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TYSTYSGRIF UWCHRADDDEDIG ADDYSGU MEWN ADDYSG UWCH

POSTGRADUATE CERTIFICATE IN TEACHING IN HIGHER EDUCATION

Cylch Dygu 2 | Teaching Cycle 2

Use of Quizdom as a Means of Assessing Student Comprehension of Lecture Material

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Use of Qwizdom as a means of assessing student comprehension of lecture material

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ABSTRACT

The role of Qwizdom as a teaching aid is investigated from two different perspectives; as a means of allowing intervention on the part of the teacher, and as a revision aid for the student. From the perspective of the teacher, this was successful as it helped to identify topics which had proved difficult for a number of students. Not all of the students chose to make use of Qwizdom as a revision aid, but those who did found it a useful aid.

INTRODUCTION

Biochemistry is one of a group of disciplines which connects biology and chemistry or physics. It is a perfect example of a science which obeys all levels of Bloom’s taxonomy (Bloom, 1956) and fits the adage, “deep enough for an elephant to bathe in, or in which a gnat may drink.” In order that the more profound level of evaluation within Bloom’s taxonomy may be reach, there are a series of building blocks which have to be learned. These basic units are the different pathways and metabolic cycles which characterise the catalysing of conversion of one molecule to another. While there are some pathways which may be specific to one particular organism or group of organisms, many of the pathways and cycles are common to many species. This is particularly true for many of the ‘core’ pathways such as glycolysis and cycles such as Kreb’s (or citric acid) cycle (see Figure 1). Being able to recognise each of the molecules within these core pathways, and particularly those molecules which are key molecules at the crossroads where these pathways or cycles overlap, is essential in order that a deeper appreciation of biochemistry is achieved.

Figure 1
The Citric acid cycle, showing the relationship between the molecules of this cycle and their importance to other pathways or cycles in the body (Berg et al., 2001).
Hence the basic element of any biochemistry course revolves around ensuring that students are familiar with all of the entry points and exit points of reactions such as those found in the Citric acid cycle. This learning involves two different levels of understanding: that of the names of the molecules and that of the structure of the molecules. While it may be possible to derive the changes in chemical structures, it is only by memorising the names of the molecules that students are able to acquire this form of information. Knowing how well students are acquiring this information is a difficult problem, as biochemistry is often taught to large classes, due to the importance of the topic to so many different areas of biology. This makes biochemistry classes ideal for carrying out progress monitoring by use of student response systems.

Electron student response systems have been around for 10-15 years (e.g. Dufresne et al., 1996; Shapiro, 1997). They were originally adapted for use with students studying physics, but their use has been expanded to a number of disciplines. Their primary benefit lies in allowing rapid assessment of the progress being made by individual students without the need to mark a lot of exam scripts. Equally, because each student has his or her own handset, they are able to use it without others in the class knowing how frequently they give a wrong answer – avoiding the perceived stigma associated with giving wrong answers in front of a complete class.

RATIONAL AND BACKGROUND TO TEACHING CYCLE 2

Previously this module has been identified as one where most students pass the module, but this is primarily down to good coursework marks, and much less due to performances in the final exam. My intention with this teaching cycle was to ensure that students were forced to revisit topics a few days, at most, after they had first heard about the topic during lectures. Although I had previously adopted a policy of undertaking this via a series of revision lectures for each of the major topics, I had not been able to determine if these had been successful in making students undertake this process of mentally revisiting the topic.

Qwizdom was the subject of a workshop run within the university and I rapidly realised that it had the potential to allow me to address the issue of student assessment of student comprehension of the material which they had been taught during lectures and to determine if they had assimilated and retained this information a few days later. I decided to make use of it in the form of a series of multiple choice questions to evaluate student retention of information.

METHODOLOGY

The module used in this teaching cycle was RS12520 (Nutritional Biochemistry). It is a module for first year Animal Science and Equine Science students, and has an annual class list of around 35-50 students. The module has 4 lecture slots per week, and 3 of these were devoted to traditional style lecture material. The fourth slot was reserved for a session using Qwizdom. Although a number of different assessment methods can be used within Qwizdom (e.g. typing specific word answers, or specific numerical values) I chose to make use of the multiple choice option.

An example of the sort of question used in the Qwizdom session is shown below (Figure 2).
Which of the following can be an important role for lipids?

