

Improving Student Engagement with Learning in Sports Science

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Introduction

One important aspect of supporting student learning is the provision of feedback. Online formative assessments can be marked electronically to provide rapid feedback to the students on their performance (Gosling, 2009). Furthermore, in a similar module, Tong and Beynon (2008) reported that multiple choice questions released to coincide with the lecture produced an average increase in student performance by nearly 10%. An improvement of a full letter grade for students taking online formative exams in Biomedical Science has also been reported (Olson and McDonald, 2004). Research has also shown that further reading allows students to develop their own understanding of particular areas as part of developing the ability to perform critical analysis which is an essential goal of education (Lucas and Milford, 2009).

This study reports on the use of online quizzes and further reading opportunities in a first-year Exercise Physiology module and whether this innovation provides learners with regular assessment opportunities and, more importantly, feedback on their progress. It also investigates whether the provision of further reading allows students to develop their own understanding and encourages a deeper level of learning, and whether these changes to the running of the module led to an improved pass rate and at the same time increased student satisfaction and engagement

Context

The module Exercise Physiology 1 is taken by approximately 70 second year students and is designed to provide an introduction to the physiological principles that explain how the human body functions during exercise. The aim of the module is to build on the general human physiology studied in the first year and apply it to a sport and exercise context. After completing this module the students should be prepared for Exercise Physiology 2 in their third year, where the aim is to provide a comprehensive understanding of exercise physiology and communicate an

appreciation of the complex nature of exercise physiology. Therefore, the physiology aspect of the sports science curriculum is based on the spiral approach to curriculum design (Harden, 1999), where topics are covered in enough depth to provide basic understanding and prerequisite knowledge for the second time round and then represented in greater depth for the third time and so on.

Rationale for innovation

For the 2010-11 running of Exercise Physiology I a number of changes were implemented, including online formative assessments and the provision of directed further reading. The rationale for these changes was to improve student performance and engagement in accordance with the concept of an aligned curriculum as proposed by Biggs (2003). The overall aim was to take into account as many of the students' individual learning styles and preferences as possible. Another rationale for these changes was that the module has been identified as a 'module of concern' and therefore an action plan was required in order to increase the pass rate to the University-stipulated 80%.

Methods

In order to evaluate the changes made to the running of this module, the model of Jacobs (2000) was used. The reason for choosing this model was that the evaluation framework takes into account the full range of variables impacting on innovative educational practice (Jacobs, 2000). Although the model is presented sequentially, the goals of the evaluation determine whether the sequence is rigidly adhered to or used in a more cyclical fashion, which makes the model highly adaptable. This is an advantage over the rigid cyclic model proposed by Hounsell (2009). Another advantage of this model is that the evaluation does not occur in isolation, but rather as an integral part of the context which shapes its very chances of success or failure (Jacobs, 2000). Importantly, the three principle sources of feedback are students, peers and self-reflection, i.e. the key stakeholders (Hounsell, 2009), as along with the pass rate. The methods used to evaluate the module included:

- Performance, i.e. the module pass rate.
- Two forms of questionnaires in order to establish the students' level of satisfaction: 1) the standard Health and Human Sciences (HHS) module questionnaire, to look at factors such as opinions on the topics studied and the number and usefulness of the tutorials, followed up by 2) a Weblearn-based questionnaire with more open-ended questions where students were able to be more specific with their comments.
- Discussions with fellow staff teaching on this module to ascertain what aspects they thought did and did not go well and potential aspects for improvement.
- Personal reflection on the module as a whole in order to establish the positive and negative aspects.

It would have been useful to have had a discussion with the module leader of Exercise Physiology 2, to see if the changes made in Exercise Physiology 1 have had a positive effect on the students' knowledge during this follow-up module. However, this was outside the scope of this study as this phase will not be implemented until October 2011.

Discussion

On the whole the module ran smoothly with a good integration between the lectures and practical sessions. There have also been some negative points and the major one has been student engagement. It is possible to make substantial efforts to help students, but they need the intrinsic motivation in order to make the most of what is available. It was surprising and disappointing to observe the low uptake of the quizzes and research articles (Table 1) prior to the revision period (on average fewer than 40% of the students did the quizzes and only 19% even looked at the research articles). It was hoped that students would be sufficiently motivated to spend more time making the most of the opportunities provided. However, merely making material available online does not mean that students will read it. Nevertheless, there was a large increase in the number of students using the quizzes during the revision period, indicating that these appear to have been more beneficial as a revision aid instead of a means of formative assessment. One member of the teaching staff, however, felt that "The quizzes posted on Weblearn helped students to revise after lectures".

