Chapter 9
Blended Problem-Based Learning: Designing Collaboration Opportunities for Unguided Group Research Through the Use of Web 2.0 Tools

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Introduction

There is an emerging evidence base for using technology to support problem-based learning (PBL), although until recently most studies had focused on technology as an alternative method of delivering the content and resources supporting the problem scenario (as noted by Savin-Baden and Wilkie 2006; Donnelly, 2006, 2010), as opposed to a way of supporting collaborative and dialogical learning in problem solving. New research points to a shift in instructional design from using technology for content delivery towards supporting interaction and the active engagement of students in learning activities. Wheeler, Kelly, and Gale (2005) have described how online learning may support active problem solving and the immersion of students within situated learning tasks which address real-life problems. Studies on blended PBL have indeed begun to address student-centred learning designs and their impact on learning behaviour (Savin-Baden, & Wilkie, 2006). There are indications that students prefer to have web support for PBL (Cunningham, Deal, Neville, Rimas, & Lohfeld, 2006), and that a blended format can have a transformational impact on their learning, encouraging learners to engage in critical thinking (Donnelly, 2009), although in the majority of studies to date, the positive reception of technology by students relates more to the ease of online access to resources, provision of tools for enhancing face-to-face discussions (de Leng, Dolmans, Muijtjens, & van der Vleuten, 2006) or basic tutor–student question and answer interactions (Dalsgaard & Godsk, 2007).

Identifying and enabling peer (learner–learner) collaboration in the online environment in a way that demonstrably supports student-directed learning outcomes remains a challenge and may involve a variety of instructional roles in managing the learning process (Danielsen & Nielsen, 2010), although some studies have

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reported positive responses from students in qualitative surveys and focus groups in relation to their learning experience (McCall, 2010; Woltering, Herrler, & Spitzer, 2009). Studies applying the pedagogy of online interaction to analysis of collaboration in the context of PBL are beginning to emerge (Bromby, 2009; Danielsen & Nielsen, 2010; Donnelly, 2006, 2010; Ryberg, Koottatep, Pengchai, & Dirckinck-Holmfeld, 2006), and it is within this context that this chapter is placed.

Defining PBL and Its Relationship to Networked Learning Theory

In recent years a close association has been asserted between PBL design and networked learning theory, based on their shared critical and humanistic traditions of learning (Hodgson, McConnell, & Dirckinck-Holmfeld, 2012). PBL has been commonly described as a student-centred pedagogy which engages learners in problem solving as a way of developing their knowledge and understanding (Costello, Brunner, & Hasty, 2002; Hmelo-Silver, 2004): learning is derived as an outcome of the work involved in tackling and resolving the problem (Barrows & Tamblyn, 1980), involving an act of cognitive construction by the learner (Schmidt, 1994). Networked learning may be viewed through the prism of ICT-enabled human interactions in cooperative and collaborative tasks, emphasising interdependent relationships between participants in the conduct of inquiry-based learning. It has been defined by Goodyear, Banks, Hodgson, and McConnell (2004) as

> learning in which information and communications technology is used to promote connections: between one learner and other learners; between learners and tutors; between a learning community and its learning resources. (p. 1)

The Danish tradition of problem-oriented project pedagogy (POPP) has highlighted the overlap between PBL and networked learning in pedagogic design, informing the way in which learning environments may be created to support inquiry and action-based learning. The POPP approach employs ICT as part of an integrated design, supporting a networked approach to problem-oriented study, which is based on socio-constructivist and sociocultural approaches to the understanding of ICT and learning (McConnell, Hodgson, & Dirckinck-Holmfeld, 2012). Central to this approach are the concerns of problem orientation and participant control, which distinguish problem-based networked learning from more traditional PBL design approaches (Ryberg et al., 2006). In a departure from a teacher-controlled or guided PBL, students exercise greater control over the problem definition, formulation of learning outcomes and the process of inquiry for the problem in hand, developing a sense of ownership and responsibility for the whole educational process, rather than a controlled component of it.