A. Storage of energy  
B. Source of insulation for animals  
C. Maintaining membrane structure  
D. All of the above  
E. No idea

Figure 2
An example of the sort of question used during the Qwizdom revision sessions.

Students were then given around 30 seconds to submit an answer. No time limit option was used within the settings as generally no student spent inordinate lengths of time on a single question and maintaining a degree of flexibility seemed beneficial. Likewise no monitoring of the performance of individual students was carried out.

Data were collated for each question and analysed later. This allowed identification of themes where the majority, or an unacceptably large number of students within the class, had failed to give the correct answer. Where such a scenario arose, this topic was revisited the following week via a different approach in an attempt to explain the point better.

RESULTS

The Qwizdom sessions were the most poorly attended sessions within the module, typically ranging from as few as 4 students on one occasion to around 20+. The reasons for this were unclear, but possible causes are speculated upon in the Discussion. However, there was a core of around a dozen students who attended on a regular basis.

The general perception seemed to be that those students who did attend Qwizdom sessions engaged in its use, but that the rest of the class voted with their feet by not attending these sessions. To monitor if my perception of those attending the sessions was correct I included questions specifically relevant to Qwizdom within the anonymous module evaluation forms. The results of these questions are shown in Figure 3, and the responses to the freeform box asking for comments on Qwizdom are shown in Figure 4.

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly agree</th>
<th>1</th>
<th>2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>I found the use of Qwizdom sessions useful in terms of understanding the topic</td>
<td>10</td>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>I found Qwizdom handsets easy to use</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>The idea of using Qwizdom to give answers without the rest of the class knowing what answer I was giving was appealing</td>
<td>12</td>
<td>5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Qwizdom allows the lecturer to identify all answers from an individual student. Would you have been happy to have this facility being used if it meant that that a student struggling with more questions than most could be identified?</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>The current use of Qwizdom was only for multiple choice questions, although it also allows answers to be sent as either text or numbers. Would you have liked the idea of using this as a way of carrying out calculations to be supplied as numerical answers (e.g. calculating molarity or pH values)?</td>
<td>2</td>
<td>11</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

Figure 3. Response to questions posed during the module evaluation process.
Helpful in revision session.

A positive feature with this module and hopefully others.

Very good. A quick and easy way to learn stuff without you realising. Allows you to go over some questions you are unsure about but don't want to ask the lecturer.

They should be used more often within lectures. They were very helpful.

Should be brought in as a regular study aid.

I believe Qwizdom to be very helpful, especially for quieter students who are too shy to speak up during lectures. A very good idea.

I like it.

Figure 4.

Comments from the students obtained during the module evaluation process.

The general impression is that with those students who used it, they found it to be a useful teaching aid. Interestingly there appears to be reduced enthusiasm, albeit very slightly, for extending its use into areas where I thought there might be more controversy (e.g. sending words or figures, or where I was able to monitor individual students).

DISCUSSION

I deliberately targeted a time point within a week of lecture delivery as the session for using Qwizdom. The reason for this is based on the evidence that there is a significant decline in remembering a piece of information more than 7 days later if there has not been some form of reiteration of this point during that time (e.g. MacKenzie and Zhang, 1997)).

The attendance at these revision sessions was disappointingly lower than for the other lecture slots on the module. The precise reason for this is unclear, but at least two causes which are not mutually exclusive may be proposed. Firstly, there is always a certain degree of resistance to revisions sessions, as by their very definition they are not going to contain fresh material. This is probably even truer for a revision session timetabled for Fridays at lunch-time. Secondly, many of the topics covered in this module are familiar to those students who took a biochemistry element within their A-level studies. Therefore, a number of students feel that they already know much of the material and that the lectures themselves act as the revision sessions. This is a point which a number of students have privately admitted to me. Possibly including a question to this effect in the module evaluation form would be useful in future years.

In the two years where I have used Qwizdom, there has been a general core of students who have regularly attended these sessions and the feedback from these individuals has been positive, suggesting that it should continue to have a role to play in promoting learning within this module.

What was possibly most surprising to me was the response to the questions I raised about the extension of Qwizdom into other areas, such as sending answers as figures or text, or allowing me to monitor the answers for each individual student. I had
expected that there would be something of a backlash towards the suggestion that I could collate and monitor data for individual students. However, although the responses were less favourable than those regarding the general use of Qwizdom, they were still more positive than I had first anticipated. This suggests that the students are generally fairly happy to put themselves in a situation where the lecturer can identify, and hopefully assist, any student who is having problems with the module.