Week	Corresponding week		Revision period	
	Quiz	Articles	Quiz	Articles
1	68%	47%	18%	1%
2	81%	43%	96%	12%
3	48%	25%	86%	9%
4	68%	26%	45%	3%
5	28%	18%	69%	5%
6	19%	11%	34%	2%
7	31%	10%	55%	8%
8	6%	13%	69%	6%
9	8%	7%	37%	8%
10	6%	1%	11%	11%
11	4%	4%	46%	8%
Mean	33±29%	19±15%	51±27%	7±5%

Table 1: Percentage of students accessing the formative quizzes and further reading during the week corresponding to the relevant lecture and during the revision period.

Despite the relatively low number of students attempting the quizzes and reading the articles, those who completed the survey seemed to view them in a positive light and find them useful:

“Good indicator of personal understanding... [The research articles were] useful for the coursework in particular”

“Anything that I was unsure of in the quiz prompted me to read up on and learn”

“The quizzes are superb reminders. Please keep them”

“The journals are interesting”

There was also evidence that students intended to use the quizzes and articles for revision purposes:

“I think [the quizzes] will be used more before the exams”

“Will probably [use the research articles] when I start my revision”

At least in part this was because it meant that they didn’t have to spend time in the library searching for literature:

“Sometimes it is difficult to locate the appropriate journals”

“Saved time searching for relevant articles”

The availability of online literature and quizzes may also have resulted in the module questionnaires reporting that 88% of the students found the web-based resources to be good. However, not everybody used them: “To, be honest, I wouldn’t know [if they were useful]”; and some found the research articles uninspiring:- “Some of [them] were boring and too long”.

This was echoed by a member of the teaching staff who said “Not sure the students will read them”.

Despite this, it certainly appears that the quizzes have been successful in terms of a revision aid, with a large increase in usage during the revision period (Table 1). The research articles were not as widely used. However, it needs to be taken into consideration that those students who downloaded them during the semester were unlikely to do so again.

2009-10			2010-11		
Coursework	Exam	Overall	Coursework	Exam	Overall
63±17%	34±21%	45±17%	60±17%	43±17%	50±16%

Table 2: Mean mark for each assessment component and the module overall after the first assessment opportunity in 2009-10 and 2010-11.

2009-10			2010-11		
Coursework	Exam	Overall	Coursework	Exam	Overall
91%	33%	61%	84%	47%	69%

Table 3: Percentage of students passing each assessment component and the module overall after the first assessment opportunity in 2009-10 and 2010-11.

Obviously a significant aspect of evaluating how successful the module has been is the pass rate, as that is what the success of a module is ultimately judged on at a faculty level. The mean mark (Table 2) and the number of students passing the coursework (Table 3) both decreased compared with the previous year. However, the higher number of students failing to submit their coursework this year (1 in 2009-10 compared with 6 in 2010-11) may have contributed to this. In contrast, the mean exam mark (Table 2) and the number of students passing (Table 3) both increased compared with the previous year. This was reflected in the improved mean module mark (Table 2) and the number of students passing the module (Table 3) by 5% and 8% respectively. Furthermore, student satisfaction appears to be high. This was supported by the comments made in the survey and the HHS module questionnaires where 93% stated that the module was well organised and 84% reported that the topics were interesting:

“Definitely [enjoyed it], as it’s what I am interested in”

“The content was interesting and relevant to [the] sporting environment”

“The lectures have been fun and exciting”

Conclusion

Overall Exercise Physiology 1 is regarded by the students and the teaching staff as being successfully run, and the students appear to have enjoyed the module. Furthermore, from the students’ responses it appears that the content of the module is appropriate and pitched at the correct level, challenging but not impossible. Therefore this module is in the correct position within the spiral approach to curriculum design (Harden, 1999). However, it is not possible currently to assess if the link between Exercise Physiology 1 and 2 is adequate. The online quizzes and research articles appeared to have been useful in terms of revision (Table 1), and a 9% improvement is consistent with previous research (Tong and Beynon, 2008), although in the future students need to be more strongly encouraged to use the articles and quizzes in conjunction with the relevant lecture as a means for them to gauge their own progress. However, based on the faculty benchmark of a pass rate of at least 80%, the pass rate this year of 69% means that the module can not be considered a success. It is hoped that the rate will improve after reassessments.

In the future it needs to be emphasised that the online quizzes are a formative tool, in addition to being a revision aid, so that students can monitor their progress throughout. Similarly, the research articles should be read at the relevant time so that the content is studied in manageable amounts.

The approach used to evaluate the module was useful as it incorporated the opinions from students and staff. Furthermore, using two forms of questionnaires provided a fuller picture. The standard HHS module evaluation questionnaire provided quite superficial information but from a relatively high number of students; in contrast, the Weblearn questionnaire provided much more detail but from only 13 students. The use of a computer-based questionnaire has previously been shown to be very effective in improving the quality of information gathered as part of module evaluation (Foster *et al.*, 2002). Consequently, it is intended to continue with the online questionnaire in addition to the standard HHS paper-based questionnaire as part of the module evaluation processes as these enable a clearer picture regarding the students' opinions.

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Biographical note

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