

Collaborative Learning: using technology for fostering those valued practices inherent in constructive environments in traditional education



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Summary

This paper presents a rationale for learners to learn through working collaboratively. An overview of the use of a number of different collaborative technologies to support pedagogy in a Blended Learning environment is reported. These technologies are then illustrated using three examples.

The first is a completed study, which investigated the use of StudyNet, the University of Hertfordshire's managed learning environment (MLE), to facilitate collaborative learning with third year students studying on an undergraduate programme in Physiotherapy. The second is a work in progress in Radiography, which is investigating students' use of StudyNet to support assignments on a third year undergraduate programme. The third is a work in progress in Computer Science, with second year students exploring the use of alternative collaborative technologies, including Blogs, Discussion Forums and Wikis, to support online collaborative working and collaborative learning.

Collaborative learning: why do we want students to learn through working collaboratively?

Collaborative working is perceived as a means of working more creatively, a 'two heads are better than one' approach, and a means to improving learning (Thorley & Gregory, 1994; Edwards & Clear, 2001). Students working together tend to do 'better' than those working in competitive and individualistic settings. 'Better' meaning deeper learning, which emerges as students become active participants in the group's learning (Tribe, 1994). Students working collaboratively tend to produce better results (Gupta, 2004). Collaborative learning has relevance for industry, in that employers want graduates with transferable skills or generic competences (Harvey & Mason, 1996; Dearing, 1997; Pew Commission, 1998; Doolan & Barker, 2004) and in academia, with increases in student-staff ratios, there is an increasing focus on creating a student-centred learning approach and the student as a self-directed learner. At times, the lecturer perceives collaborative working as a way of dealing with large student numbers and tight time constraints (Edwards & Clear, 2001; Pilkington *et al*, 2000; Doolan & Barker, 2003). This is all within a context where the UK government wishes to widen participation, increase student numbers and produce lifelong learners as set out in the White Paper on the future of Higher Education (Dearing, 1997).

Technology can be used as a strategic resource in supporting teaching and learning. The current infrastructure and investment that is available means that there are opportunities for technology to be used in collaborative learning. This may complement traditional practices and provide open and distance learning, while at the same time fostering those valued practices inherent in constructive environments, perceived as being important practice in traditional education.

Why use a Blended Learning environment for collaborative learning?

There has been considerable pedagogic research into collaborative learning and it has been shown to contribute to the graduate skills of 'teamwork, communication, lifelong learning and problem-solving' (Gupta, 2004, p.63). However, there has been limited research in using this approach in a Blended Learning environment (Baskin *et al*, 2005). The importance of processes and clear guidance to facilitate students to engage in collaborative learning activities has been widely reported (Hartley, 1999; Maor, 2003; Doolan & Barker, 2004). This includes processes such as:

- creating templates
- establishing deadlines
- encouraging the group to adopt an agenda.

Hiltz & Turoff (1978) reported that options not available during face-to-face meetings are provided by systems such as anonymity of group members and increased access to possibly widespread information. Students can work at times and places convenient to themselves, thus giving them flexibility (Alltree & Thornton, 2004). Working collaboratively online provides the opportunity for scaffolding, particularly in the form of learner-to-learner support, enabling students to input documents, share ideas and provide feedback to each other on the input. This is one means of supporting student learning that is both cost-effective and an efficient way of managing learning online (Lockwood & Gooley, 2001). Students have been shown to value peer-produced resources in their learning (Doolan & Barker, 2004; Alltree & Thornton, 2004). An important motivational factor for the learner in using these systems is the nature of the task in which the learners are engaged.