Danielsen and Nielsen (2010) in particular have focused on the cooperative and collaborative properties of student-centred rather than teacher-directed activity in

problem-based networked learning, highlighting the changing role of the tutor in facilitating the learning process. Knowledge acquisition can be seen as the result of cooperative and collaborative actions led by the students:

> In the problem-oriented project work the students themselves are responsible to identify the problem, to work with, and the very act of formulating a problem actually to work on is a large part of the learning process. (Danielsen & Nielsen, 2010, p. 529)

In this chapter we consider how the pedagogic values associated with problem-based networked learning may be applied to a blended course design. The chapter explores how Web 2.0 technologies may be employed to support the processes of knowledge sharing, negotiation and resolution in unguided PBL group research activities, where the focus is placed on student-directed learning. An underlying issue for consideration in this chapter is the degree to which we can design for collaborative and interdependent problem solving to take place online. How far can curriculum design take us in creating the conditions for student-centred self-directed learning, and what should the role and responsibilities of the tutor be in fostering the targeted learning behaviour?

York's Approach

This chapter reports on a blended design approach for a new postgraduate LLM International Corporate and Commercial Law programme at the University of York, which was first delivered to students in October 2009 using a combination of lectures, discursive seminars and problem-based learning activities. The LLM programme is taught over one year, during which students study for 180 credits through a mixture of compulsory and optional taught modules (worth 10/20 credits each) followed by a dissertation. The use of problem-based learning is presented to students as a core element of their study programme, enabling them to focus on aspects of law which have been introduced in the seminars and lectures. The emphasis on PBL is indeed common to all taught programmes delivered by York Law School and aims to

> facilitate the delivery of an integrated curriculum: theory and skills can be taught and learnt together and socio- legal aspects of law can be considered alongside practical problems and the basic law underpinning them. (York Law School Guide to Problem-Based Learning, 2009, pp. 9–10)

However, a defining characteristic of the postgraduate curriculum design relates to the level of student autonomy in the performance of PBL tasks. Whereas the University's LLB teaching to undergraduates is based on a guided discovery model for PBL activities with learning outcomes for problems prescribed by the teaching staff to ensure consistency in what is studied across a cohort, the LLM model follows a more open discovery model, more closely associated with andragogical self-directed learning (Walton & Matthews, 1989). A dedicated PBL tutor, rather

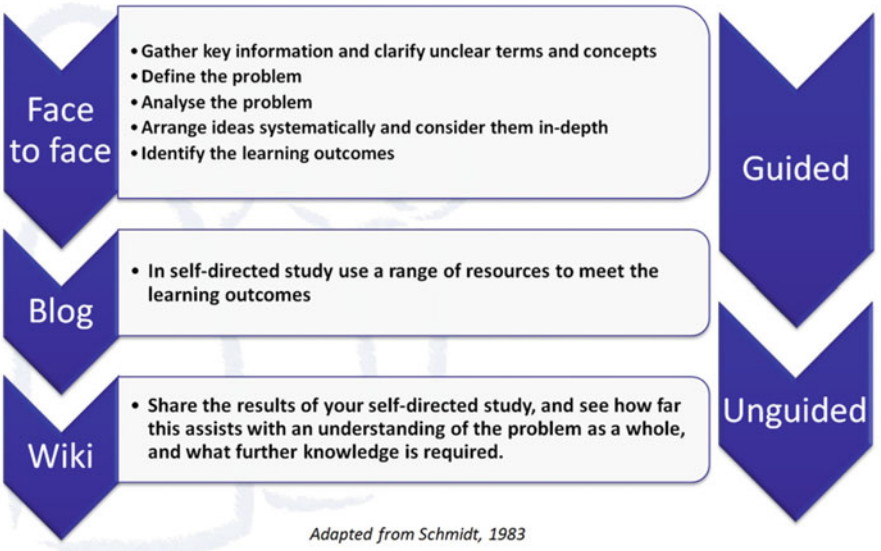

Fig. 9.1 Blended design for the LLM programme

than a member of the teaching staff, oversees the learning process with students given a freer hand to determine their learning objectives, how to address them and to evaluate what they have learned. Figure 9.1 above captures the essence of the blended design approach for the LLM programme, outlining the range of activities that LLM students perform and the balance between guided and unguided learning.