There was still some enthusiasm, although much less so, for the idea of having answers sent as either text or numerical values. I can see this being a more difficult situation to monitor, as particularly in a module such as biochemistry where there are often fairly long names given to specific molecules. Particularly for students who are dyslexic, there may be a real issue associated with having to send answers as words.

REFERENCES


FEEDBACK AND PERSONAL REFLECTION

I found Qwizdom a useful teaching resource as for very little investment in time I was able to rapidly generate a set of multiple choice questions which allowed me to determine the general state of knowledge across the class for a number of different areas within the module. This was particularly useful in a couple of cases as it allowed me to identify areas of the module where the majority of the class had failed to understand a particular topic. I then returned to this point again during the following week – as evidenced in one of the observation feedback forms.
My temptation is to try and expand the use of the feedback to allow me to identify students who are having problems with the module. However, this will require issuing specific handsets to specific students and recording which student has this particular handset.
I have also made use of the Qwizdom handsets in two other modules, RS30510 (Emerging Technologies in Animal Sciences) and RS14420 (Animal Science). The feedback from students studying RS30510 was very positive, and again it was a feature which they seemed to enjoy using as a revision aid. The use with RS14420 students was only a few weeks ago and I have had no feedback from this class as yet. The other aspect which I am interested in exploring from the use of Qwizdom is to try and integrate it into all lectures within the module which was used as part of the current teaching cycle. Particularly with the increase in the number of handsets within the university this should be an option which will be possible in the future. However, until the planned relocation of staff from the Llanbadam campus onto the Penglais campus, I feel that the practicalities of having Qwizdom handsets transferred
across from one campus to the other means that realistically in the short-term (i.e. academic year 2008-2009) I will continue to make use of this resource only on a weekly basis.
The use of Qwizdom as a means of assessing student comprehension of lecture material

Neil R. McEwan
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Module used for Teaching Cycle

Nutritional Biochemistry
RS12520

The module has 4 sections for ‘lecturing’. 3 of these have previously been used as ‘traditional’ lectures. The final one has been set aside to revise the material from the previous lectures.

Material in this module is core information necessary for a fuller appreciation and comprehension of modules in later years. Unfortunately there are large sections which require rote learning.
In general, almost all students pass the module.

However, much of this success appears to be due to coursework (60%), rather than the final exam (40%).

How well did the students understand the material from lectures?

Data suggests better information retention if the learner is forced to re-visit material shortly after the lecture.

Change the final session each week to one which required:

1. Increased student participation
2. Some degree of reflection by students

Approach adopted – use of Qwizdom interactive handsets

Qwizdom allows feedback on student comprehension

It allows them to answer without having to speak in front of their peers

It allows all students to provide an answer, and not just more confident ones.

The teacher can either use the handsets to maintain student anonymity, or to identify answers from students.

For this teaching cycle work I chose anonymity.
**Advantage**

Students feel more confident about trying to answer in the knowledge that no-one will know about their mistake(s).

**Disadvantage**

If a single student is getting the majority of the answers wrong, then they cannot be identified.

Which of the following can be an important role for lipids?

A) Storage of energy  
B) Source of insulation for animals  
C) Maintaining membrane structure  
D) All of the above  
E) No idea

**Multiple choice questions are much easier to deal with in a 'real-time' environment**

Texting of answers is possible, but trying to pinpoint the cause of wrong answers can be more difficult.

**Benefits to teacher**

1. Quick method of assessment  
2. Confidence that the message has sunk home  
3. Identification of areas poorly understood

**General remarks on module attendance**

1. Most lectures have >75% attendance  
2. Quizdom has about 50% attendance  

Are students opposed to this method, or do they just want to avoid a revision session when the refectory is serving food?

NB some of this material may have been covered at A-level by some of the students

**Feedback within module evaluation forms**

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Strongly Disagree</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>5</td>
<td>12</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>
Concluding remarks on Qwizdom

1. Helpful as a tool to assess ‘problem’ areas
2. Provides opportunity for student reflection
3. Rapid feedback to students on understanding of key points from lectures