Within the task, each member of the group needs a structured job to do (Crook, 2003). Online group work seems to work best when the participants themselves are encouraged to take individual ownership of the roles required and of their role in the discussion (Pilkington *et al*, 2000). The key issue is that learning processes become visible, and thus enhance the quality of the feedback provided by tutors, in addition to the feedback learners receive from one another (Crook, 2003). A further advantage of working collaboratively online is that the tutor can view how well the group is working together and can monitor the pattern of performance within the group. It is also a very useful tool for monitoring the level of student engagement amongst their peers. This helps in further understanding students' study patterns (see Figure 2 in example 3, p15). The following table provides a summary of current online technologies to support collaborative learning:

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Table 1: Technologies for collaborative learning

Asynchronous Respond any time any place, delayed communication	Discussion forum	Message posting, read messages, respond to postings, threaded by topic, author, date stamped, emoticons, search facility. Upload attachments with postings.
	Wiki	A "white board" which can be written to, another can edit and add content. Track changes. By tracking changes it is possible to monitor the progress of a document and watch student ideas develop and grow. Can share resources, chat, problem solve etc.
	Blog	Bloggging involves both writing an online electronic journal (called a blog or weblog) and reading the blogs of others. Will allow multiple users to contribute, read weblog, add comments, add links and images.
	Email	Compose message, read message, respond to message, attach document with message.
Synchronous Instant chat in real time	MSN	Allows for fast exchange of messages – conversation. Members registered, when logged on other members are notified.

Pedagogy for collaborative learning in a Blended Learning environment: the role of the learner

In collaborative learning the emphasis is on the students and the learning environment. Learning is a social activity where peers play an important role in encouraging learning. Vygotsky (1978) argues that students and tutors take on specific roles in this learning environment. Students play an active part and assume responsibility for their own learning, solving problems while working together with their peers. Working collaboratively online supports this, as it provides the environment where students actively engage in the learning activity whilst providing peer-to-peer support and feedback to members of the group.

Learning in a blended environment requires the student to take further responsibility for managing their own time in order to become autonomous learners, whilst utilising online resources effectively (Allan, 2004; Sweeney *et al*, 2004). This is exemplified in example 1. In order to participate effectively, students do need sufficient IT skills to overcome the social and psychological barriers (Cramphorn, 2004). When students do not collaborate effectively, the social and cognitive advantages of group learning are lost (Soller, 2001) – see example 2. It has been recognised that collaborative learning does not suit all learners (Laurillard, 2002) and online collaboration may, in itself, cause stress for collaborators (Allan & Lawless, 2003) – see example 2. Students may find publicly exposing their views difficult, as in, for example, discussion forums. This in part may be overcome by allowing anonymous posting – see example 1.

The role of the lecturer

Sfard (1998) indicated a change in the role of the lecturer/instructor from one of delivering, conveying and clarifying, to one of expert

participant. This role should not be underestimated and it is well documented that it is a critical factor, especially where course design emphasises peer learning (Kear, 2004; Sweeney *et al*, 2004). Duchastel (1997) reports that the lecturer/instructor should:

- Specify goals to pursue instead of content to learn
- Accept a diversity of outcomes instead of demanding common results
- Request the production rather than the communication of knowledge
- Evaluate at the task rather than at the knowledge level
- Build learning teams instead of assigning activities that only have meaning to the individual
- Promote global learning communities instead of remaining localised.

When technology is used in teaching and learning it has been well documented that the cognitive load, as well as the time burden, on the lecturer/instructor can become very high (Collis & Moonen, 2001; Fitzgibbon & Jones, 2004). In example 1, the lecturer addressed this by reducing the teaching contact time, giving the lecturer time to support collaborative working online. In addition, by empowering the students to view their peers as a resource for learning, dependence on the lecturer is reduced.

Three examples of using technology collaboratively to complement traditional practices

The following examples refer to StudyNet, which is the University of Hertfordshire's managed learning environment (MLE). Example 3 uses other technologies such as Blogs (available within StudyNet) and Wikis.

Example 1

The first example is a completed study that investigated the use of StudyNet to facilitate collaborative learning with 80 third year students studying on an undergraduate programme in Physiotherapy.