Following this approach the PBL tutor's role is more akin to that of a learning facilitator, ensuring that students are on the right track in their definition of the learning outcomes and suitably prepared to tackle the problems in the performance of unguided research activities. Another defining characteristic of the LLM approach is the integrated use of ICT tools to support the performance of the unguided group research tasks—an essential part of the blend in course delivery and study methods. The selection of collaborative tools and a virtual space for student-managed activity aligns with the philosophy of the teaching programme to foster self- and group-management skills expected of students at this level. Web 2.0 tools assist with this process, with a group blog used to support information sharing and discussion of the problem and a wiki tool for the presentation of a group's combined solution. The emphasis on virtual collaboration is also intended to be enabling for postgraduate students, who are geographically dispersed and unable to collaborate face-to-face during the period of unguided group work, given that there is no requirement to be resident on campus during the period of self-study.

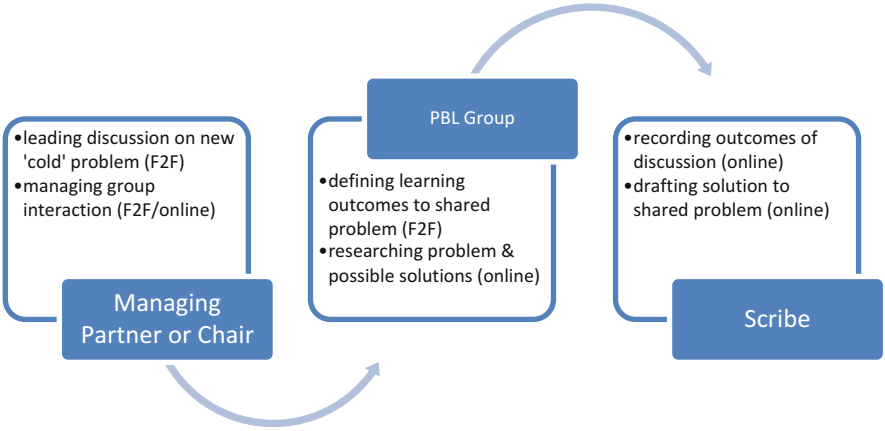

Fig. 9.2 PBL cycle: roles and responsibilities

The PBL Cycle Within the 2009–2010 LLM Programme

The 2009–2010 LLM programme was designed to include an assessed PBL activity in each module, worth 30 % of the total marks on offer to students in the module assessment. The PBL activity followed on after the delivery of introductory lectures and seminars by the teaching staff, which provided students with a theoretical overview of the key themes of the module. The PBL cycle ran over 1 week, from the introduction of the problem to the submission of a group solution by students: once initiated, it was designed to run as a 'stand-alone' activity, exploring a practical aspect of law which not been dealt with in detail in the seminar, with a dedicated tutor overseeing the cycle as depicted in Fig. 9.2 above.

At the start of each cycle, a new problem was introduced 'cold' to students in a face-to-face session, with the PBL tutor acting as facilitator and providing feedback on the performance of the group. The problem took the form of a case history, which students were invited to analyse and then respond to questions, addressing principles of law and citing relevant cases in their solution. For example, one problem in the Law and Commercial Transactions (LCT) module was presented as a summary of contract negotiations between two parties, with students invited to analyse the terms and conditions for the commercial transaction under negotiation, determining whether an agreement had been reached.

