

An Interactive Triangle Approach to Student Learning

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Background and Rationale

A retrospective review of module results and student performance for the last 3 years on BM1119 Human Physiology (a core module in the Biomedical Science portfolio) revealed a pattern of excellent performance by many students, tempered by a markedly poorer performance by other students. Poor performance is often characterised by poor attendance and poor attention during lectures. Nominal group interviews with students during resit tutorials indicated that negligible student directed effort had been made. The module team concurred with Biggs' view that the traditional approach, encompassing content-heavy lectures and a tutorial was largely ineffective for all but the most 'academically committed students' (Biggs, 2003). The project seeks to resolve the disparity in performance by replacing the traditional approach of a lecture and tutorial model with a more 'active' and learner-centred approach. The initiative aims to communicate clearly to students the way in which they should direct their own learning by providing 'land-mark' lectures on-line, linked to references to key resource material in textbooks, on web-sites and in computer software programmes. These elements constitute the base of a learning triangle, whose apex is class contact in the guise of dedicated workshops that enable staff to work alongside individual students or student groups. Workshops provide an opportunity to diagnose areas of difficulty and provide strategies for resolving them, with an additional support mechanism provided by way of dedicated 'drop-in' sessions facilitated by a team of demonstrators.

The Innovation

To foster through the medium of the University on-line learning framework a technology based, active learning format for Level 1 students, the traditional format of the module comprising a weekly programme of 2 lectures and one tutorial, was replaced by converting lectures into an on-line form and hosting them on the University's virtual learning environment (WOLF), linking these to key texts, on-line resources and computer software packages – comprising the 2 points of the base of the students' learning triangle (Figure 1). The apex point is one of 9 3-hour interactive workshops covering the key areas of physiology – the 'class contact' element.

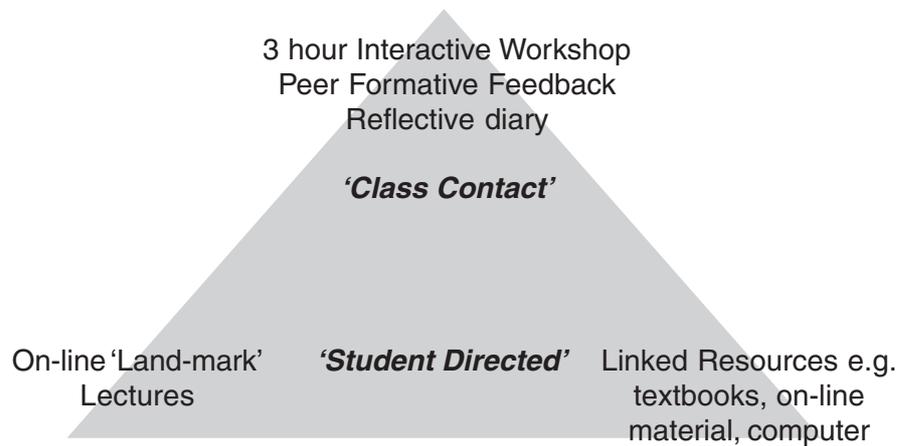


Figure 1: The students' learning triangle

Linked into the class contact element is a weekly student diary sheet designed to encourage and help students reflect on their learning and accomplishment during the week. During the module, students were expected to engage with the process outlined in Figure 2.

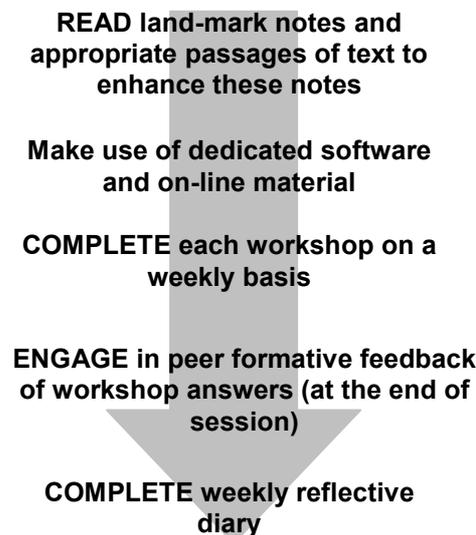


Figure 2: Expectations of engagement required of the students

In addition staff monitored attendance, satisfactory completion of the workshop and reflective diaries. Assessment is via 2 unseen Phase Tests in a similar format to the workshop material, plus the write-up of 1 selected practical report from a set of 3 (pass/fail basis). The mode of assessment for the workshop approach is congruent with that of the traditional approach.

