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POSTGRADUATE CERTIFICATE IN TEACHING IN HIGHER EDUCATION

Cylch Dysgu 2 | Teaching Cycle 2

Consolidation at End of Lectures

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CHAPTER 3
Teaching Development Cycle 2

CONSOLIDATION AT END OF LECTURES
3.1 Introduction

The lecture is a ubiquitous element of university teaching, particularly when group sizes become large. Their advantages are well known; they can be effective at transferring large amounts of information accurately, they can also give a personal perspective on recent developments in a field that are lacking in printed sources, particularly when given by a lecturer who is research-active (Biggs 1999). These advantages apart, lectures also have a number of severe limitations, in particular progressively lower levels of attentiveness as lectures proceed and poor long term retention by the student of the information presented. This is the inevitable result of prolonged and monotonous low-levels of activity on the part of the student. Listening to lecture material, which of necessity may be complicated, often requires sustained concentration in order for the content to be understood. It is thought that the low-level outcomes often observed with poor lecturing (for example, McLennan and Heath, 2000) are in large part due to unbroken listening and note taking (Biggs 1999). It has been estimated that the attention span of the ‘average student under average conditions’ is approximately 10 to 20 minutes, after which the absorption of taught material declines rapidly. It has also been suggested however, that a change of activity or the inclusion of ‘rest periods’ in the lecture can restore effective learning (Bligh 1971).

Another method of improving the retention of lecture material is to have a period of consolidation or rehearsal after a lecture (Bligh 1971; Gibbs et al. 1984; Cannon 1988). Consolidation can be taken to mean the student running through or actively revising the lecture material in some way after the initial presentation. The potential usefulness of such immediate consolidation is evidenced by an experiment conducted by Bassey (1968; cited in Bligh 1971): Five balanced groups of students (groups A to E) were given a lecture. Group A were tested on the subject matter (and therefore consolidated the lecture material) immediately after the lecture, group B were tested after one day, group C after one week, D after 2 weeks and E after 3 weeks. Each group was tested again 2 weeks after the first test, while groups A and E were tested again 9 weeks after the initial lecture (Figure 3.1). The principal finding of this experiment was that those undergoing some form of consolidation immediately (group A), retained substantially more information, and for a longer period of time, than those consolidating just one day later (group B), whilst consolidation at later stages became progressively less effective (Figure 3.1).
Another example is that of King (1992), who noted that generative methods of study (in this case either getting groups of students to create, and answer, their own questions about the lecture material, or individually to construct summaries soon after the lecture had finished), significantly enhanced learning from lectures.

Accordingly, rather than just summarise what was said at the end of lectures, I decided to introduce a period of active review for some lectures, whereby I would ask the class questions about what had been taught, and to the greatest extent possible, get the students to tell me the content of the lecture material. In the first instance, this was attempted with an eighteen strong group of year-one HND Agriculture students in the module ‘RD17710 – Dairy Production’ in semester two of the 2001 – 2002 academic session. In this way, the students actively reviewed half of the lectures that I taught on this module, whilst the remaining half were summarised solely by me, as per my previous practice. From the end of semester exam, a comparison was made between questions derived from lectures actively summarised with those of lectures summarised just by me. The indications were that those lectures that had been actively summarised resulted in questions that were answered better, but that the limited extent of this study curtailed the drawing of any firm conclusions.

3.2 Methodology

The ‘R17710: Dairy Production’ module in 2002 was class of 17 students with strong agricultural backgrounds, though in the main this was with the sheep industry rather than the dairy industry, such that most students’ practical knowledge of
commercial milk production was not extensive. The intended outcomes of the module were briefly (see appendix 3.1 for module description and scheme of work):

i. Manage a mastitis control programme  
ii. Evaluate the quality and yield potential of individual dairy cows  
iii. Evaluate dairy enterprises  
iv. Explain the principles of natural and normal dairy cow behaviour, and the application of good health and welfare practice. Explain the symptoms, treatment and prevention of metabolic disorders, lameness and poor fertility.  
v. Discuss the importance of sound heifer rearing and management.

This module was worth 10 credits (22 lectures plus 5 practical sessions) and was taught between two people including myself. My input into the module was a total of 11 lectures and 2 of the practical sessions. Five of the 11 lectures were summarised by my reiteration of the main points, with the students listening, with some taking notes. The remaining six lectures were actively summarised by the students at my prompting: I asked questions relating to the content of the lecture, initially generally to the class as a whole. After approximately 2 questions, I then directed questions to specific individuals, so that by the end all students had answered at least one question. In general, the questions asked demanded answers of a few words, or a sentence at most. I generated the questions on the spur of the moment, and no record of them was kept. Frequently, the individual asked was not able to answer the question set, in which case I gently prompted the student with increasing amounts of information until he or she was able to make a connection. For questions of a more difficult nature, I turned the question over to the group, if the individual was unlikely to be able to answer.