For each problem, a student acting as managing partner or chair assumed responsibility for leading the discussion and managing the interaction of the group, and another student acted as scribe, recording the details and outcomes of the discussion. These roles were rotated amongst the group to ensure that all students had the opportunity to participate. In these sessions the students identified their prior knowledge as well as the learning outcomes and priorities for the group research task, which were elicited through a brainstorming exercise facilitated by

the PBL tutor. The learning then moved to the self-managed collaborative space on the University's virtual learning environment (VLE), where students were presented with the group wiki and blog tools (Learning Objects Campus Pack 3 tools hosted within the Blackboard VLE) to manage their own research activity to address the learning outcomes and seek an agreed solution to the problem.

At this stage of the PBL cycle, it was anticipated that students would engage in self-directed learning, researching solutions to all of the targeted learning outcomes for the problem under review. They were encouraged to post their ideas to a group blog area, with no prescription as to the form in which they made their submissions. The choice of a group blog tool was intentional, with the aim of supporting an open and free-flowing discussion, rather than a predefined or structured discussion mediated through a discussion forum. Reflections on all the learning outcomes were to be captured in holistic posts, with students setting out their individual perspectives on the problem. The collaborative process was intended to follow on from this, when students were in a position to share their findings and engage in the problem-solving process as a group, negotiating and constructing new knowledge online (Hmelo-Silver, 2004; Schmidt, 1983). Discussion was conducted through the blog, with a commenting facility also made available for students who wanted to attach responses to specific blog posts from their peers.

The group wiki was reserved as the space for the presentation of the group's finalised solution, drawing on the blog postings and combined research effort. Students were encouraged to reach an agreed group solution to the problem, although the scribe could record differing interpretations to aspects of the problem in the final wiki report if disagreements existed within the group.

The research and negotiation of the finalised solution were intended to be unguided, with no input from the PBL tutor, although an interim face-to-face meeting was convened midway through each exercise to check that students were on the right track. Individual contributions to the group work were assessed as 30 % of the coursework mark for the module, acting as an incentive for engagement, group participation and adoption of the targeted learning methods.

Research Focus and Evaluation Methods

The PBL sessions were delivered in the first term of the new programme in October 2009 across two compulsory modules (20 credits each) and two optional modules (10 credits each) for a small cohort of 7 international postgraduate students, drawn from a mixture of countries including China, South Korea, Pakistan, Germany and the United Kingdom.

Evaluation focused on the nature of group interaction within the virtual space that had been set up for the unguided research task—in particular how students responded to this medium in their approach to the weekly problems. This involved a study of the full range of learning that was being supported online, from evidence collection and reporting of findings relevant to the problem under discussion to

deeper levels of learning involving the critiquing of conclusions and delivery of constructive feedback to others.

By drawing on multiple data collection methods, the research aimed to build up a rich picture of student learning across a selected range of PBL activities. Weekly blog sites were randomly selected from the compulsory LCT and the optional Corporate Finance and Corporate Insolvency (CFCI) modules of the LLM programme to serve as a focus for the research activity, which investigated PBL activities over a period from October to November 2009. Wiki sites were of less interest and not a feature of the research, as they were used exclusively by the PBL scribe to post the group's finalised solution and were not intended to be used in an interactive way by other members of the group to record their perspectives on the problem.

The unit of analysis for the online blog contributions was a blog post or comment associated with a post, which could contain multiple 'units of meaning' within each post. To evaluate the posts for each selected weekly problem, Fox and MacKeogh's 16 categories of cognitive thinking (Fox & MacKeogh, 2003) were employed, which are in turn adapted from Salmon's original framework for interpreting online contributions (Salmon, 1998). This framework maps closely to the stated objectives for the unguided research in addressing evidence of self-directed research (reading/citation of resources) and of skills ranging from opinion forming (declarative statements) to higher-order cognitive skills (articulating and explaining, critiquing and challenging ideas of others).

Quantitative research methods were also used to track students' visits to the VLE module sites and to the weekly blogs where research findings were posted. In addition to this, a number of blog posts and comments that were made were recorded as a means to measure individual contributions to the PBL group research activity. Finally, focus group interviews were conducted with the course instructor, PBL tutor and students to probe their accounts of the learning that had taken place online.