Outcomes and Evaluation

Quantitative evaluation

Overall performance

There was a small improvement in performance in both of the unseen phase tests and consequently an overall improvement in module performance (Figure 3 below). As a caveat here it is of value noting that the workshop analysis has yet to incorporate the Part Time and Block Release students (as they study BM1119 in Semester 3 – Summer iteration), who traditionally provide a 3-5% upward shift of the performance.

Figure 3 below shows the percentage of cohort achieving a pass (grade > D5) in First Phase Test, Second Phase Test and Overall Performance for the Module according to the mode of delivery, Traditional Approach (n=151) versus Workshop Approach (n=110).

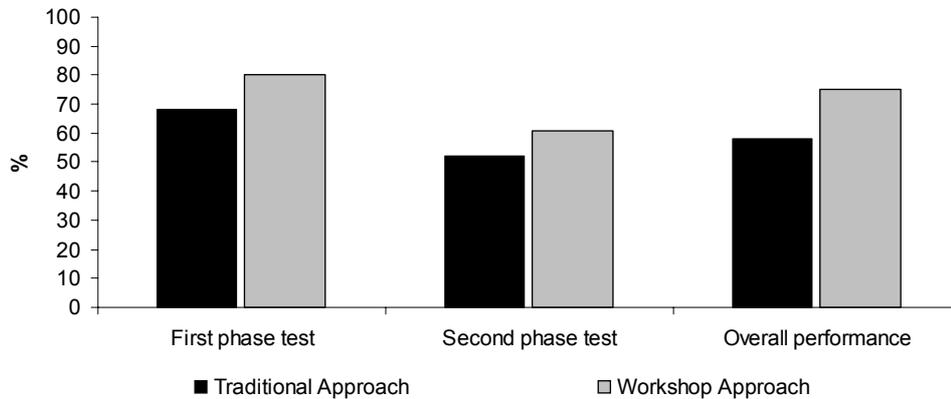


Figure 3

Performance in specific questions

The phase tests are constructed from a range of different types of short answer question, thus dissecting these assessments according to the type of question (Figure 4), revealed that a more 'active' learning approach as facilitated by the workshop model, manifested as a slightly improved performance in descriptive, applied knowledge, diagram drawing and 'matching' questions. A comparable performance was evident for fill in questions. However a slightly disappointing aspect was the lack of improvement in quantitative questions, as staff had given this particular aspect emphasis, providing much student support. This is possibly linked to the well documented decline in the mathematical literacy and fluency of undergraduate students (Tariq, 2002a; Tariq, 2002b; Tariq, 2004), as well as a lack of confidence when faced by a number/maths type question (Mackenzie, 2002; Coben, 2003), which was a feature noted by module staff during the workshops.

Figure 4 below shows the mean % mark \pm SD achieved for each question type (*recall; descriptive; quantitative; applied; list; matched; diagram & fill in*) following both a Traditional Approach (n=151) and Workshop Approach (n=110).

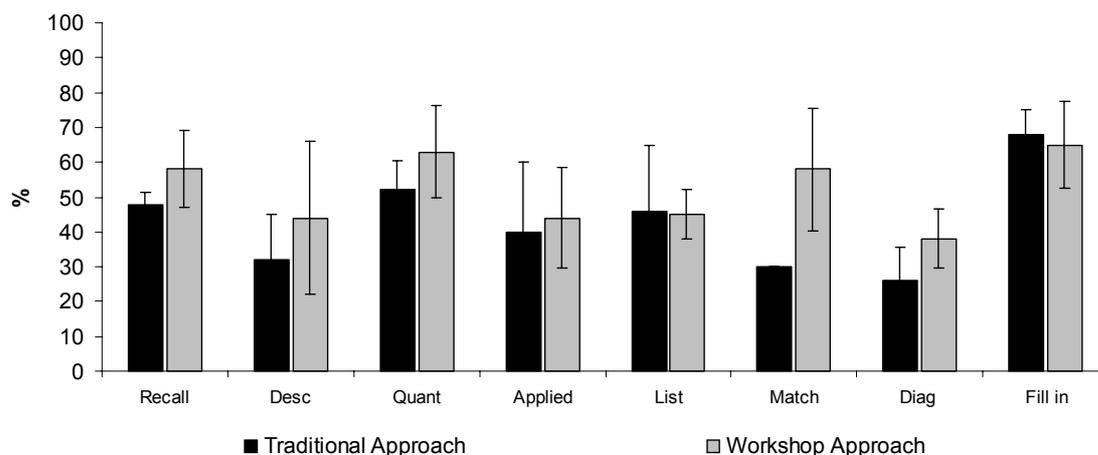


Figure 4

Attendance and Performance

Attendance across the 9 3-hour workshops was sustained at 80% or more, clearly an upswing in attendance from the 50-60% recorded for the traditional approach. Figure 5 explores the correlation between module grade (overall performance in both phase tests) and attendance at workshops. There is a significant correlation ($r=0.8653$) between the number of workshops attended and the module grade attained. Although attendance is by no means a barometer of engagement with the learning process this is a positive result and it is the intention of the module team to use these data to emphasise the importance of attendance to future cohorts of students.