Course delivery

Topics for each week were focused around a specialist patient group in a modified Problem Based Learning format (Schwartz *et al*, 2001). Class contact was reduced by 26 hours to enable students to work collaboratively in preparation for seminars. Lectures were delivered by practitioners and these were followed by seminars, where students gave presentations on the weekly topics. Students were placed in teams based on their Belbin roles (Belbin, 2003), were taught teamwork theory and participated in a tutorial in which the teams set the ground rules for working. This induction process was to promote effective teamwork and skill development, skills which are highly valued in the NHS.

Using a blended approach in the delivery

The functions that were used via StudyNet included news, module information and teaching resources. Additionally, the discussion forums were seeded, and resources and web links were posted. Students provided a weekly electronic file to go onto StudyNet, which was posted in teaching resources by the tutor. The cohort was divided into groups, then teams, so for each topic there were several teams doing the same topic and students could see several interpretations. This integration has been formally evaluated over several years.

Evaluation of delivery method

From one questionnaire (Alltree & Thornton, 2004) 98% of students rated the use of

StudyNet as "Very useful" and feedback comments included: "*The best thing since sliced bread*", "*Excellent way of communicating, fair to all*". Subsequent development has resulted in high levels of engagement with StudyNet. Analysis of student feedback suggested there were three main themes showing why students viewed the peer materials and the discussion site:

- To voice concerns/worries, request clarification
- Keep for future reference/hard copy/print off
- Broaden knowledge/other points of view

Students developed their graduate skills through preparation for the seminars, including self-management, communication and interpersonal skills, searching, presentation and intellectual skills to contrast the evidence with practice. The students recognised the value of the seminars as evidenced in their comments: "*Helped to generate our own views and arguments in a very productive way*", "*Difficult subjects but seminars compelled us to take a closer look – Good Tactic!*", "*Much improved confidence, great teamwork, a good way of learning*".

Using a blended approach in the assessment

Three different pieces of assessment were used:

- Coursework – a discussion of the issues in an article with a choice of six articles, which were accessed electronically
- Exam – using 'take away' topics (Freeman & Lewis, 1998), which reflected the learning process they had been undertaking and with a choice of questions
- Presentation – allowing them to choose the topic and utilise the skills they had learnt in the seminars

The students were also encouraged to discuss coursework and they used the discussion facility to organise face-to-face meetings. By using the discussion facility, all students had access to these meetings and it encouraged the sharing of information not only in their normal friendship groups but also across the cohort.

Evaluation of assessment method

In one year there were 255 postings on the discussion site. Some students highly valued the anonymous thread: *“I felt more confident to post anonymous questions”, “I like the anonymous thread as students can ask more questions without feeling silly”*. Of the 54 responses on the anonymous thread, only 15 had been made anonymously. On all the rest the students had posted their names. Of the 71 discussion threads, only 20 were not directly related to assessment. When actual postings are considered, of the 255 postings only 23 were not related to assessment. This illustrates the importance of using a blended approach to the assessment as well as the delivery.

This example highlights the use of group work to facilitate skill development, especially team-working skills that are required for the effective treatment of patients. It also shows the importance of ‘carrots’ to engage students – in this case, the use of discussion sites to support assessment, and the opportunity for students to see their peers’ work, make comparisons and challenge their own viewpoint.

Example 2

The second example presented is a work in progress in Diagnostic Radiography which seeks to investigate students’ use of StudyNet to support assessment on a Level 3 undergraduate module. The module contains common core material, which students then investigate from the viewpoint of their chosen imaging modality. This module uses a spiral

syllabus design as described by Pincas (2002); see Figure 1 below:

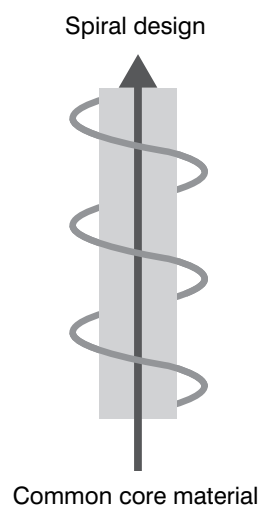


Figure 1: Spiral syllabus design (Pincas, 2002)

Assessment for this module requires students to work collaboratively while undertaking three pieces of assessment using three different methods of participation. This assessment drives the students to develop team-working skills essential for working within the NHS.

