Title

Shadow Modules in the Biosciences

Subject Area

Undergraduate Degree in Biomedical Sciences

Scope and Context

The aim of this initiative was to explore and develop new student-directed learning pedagogies. Building on the idea of modularisation of courses, it focused on the development of "shadow modules" run by the students themselves to complement teaching that takes place through the core curriculum. Small groups of students engaged in collaborative work using a wide variety of digital technologies to design and develop resources to support the study of the formal academic modules.

Rationale and aims

The aim was to establish a student-led peer-to-peer approach to discovering and implementing digital technologies for academic tasks. Participating students benefit in a variety of ways, in terms of developing a range of digital literacies associated with designing, planning, producing and publishing multimedia educational resources.

Modular course systems along with increasing student numbers have the potential to lead to a decline in opportunities for discussion and collaboration between students. The goal of the 'Shadow Module' initiative was to enhance student collaboration and discussion and encourage student ownership and involvement in the content of the curriculum. In this way, students may become partners in the learning and teaching process, undertaking work that not only supports their learning, but which can also feed back into the way subjects are taught and the design of the curriculum itself. Thus delivery methods may become more student-centred and promote deep learning strategies.

The approaches undertaken in this study seek to adopt a social constructivist orientation, following Mercer's revision of Vygotsky's ZPD as the 'Intermental Development Zone' (IDZ; Mercer, 2000). According to Mercer's model, discourse that occurs between individuals while jointly solving a problem is vital in providing a structure for supporting all participants' learning. Working collaboratively towards the IDZ allows all participants to operate just beyond their perceived capabilities.

In addition, there is a also sector-wide drive for developing innovative pedagogy and policy that supports and facilitates the improvement of both student and staff adoption of web 2.0 collaborative technologies, which is a large part of the 'digital literacy' agenda. In an effort to develop and sustain a critical community of learners (Garrison and Anderson, 2003), the Shadow Module is an attempt to embed the use of technology in an effective pedagogy and reflective learning and teaching environment. Computer supported collaborative learning (CSCL) may also help to promote peer interaction and facilitate the sharing of knowledge among a group of learners (Lipponen, 2002). Shadow Module participants employ CSCL methods to help facilitate joint design and development of learning resources.

Digital literacies addressed

Students are presented with the opportunity to explore and experiment with a wide range of different kinds of digital technology. They are give free license to utilise whatever they feel is most appropriate for their project. However, there is limited technical support and the group is expected to draw upon as much as possible the existing expertise of members. Although there was substantial evidence of students learning from each other, the obvious limitation with this approach is the type and level of knowledge and experience of those involved.

Overview

The Shadow Module is a student-led activity run in parallel to the core academic curriculum. The main aim was to increase student engagement with digital technologies and experience collaborative learning. In this format, the Shadow Module Leader is a student responsible for organising student-led workshops utilising collaborative learning to design study resources. The products of this work are made available for current and future student cohorts, and potentially to be shared externally. Students also identify and curate free learning resources available on the web. The group working is supported by the use of interactive and collaborative IT tools of various kinds.

Activities performed by students in the Shadow Module sessions:

- warm-up exercises (brainstorms, topic review and discussion, spot tests);
- group reading and write-up (from papers, books and lecture notes);
- topic discussion;
- creating shared notes;
- essay planning and marking;
- revision and learning exercises, producing study aids for self and peers.

Digital resources and know-how used

A broad range of digital technologies were used by students during the Shadow Module. They were presented with opportunities to use different online collaborative environments and experience their different capabilities and limitations. For example, a number of web 2.0 type tools were accessible through the institutional VLE (Blackboard), but they were judged not provide the flexibility of more familiar 'socially oriented' web tools provided through such services as Facebook. It lacked group communication features such as a module wall, event management, posting comments, and seamless embedding of rich media (e.g. videos, PDFs, images).

Students gained experience from developing and using many different kinds of digital resources, such as graphical images, presentation slides, video and audio files. They made extensive use of digital tools to disseminate, reuse, maintain and improve what they had produced. For example, data-projectors were used by students to annotate and overlay images on a whiteboard. This was particularly useful for designing quick spot tests for colleagues, working together to make additions to existing diagrams, reviewing previous work and exploring new resources. Photographs of the end products were then captured using digital cameras and imported into Google Docs.

The benefit and value of using non-IT methods was not overlooked. A number of activities used no technology whatsoever, relying on the use of whiteboards, A3 paper, markers and post-it notes.

Benefits and impacts

The ultimate goal of the Shadow Module approach was to increase the involvement of the students in the way they learned about their subject, and to encourage student ownership of the module and the syllabus. Student feedback from this trial indicated that this did occur to some extent.

An online survey of participants clearly indicated that the students involved found the Shadow Module approach to be a valuable exercise. A number of areas were cited as being of benefit: impact on studying (alone or with peers); impact on working with others; interest in the module subject; and collaborative and communication skills. When the students were asked about whether the Shadow Module allowed for 'advice, support and feedback from

peers', there was an overall positive response. Also, 80% of students surveyed believed that the sessions had a positive impact on them dedicating more time to study.

To analyse the impact upon student module outcomes the module grades of the students who participated in Shadow Module sessions for that module were studied and compared to the mean of other students who did not participate in Shadow Module. Unfortunately, no clear benefit to student examination results could be demonstrated. But the experience did impact on student motivation, interest and engagement with the subjects studied.