Figure 5 below shows the relationship between module grades achieved \pm SD and attendance at workshops for the Workshop Approach cohort ($n=110$)

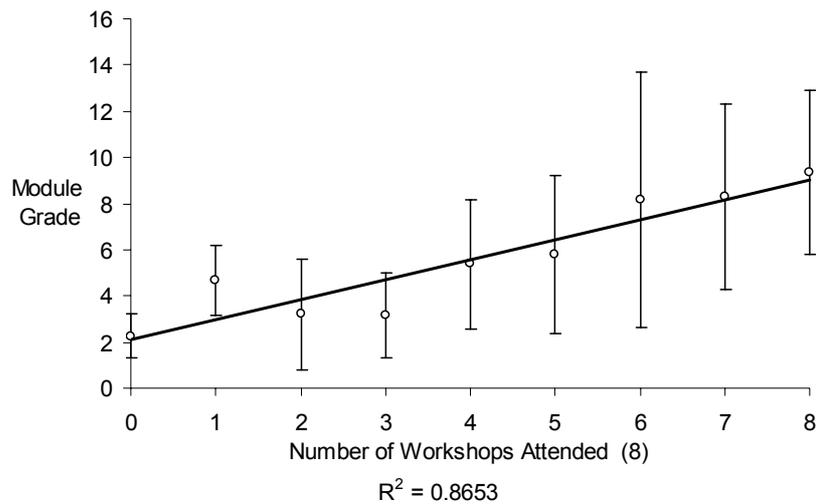


Figure 5

Effect of keeping diaries

Figure 6 below shows the relationship between module grades (overall performance in both phase tests) \pm SD achieved and level of engagement as defined by completion of a reflective diary for the Workshop Approach cohort ($n=110$). Completion of the reflective diary sheets was used as a measure of the engagement with the learning process. There is a clear and significant correlation ($r=0.925$) between engagement with the learning material and module performance, again these data will be used to encourage greater engagement with the learning process in future cohorts.

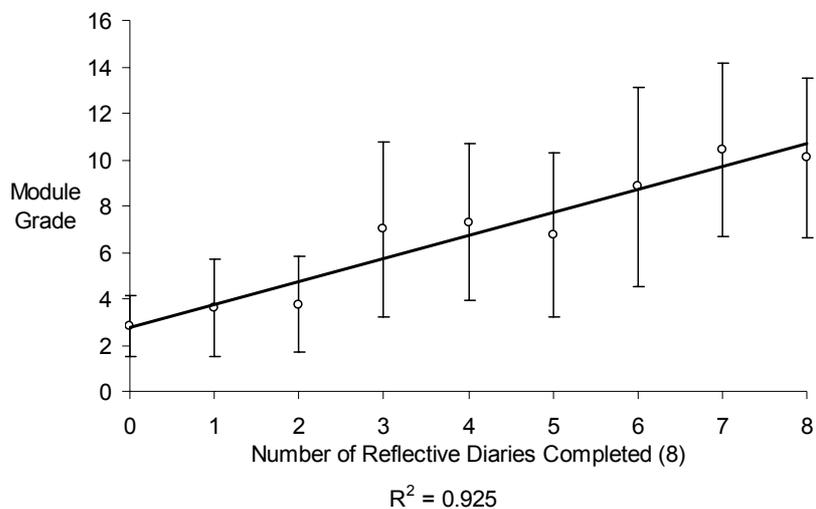


Figure 6

Qualitative evaluation

Student perception was elicited via the use of the module end questionnaire (MEQ) and module staff opinion was gauged by means of group discussion. Generally the qualitative responses in the MEQ were favourable with only a few (<5) students indicating a preference for a traditional approach encompassing lectures. 100% of respondents to the MEQ agreed that the outcomes of the modules had been made clear to them (Table 1) and the majority of respondents found the workshop approach 'helpful' and a 'stimulating' learning experience (Table 1).