Using a blended approach to the assessment

The first piece of assessment involves students exploring applications of a chosen imaging modality relating to the head and neck region in electronic journals as provided within the learning resources section on StudyNet. Firstly, students individually have to upload a link to an electronic article and a 200-word summary of its contents by a preset deadline date. Students

must then write an individual assignment based on three related articles uploaded to different imaging modality group areas.

The second piece of assessment involves students working in groups of their own choosing and submitting a group written assignment based upon a choice of three topics exploring differences in general radiography and specialist imaging areas.

For the third piece of assessment, students are required to work in groups that are not of their own choosing. They are assigned to groups and asked to critique a given website. Each group member is given a specific task, and a group written assignment must be submitted. This type of group work is commonly called the 'jigsaw method' (Schweizer *et al*, 2003).

Evaluation of assessment method

Following the submission of the three pieces of assessment, students are given a brief questionnaire asking them to indicate the number of times they accessed StudyNet in order to carry out each task, and their opinion as to whether the type of assessment encouraged them to learn independently and effectively. They are also asked to indicate strengths and weaknesses in each type of assessment. Following the submission of the three pieces of assessment, students rank them in order of preference. The data generated is analysed and used to inform the future use of online collaborative working within the programme.

Problems did not occur in the first piece of assessment, which was submitted individually. For the second assessment, however, there was a minor incident of one of the groups completely breaking down in their ability to work together. With hindsight, greater preparation of the students to undertake group work may have been beneficial. The third piece of assessment is currently awaiting submission.

Example 3

The third example presented is a work in progress in the School of Computer Science exploring the use of alternative collaborative technologies. The technologies are currently being used to support in-module assessments with 90 second year students studying an information systems development module. These technologies lend themselves well as tools for collaboration and communication for developing communities for learning. This study seeks to explore their potential for supporting online collaborative working and collaborative learning. Furthermore, it seeks to understand how pedagogical change can bring about improvements of learning.

Using a blended approach to collaborative working

As part of the assessment, students are required to undertake tasks working collaboratively in groups of six. These are allocated by the tutor from across the cohort.

Groups are provided with their own private collaborative space to engage with their peers using Wiki technology and the group area on StudyNet. Features enabled for the group on StudyNet include Blog, Project Planner and the Discussion Forum. These are actively used by students alongside their group area on the Wiki. The general class discussion on StudyNet is also utilised. Students are actively engaged with the technologies alongside traditional face-to-face meetings and class contact. Figure 2 (overleaf) illustrates this active engagement with Wiki over a four-week period.

The Wiki provides an indication of the students' study pattern and level of engagement with the technology over the duration of their first in-module assignment. The majority of engagement took place on Thursday when the students were timetabled for this module. It is

evident students were working constantly throughout the week, but with higher levels of activity on Sunday than Saturday. As might be expected there is a natural progression in learner activity (3,539 page loads) on the Thursday prior to the Tuesday assessment submission day. As mentioned above, an important objective of this study is to explore the potential of the technology for supporting collaborative working and learning. This pattern of usage indicates that the technology is supporting these learners whilst undertaking their group assessments. As this is a work in progress there is further analysis that needs to be carried out.

Evaluation

A range of qualitative and quantitative evaluation methods are being employed in the study, including students' reflective blogs. The intention is to examine and present students' views about the extent to which the various technologies facilitated collaborative working and learning in a Blended Learning environment. Student contributions to the technology will be analysed in order to explore how the students worked and learned collaboratively using the technology and how pedagogical change can bring about improvements in learning, using online communities for learning regardless of the technology.