The opportunity to work collaboratively in groups was noted by many as being both welcome and useful. Informal feedback revealed an improved sense of collegiality amongst those who participated. Students said that they had acquired a greater sense of ownership of the curriculum they were studying. Although not leading to measurable academic achievement, these are nevertheless important reasons for including students in curriculum development, and the Shadow Modules have real potential for improving the student's experience.

Conclusions and lessons learned

The pilot study has demonstrated that the Shadow Module approach is a viable and useful activity complimenting the core curriculum. The intention is to develop this approach and to further investigate the long-term impact of the pedagogy to the student learning experience.

The number of students who participated in the Shadow Module was relatively low compared to the overall size of the cohort. Student engagement with technology during the sessions was high, with many activities involving students collaborating towards the development of online resources.

Students were more likely to get involved in design and development activities if they had their own computing devices. After attending one or two sessions most participants were bringing their own laptops.

The online collaborative space presented some challenges to the students. A major limitation to the approach was the requirement to run much of the

process through the University's VLE. Its inflexibility pointed to the need for a more robust, interactive and usable community virtual space. The main collaborative tool used was Google Docs, which also had limitations.

There is a need for a dedicated online social space to facilitate student activity in Shadow Modules. Currently the only versatile and usable spaces for this kind of collaborative working are popular social media sites (e.g. Facebook). Such an environment should ideally be owned by the university providing a common place for communication between students and feedback from academics and peers. It should include a repository for multimedia resources, with the ability to interface with other colleges/universities to enable inter-institutional collaboration. The platform could also be a means of improving the level of academic input in the Shadow Module without impeding on the progress of students in Shadow Module sessions.

Feedback revealed that the Shadow Module was an engaging and useful experience, in particular the opportunity to learn collaboratively. However, some felt that they would have benefited from more structured input and support from academic staff. The extent to which academic staff are involved in facilitating a Shadow Module should be carefully considered. Depending the baseline digital literacies of the students, a balance is required between more structured and directed forms of learning and opportunity for discovery oriented and self-managed approaches.

Some cultural challenges were evident. So as to better understand the specific needs of young learners it is suggested that academics seek out more opportunity to become equal partners in the learning process. Future work should focus on identifying pedagogical and technological features that lead to a sustainable community of practice involving academics and students.

Although participation in the Shadow Modules encouraged student engagement, significant sustained input is needed if a self-perpetuating community is to be realised. Students clearly needed help adjusting to the approach, mainly with the organisation and running of the sessions, but also interpersonal skills in the context of collaborative learning. The level of autonomy/independence demonstrated by the groups was variable. In practice, much of the work of the groups was dependent on input from the

Shadow Module Leaders to help manage the sessions and generate ideas for future work, although student confidence and contribution did improve over the duration of the module. Motivated and engaged students and academics, equipped with the right tools and knowledge of how to use these tools effectively are a critical to this process.

Students demonstrated willingness to collaborate and upload notes to a shared space during the sessions. The creation of topic specific resources by the students on the Shadow Module was of direct benefit to their peers for study and revision, with the resources being successfully accessed by students who did not participate in the Shadow Module. This was observed to occur most frequently near the date when the module examination was taking place.

Interestingly, subsequent independent work done by students after participating in the module was not as readily shared with other students. It would be interesting to explore in more detail the changing attitudes and motivation of students involved with the Shadow Modules.

A number of simple improvements are recommended to improve Shadow Module outcomes.

1. The number of shadow modules should be increased so that students become more familiar with the format and the benefits.
2. Increase shared physical spaces made available to accommodate more informal shadow activity, which are large and dynamic enough for the varied learning and teaching modalities that arise.
3. Changes in technology use could improve outcomes of the Shadow Module pedagogy.

Links and further information:

Rutherford and Scott (2012)
http://www.heacademy.ac.uk/assets/documents/disciplines/biosciences/2013/HEA%20Bristol%20Swap%20Shop%20SMR%202013.pdf

Enhancing learning and teaching in higher education in Wales
http://www.heacademy.ac.uk/assets/documents/nations/wales/Enhancing_learning_and_teaching_in_higher_education_in_Wales.pdf

Joe Nicholls & Jon Scott. The value of digital literacy. Social Connections II
http://www.youtube.com/watch?v=_p2fytsD80s

http://prezi.com/ecp1suh6mom5/making-the-connection-the-value-of-digital-literacy/

Bibliography

- Garrison, R. and Anderson, T. (2003) E-Learning in the 21st century: a framework for research and practice. London: Routledge.
- Lipponen, L. (2002) Exploring foundations for computer-supported collaborative learning. In: Stahl, G. (ed.) Computer Support for Collaborative Learning: Foundations for a CSCL community. Proceedings of the Computer-supported Collaborative Learning 2002 Conference. Colorado, USA 7-11 January. Hillsdale, NJ: Erlbaum, pp. 72-81.
- Mercer, N. (2000) Words and minds: How we use language to think together. New York: Routledge.
- So, H. and Brush, T. (2008) Student perceptions of collaborative learning, social presence and satisfaction in a blended learning environment: Relationships and critical factors. Computers & Education. 51 (1), 318-336.
- Wilkinson, S.C. (2011) Using socially constructed technology to enhance learning in higher education. Journal of Learning Development in Higher Education. 3.

Further opportunities

The trial continues in Biosciences with a view to promoting its inclusion in other courses.

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