussion & Revision
  - Perception phase
    - Inputting of questions
    - On-line trialling
    - Development of feedback
    - Bug checks and revisions
  - Teaching Committee
    - Discussion of policies
    - Some issues unresolved
    - Sub-group of TC formed

- Review
  - Sub-group (four members)
    - proposals for each issue pre-circulated
    - Sub-group’s decisions made in one hour meeting

- Revision
  - In accordance sub-group decisions
    - Mandatory part of course
    - Not negatively marked
    - Multiple attempts OK
    - No laboratory data used
    - Maths to GCSE level only
    - Explicit feedback for wrong answers
Implementation (All ratified by TC)

- Quizzes integral to laboratory practical coursework
  - quiz visible 7 days prior to laboratory practical
  - failure to satisfactorily (>40%) attempt quizzes = failure to adequately complete coursework & Unit

- Adopted for all first year programmes in 2008_9

- Expanded to include pharmacology (roll out Oct 09)
Implementation – advice 1

PS1 Nerve muscle properties

These tests are associated with each first year laboratory practical. They have been made available to you as a revision aid; for you to use as you see fit. They will remain visible until after the examinations.

Please note:

1. You can access the test as many times as you like;
2. Your mark and detailed feedback is provided at the end of the quiz once you’ve gone through all the questions (see the instructions on the page that reports your score at the end of the quiz);
3. Some questions permit only a single option to be selected (selection is seen to 'toggle'), whereas others permit multiple options to be selected;
4. Some questions require calculation for which you are permitted to use a calculator or the calculator application in 'Start', 'Programs', 'Accessories';
5. Where the answer is a number, do NOT type in the units, but DO take note of the units that apply i.e. if you calculate an answer to be 10 ml entering ‘10’ will be incorrect if the question specifies that the answer should be expressed (given) in litres; in which case ‘0.01’ is the correct response;
6. The quizzes are NOT negatively marked;
7. Questions of a similar type will form part of your end of year examination.

The questions test several things:

- That you have read the practical schedule (something that helps you and the teaching staff)
- That you have the necessary knowledge and skills (basic maths, knowledge of International Standard (SI) units etc)
- That you have the vocabulary required to understand the concepts which underlie the practical class

We would expect you to achieve an overall pass mark (40% for B.Sc. or 50% for professional courses) for these quizzes.
Implementation: Look and Feel

Information: The Fick equation relates cardiac output (litres of blood pumped by the heart per minute) with the amount of oxygen used by the body and the amount of oxygen in each litre of arterial and mixed venous blood. The Fick equation strikes fear into the heart of most students.

Before tackling the Fick equation in its proper context, it is often helpful to consider an analogy. Let’s consider the takings at your Hall bar.

Using the modified Fick equation:

\[
\text{number of students} = \frac{\text{total takings}}{\text{money @ start} - \text{money @ end}}
\]

money @ start = the money in your pocket at the START of the evening (assuming same for all students)

money @ end = the money in your pocket at the END of the evening (assuming same for all students)

Question: Assume that each student starts with £35 and finishes with £15 and that the total takings were £10,000.

How many students were present?
PS1 Practical Essentials 2 of 2 completed
Total score: 0 out of 20, 0%

Your score was less than 40%. Given the nature of questions, we regard this as unsatisfactory. If you know or suspect that your maths skills are weak, we highly recommend that you look at this book - Maths Skills for Advanced Sciences by Ken Price. It is available in the Medical Library which you can search here.

**IMPORTANT:** You have the opportunity now to review each question and tailored feedback will be provided on each question; depending on whether you answered the question correctly or not. The value (to you) of these formative tests will be greatly increased if you can find the time to review the feedback and reflect on your reasoning.

When you have finished reviewing the feedback, click on 'Home' button at the bottom of the page to close the assessment.

1 of 20

On a line graph, the horizontal axis can be called the:

- y axis
-ordinate
ox axis

0 out of 1

No, the horizontal axis is the **x axis** which is also known as the **abscissa**. You may find it useful to remember "scissors (abscissa) cut across"
Feedback is purposeful
- *No answer earns no feedback*
- If answer from handbook – feedback = ‘read handbook’
- If answer reasoned – feedback is explanatory

Information: Confident ability to convert between units is an important skill that all scientists should aim to acquire.

Question: After measuring distances (between the stimulus and recording sites) in cm and recording latencies in milliseconds, a group reports the conduction velocity as 60 cm per millisecond. What does this figure represent in meters per second?

(type in the number but not the units)

5

Score

0 out of 1

Feedback to student:

The question said the group claimed a propagation rate of 60 cm in 1 millisecond. Perhaps the easiest way to get to meters per second is to first express both values as ‘milli’. So, 60 cm = 600 millimeters and time was already in milliseconds (ie 1 millisecond).

The conversion from milli to full units (meters and seconds) involves multiplying by 1000, there is essentially nothing to do……

600 millimeters per millisecond = 600 meters per second.
Costs & timescales

- Authoring 150 questions (PDL) - 50 hours
- Discussion/revision with laboratory lead staff - 10 hours
- Inputting questions (& feedback) - 75 hours
- Trialling (& discussions)
  - Lead staff (5 x 2 hours) 10 hours
  - all staff (10 x 2 hours) 20 hours
  - Students (voluntary exercise) - ????
- Revisions (post-trialling) 40 hours
- TC (10 staff x 1 hour) 10 hours
  - Sub-group (4 x 2.5 hours) 10 hours
- Revisions required by sub-group decisions ~ 30 hours
- Proposals, reports and documentation ~ 10 hours
- Excel spreadsheet development ~ 25 hours

Total = 300 hours
(~235 hours by PDL)
In 2008_9:

- PPQs rolled out for other programmes that share the same practicals:
  - Veterinary science year 1
  - Medical science year 1
  - Dental science year 1

- PPQs developed for 18 practicals in Pharmacology year 1 Units
  - Recent graduates in collaboration with academic staff

- Questions developed for experimental design & statistics (years 1 & 2)
  - Potential for a faculty-wide on line course......!
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"Progress is impossible without change, and those who cannot change their minds cannot change anything."

George Bernard Shaw (1856-1950)