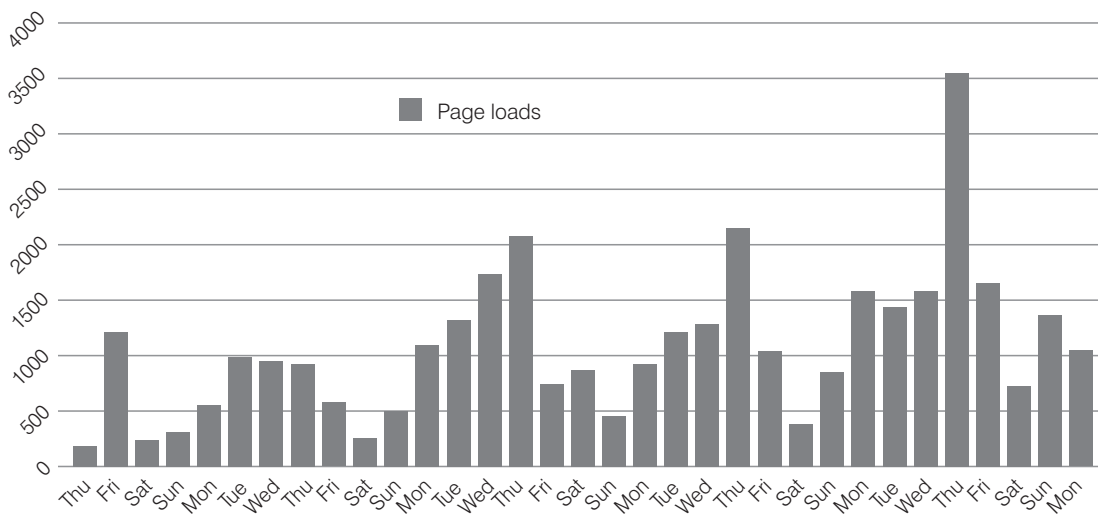


Figure 2: Student engagement with Wiki over a four-week period.

Conclusion

This paper has reviewed the use of collaborative learning in a Blended Learning environment, using a number of different technologies. For this to be successful, it needs careful module design to use the technologies in an effective way, and it requires changes in the roles of learners and lecturers. The students need to take responsibility for their learning, and organise their time effectively to use both the face-to-face teaching sessions and the online resources. The three case examples illustrate different ways of integrating technology to support collaborative working and learning. Lecturers need to become familiar with the technology and then seek to integrate it into their courses as an integral part of delivery.

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Biographical notes

Martina A. Doolan graduated from the University of Hertfordshire in 1996 and joined the University as a member of the academic staff in the School of Computer Science. Martina has been active in the area of Teaching and Learning since joining UH with a particular interest in exploring/ exploiting alternative technologies to support learning. Martina is currently working on developing online collaborative spaces and building learning communities. Martina gained the Vice-Chancellor's Award for excellence in Teaching and Learning 2004, is a principal lecturer in Computer Science and is a BLU teacher.

Alan Hilliard qualified in 1988 as a Diagnostic Radiographer and worked within the NHS until 2001. Since moving into education in 2001, he has developed his interests in motivating students to engage in active learning. From the introduction of StudyNet he has worked to investigate methods of integrating it into teaching and learning, and to explore new ways of collaborative learning, to create a Blended Learning environment. Alan was made a University Teaching Fellow in November 2005 and is currently continuing his development and evaluation of collaborative learning in his role as a BLU teacher.

Heather Thornton qualified in 1986 as a physiotherapist and then worked in the NHS until 1999. She specialised in the neurosciences, and health service management. Since moving into education in 2000 she has been interested in how to encourage students to take an active part in learning and the use of group work. Heather became a University Teaching Fellow in November 2005 and is a BLU teacher.