Evaluation Findings

Profile of the LLM Cohort

The cohort had little prior familiarity with the PBL approach and use of online tools at the outset of the LLM programme. One of the students had encountered a seminar-based discussion of law in her undergraduate studies, although this was focused on the theory rather than the practice of law. For the others, the discursive and research-based components of PBL were entirely new. Some of the students were familiar with VLE platforms and module sites as repositories for course resources and test questions, but not as spaces for collaborative research and the elaboration of knowledge. As a way of introduction to prepare students for

Table 9.1 Frequency of individual contributions to PBL blogs

	Frequency of blog posts and comments			
	LCT	CFCI	CFCI	LCT
Students	Week 3	Week 2	Week 4	Week 6
Student 1	1	2	4	2
Student 2	1	2	1	2
Student 3	2	6	2	1
Student 4	1	3	1	1
Student 5	3	–	–	5
Student 6	2	–	–	1
Student 7	1	–	–	2

these new learning methods, the cohort observed a face-to-face undergraduate PBL session and followed a dedicated training session on how to post messages to a blog site within the VLE.

Outline of Key Findings

Activity logs for the CFCI and LCT modules reveal a regular pattern of logins for the weekly PBL tasks, with students accessing the VLE on a daily basis. However, the pattern of posts reflects a concentrated period of activity at the end of the weekly study cycle during which students delivered their responses to the targeted learning outcomes. Table 9.1 above reveals the frequency of individual contributions, with individuals contributing a mean average of two posts per problem. Whilst the number of posts may seem low, it is worth noting that students were expected to address all of the learning outcomes in their posts, which led to long and considered responses to the PBL problem under investigation. Interaction between students was limited, but some responses acknowledged previous blog posts—for example, an elected scribe provided an aggregate response at the end of each weekly research cycle, summarising the group solution to the problem, drawing out differences in interpretations of the problem, where they existed within the group.

The next level of analysis focused on the content of the blog messages that were posted to the blog, with each message coded against Fox and MacKeogh's adapted framework (2003, pp. 129–131) to record instances of cognitive skills. Following the assessment guidelines, students tackled all of the learning outcomes in their contributions, rather than focusing on a subset as part of a cooperative learning strategy. The lengthy nature of blog posts enabled multiple categories of cognitive skills to be recorded in one contribution, ranging from surface level examples (e.g. offering resources) to deeper levels of learning (e.g. critiquing and challenging ideas of others). Table 9.2 below captures some excerpts from the blog messages, mapping them against a selected range of the cognitive skills that were observed.

Table 9.2 Categories of cognitive skills and examples from the weekly blogs

Characteristic of cognitive skill	Example from blog posts
Offering resources	This case relates to cases of master and servant, these principles apply equally to directors serving the company under express or implied contracts of service, and who are therefore also employees (Dranez Anstalt v. Zamir Hayek)
Adding examples	The offence of insider dealing can be committed in 3 ways. If an insider: deals in price-affected securities, when in possession of inside information, s.52(1) CJA 1993 encourages another to deal in price-affected securities, when in possession of inside information, s.52(2)(a) CJA 1993, or discloses inside information other than in the proper performance of his employment or profession, s.52(2)(b) CJA 1993
Supporting positions on issues	Once Ackerman heard from the inside information from his father in law, he would be as insider under s. 118B (e) of FSMA because he has information "which he has obtained by other means which he could be reasonable expected to know is inside information". Therefore his action to sell his share of SAH would be dealt with as insider dealing
Critiquing and challenging ideas of others	I am open to being corrected on this, so this is just a question: regarding the paragraph wherein you say "In this case, there may have been a counter offer by N by stamping the performance certificate but there was no acceptance as it was never communicated further to M"—the better approach here may be to take the 'first shot' approach as advocated by Lord Denning in Butler v Machine Tools . . .

The coded frequencies were then totalled up for each week for the PBL exercise under observation, with percentage scores for each cognitive skill derived from that total. Table 9.3 (below) reveals the categories of messages that students posted to the blog sites.