Table 1: MEQ evaluation data expressed as a % of respondents

Question	Yes	No
Were the module outcomes clear?	100	0
Did you find the tutorials/workshops helpful?	82	18
Did you find the learning experience stimulating?	71	29

Table 2 indicates that the balance of directed reading is 'About Right'; indeed it is a possible consequence of the 'novel' mode of delivery using the workshop approach that when students use a reference point for this question they reflect upon semester 1 modules that have been delivered in a traditional way, perhaps accounting for the perception of 'excessive' directed reading in 39% of responses (Table 2).

Table 2: MEQ evaluation data expressed as a % of respondents

Question	Excessive	About Right	Light
Do you consider the amount of directed reading for this module to be...?	39	58	3

As evidenced in Table 3, 45% of respondents considered the 'difficulty' of the module to be 'high' relative to other modules experienced at level 1, with no responses recorded in the 'low' category

Table 3: MEQ evaluation data expressed as a % of respondents.

Question	High	Medium	Low
What was the degree of difficulty, compared to other modules?	45	55	0

Students were given the opportunity to comment on the module and the following comments illustrate their general satisfaction:

I liked not having lectures as you normally would, because I think you tend to learn and understand more when you do the work yourself (self-study) as you do with this module.'

I would much rather have had lectures than workshops'

Understood the work using the workshops and helped us revise the exercises throughout. Also that we have to research more rather than just sit in lectures and make notes.'

Workshops have helped me a lot more than lectures. We have been able to use more resources'

Workshops are a more constructive way of learning – I found this type of learning more stimulating than lectures'

Staff views were also gathered. The following quotations illustrate some of the benefits of this approach from their point of view:

'Working alongside groups of students allowed me to appreciate areas of difficulty and resolve them at the time, hopefully providing students with a more effective learning experience.'

'Enlightening to see how students were able to perform, on their own merit, during the workshops. The workshops allow lecturers to instantly see areas of student understanding that requires additional support.'

The demonstrator team reported a marginal increase in visits though often this was to clarify items on workshops rather than to discuss concepts and principles of physiology:

'An effective way of fostering learning but the key is that students must be guided to engage with the work effectively'

The change in delivery style of the module with greater emphasis afforded to a more 'interactive' student centred workshop approach impacted positively upon attendance with a rise from 50-60% with a traditional approach to a sustained 80% or greater with workshops. This was probably as much due to the obvious monitoring of attendance and periodic follow-up of absenteeism by the module team, than the shift in the form of learning.

Interestingly, analysis of the reflective diaries revealed more time spent in reading material, but rarely evaluated the quality of the learning experience. Student engagement with the process of completing the weekly reflective diary was positive, with the majority of accounts characterised by candour; however diaries are largely characterised by descriptive writing or descriptive reflection (Moon, 2001), with some students developing a more dialogical or critical reflective narrative. Despite 'scaffolding,' the approach of the majority of students tended to be mechanistic and uniform rather than critical, an approach consistent with the findings of both Creme (2005) and Hatton and Smith (1995). Reflective diaries were successful in developing the students' awareness of the value of formative feedback, with the majority of students acknowledging the value of the formative feedback opportunity.

The emphasis and guidance received by students in terms of conducting their own learning effectively, has provided an early opportunity to experience independent learning in a context, thus providing a 'real' experience of the expectations of a university student and creating a foundation for more independent learning experiences during years 2 and 3 of their course.

The problem-solving workshops encouraged student interaction and deeper learning of aspects of physiology. This is now linked to a more specific project to focus on quantitative issues for undergraduate students.

Although responses to some types of question have improved (Figure 4), there is need to re-evaluate the approach with particular reference to quantitative questions.

Conventional lectures and tutorial material were successfully converted to an on-line format and mounted on WOLF with linked key texts and software resources.

Overall module attendance, performance and engagement were all improved.

Future Developments

- Students should be given more information revealing the importance of completing all 3 points of the interactive triangle to facilitate more effective engagement and to enhance the quality of the learning experience
- Greater guidance needs to be provided to enhance the reflective learning process and the weekly diary will be reviewed and modified to promote this
- The success and continued evolution of this model will enable other learning material to be framed in a similar way with a view to facilitating effective deep learning opportunities

- Quantitative and qualitative data relating to this Innovation Project continues to be generated, collected, analysed; consequently reporting of the outcomes is an ongoing process

Valuing the constructivist approach, SOLO taxonomy (Biggs, 2003) is important and the workshop approach supports appropriate levels of cognitive thinking, and encourages students' to pursue deeper learning and assume responsibility for their own learning (Devlin, 2002). Human Physiology workshops provide a clear illustration of an active process, encouraging students to discover ideas, construct their own knowledge in parallel with recognition of personal responsibility for learning, feedback from these workshops.

Acknowledgements

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