I allocated approximately the last 3 minutes of each lecture for the passive type of summary and usually they were completed within this time. I allocated approximately the last 7 minutes of each lecture for the active type of summary; these occasionally took a little longer. The lectures were paired so that approximately equal amounts of scientific/technical material and practically orientated information were incorporated into each summary type. An attempt was also made to 'randomise' the sequence of passive and active summaries through the semester. The sequence, attendance, title and date of each lecture, as well as the type of summary given are as follows:
The end of semester examination consisted of three sections: Section A, worth one third of the exam mark, containing 8 questions from my part of the module (and 8 questions from the teaching of my colleague, that will not be considered here), each requiring short answers, all of which were compulsory. Sections B and C, worth two thirds of the exam mark, contained 4 essay type questions in total, of which two had to be answered. An indication of effectiveness of the active/passive summaries was obtained by comparing the marks achieved from those questions in Section A derived from the ‘active’ and ‘passive’ summary lectures.

My questions in Section A, along with the summary type for the associated lecture, are given below:

<table>
<thead>
<tr>
<th>Question (with marks available for question)</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. On average, how long is the oestrus cycle in the dairy cow? (1)</td>
<td>Passive</td>
</tr>
<tr>
<td>2. List 3 ways a farmer can improve hygiene in the milking parlour (3)</td>
<td>Active</td>
</tr>
<tr>
<td>3. How does the ‘Bactoscan’ method differ from the ‘Total Viable Count’ method with regard to defining milk hygiene levels? (1)</td>
<td>Active</td>
</tr>
<tr>
<td>4. How does ‘chronic mastitis’ differ from ‘clinical mastitis’? (1)</td>
<td>Active</td>
</tr>
<tr>
<td>5. How should a ‘dry cow’ dairy feed supplement differ from a ‘milking cow’ one with reference to its mineral content? (1)</td>
<td>Passive</td>
</tr>
<tr>
<td>6. List two symptoms of ketosis in dairy cows (1)</td>
<td>Passive</td>
</tr>
<tr>
<td>7. What is the normal, minimum ‘dry period’ that a cow should be allowed? (1)</td>
<td>Passive</td>
</tr>
<tr>
<td>8. Which claw (outer or inner) of which foot (front or hind) is most likely to develop problems leading to lameness? (1)</td>
<td>Passive</td>
</tr>
</tbody>
</table>
The questions in Sections B and C of the exam were designed to be integrative in nature, such that the answers could not easily be ascribed to any one lecture; the questions of Sections B and C were not used in any analysis for the purposes of this portfolio. Sections A of the examination papers completed by the candidates are included in appendix 3.2

3.3 Results and Discussion

The average mark (± standard error) achieved (out of a possible 5 marks) for the questions derived from the ‘passive’ and ‘active’ lectures were 2.91 ± 0.29 and 3.59 ± 0.21, respectively. When compared by Student’s paired t-test, these values were significantly different (P<0.05). That is, this study indicates that the mark achieved with the ‘passive’ lectures was significantly lower than that achieved with the active lectures. It is accepted, however, that this result of itself cannot be relied on, as there are a number of shortcomings: the number of students; the very incomplete coverage of the lecture material by the exam questions asked; the relatively poor attendance record of the students for this module in this semester; that more time was spent at the end of lectures on the active summaries than the passive summaries (inevitable, as it takes longer to get the information out of the students than if only I am giving the information); that section A was easier than sections B and C. There is, however, much literature evidence to suggest that the use of generative study strategies (such as directed questioning of students at the end of lectures) enhances learning from lectures, aiding long-term retention of the lecture material (Bligh 1971; Gibbs et al. 1984; Cannon 1988; King, 1992; Davis and Hult, 1997). It is also accepted that directed questioning at the end of lectures is probably only suitable for small class sizes, as clearly, the larger the class the fewer the questions an individual has to answer for a given period of time, diluting the effort an individual student has to make. Despite this, I fully intend to use this method again because of the increased interaction and connexion I enjoyed with the students, in addition to the advantage of the students consolidating and digesting the information and thus making it more likely that they will remember it. To this extent, I considered this project a success.

A somewhat disappointing feature of this group of students was the relatively poor attendance throughout the semester (for the module as a whole for the semester, it was only 58%). I am fairly sure that the poor attendance was not specifically associated with my teaching as attendance was just as poor for the lectures of my colleague on this
module as well as for other modules that involved this group of students; equally it could be said that attendance for my classes was no better. It was generally the same students that were inclined to miss lectures throughout the semester. Three students were referred in the module, and it was these students that were most likely to be absent. I am not sure why the attendance record of these students was so much worse than that of this module for the previous year, which was very good. It is the case that students are less likely to miss lectures if they find them interesting, and that making lectures more interesting can improve attendance. The traditional lecture of 50 minutes of unbroken speech with this group of students is completely ineffective to the extent that some, if not most students will take no notes nor pay any attention.

During my two and a half years of teaching experience I have succeeded to some extent at increasing interest, with for example, discussions, directed questioning, student presented seminars, worksheets, slides and other visual aids to illustrate the points made, etc. Undoubtedly, the attentiveness of students has improved with the introduction of these developments, (evidenced by improved exam results, improved student module reviews and fewer students looking through the window during lectures!) though this has been from a low starting point and I still feel that more engagement for the subject by them is possible. Other more involved techniques that have been shown to improve the use of the higher orders of engagement include problem-based learning (e.g Price and Price, 2000), computer assisted learning (e.g. Holt et al. 2001), peer assessment (e.g. Gibbs, 1998) and the creation of portfolios (Harris et al. 2001). For my next teaching development cycle I decided to take one of these methods further, and to attempt to engage these students with the introduction of peer assessed seminars.