Matching the results against the targeted objectives for the unguided research, we can observe a close fit in terms of the evidence of wider reading and citations (examples/offering resources categories) that were included in blog posts. Evidence of higher-order thinking is also revealed in the results, with the leading categories reflecting skills in articulating and explaining positions, as well as negotiating and interpreting issues. This reflects developed lines of argumentation, moving beyond opinion-based conclusions to reasoned discussion on the issues at stake, as illustrated in the following excerpt from a blog post for the LCT research task:

> I am open to being corrected on this, so this is just a question: Regarding the paragraph wherein you say "In this case, there may have been a counter offer by N by stamping the performance certificate but there was no acceptance as it was never communicated further to M". The better approach here may be to take the 'first shot' approach as advocated by Lord Denning in Butler v Machine Tools so as to see whether the first offer communicated,

Table 9.3 Content analysis of PBL blog posts

	% of posts exhibiting characteristic			
	LCT	CFCI	CFCI	LCT
Characteristic of cognitive skill	Week 3	Week 2	Week 4	Week 6
Offering resources	16	14	16	13
Making declarative statements	0	5	0	2
Supporting positions on issues	11	8	14	6
Adding examples	8	8	8	19
Articulating and explaining	18	16	14	17
Asking questions	8	5	0	4
Inviting critique	3	0	5	0
Reflecting personal experience	0	0	0	2
Re-evaluating personal positions	3	0	0	2
Agreeing with ideas of others	3	5	3	8
Expanding ideas of others	11	5	5	2
Critiquing and challenging ideas of others	3	3	3	10
Negotiating and interpreting	13	19	16	6
Defining	0	5	14	6
Summarising previous contributions	3	0	0	4
Proposing actions based on developed ideas	3	5	3	0

> that of M to N was accepted by N. It seems it was, so according to this approach the fact that N had their own standard terms and conditions stamped on top of M's is irrelevant as it was never communicated to M. (Law & Commercial Transactions, week 6 blog post)

Interestingly, an increased frequency of messages acknowledging other contributions is apparent in the week 6 LCT blog, either by agreeing with or critiquing the ideas of others. This may suggest that students acquired a greater confidence in the virtual space as a location to test out ideas, rather than publish answers to the learning outcomes under research as the LLM course progressed. This extended to disagreements and questions, with group members perceiving the virtual space as a place to log issues that they were struggling with, thereby making their working process transparent to the course instructor, as evidenced in the excerpt below:

> Reply to [X]: You are absolutely right that the party to the contract, which should be taken into consideration is M, not LC. I got it wrong for some reason. Nevertheless, neither of the contractors is a consumer! They are both dealing in the course of their businesses. Please have a look at this definition of consumer in UCTA. (Law & Commercial Transactions, week 6 blog post)

In order to gain a clear insight into what was happening during the online unguided learning phase, a focus group was convened with participants to review their learning experiences across both modules. Students were invited to comment on their study approach in the performance of the group tasks. Focus group

responses revealed that students conducted all communication for the problems online, without recourse to face-to-face meetings or telephone discussions to resolve problems. Indeed, they viewed this approach as a strength in supporting the flow of the research tasks:

> It's quite helpful because you are actually seeing someone's argument written out, so you can actually follow it, which is useful. Sometimes when people are speaking, you get lost with what they are saying, whereas when you're reading it you can think—you can read back—and it's quite good to see two views. If you're not involved in the argument, you can see which side you agree with, so it's useful. (UK female student)

Given the assessment criteria governing individual contributions to the PBL work—accounting for 30 % of the coursework mark for a module—this was an important consideration to take into account. However, the emphasis on communication through blog posts also appeared to help students to engage in reflective learning and the application of theory to practice, obliging them to take a position on all the learning outcomes in a transparent way to demonstrate their learning to their peers. This fostered a process of self-reflection amongst group members, as outlined in the following comment recorded in the focus group:

> ... when you are forced to write something and put it on the blog you have to reflect your own thoughts more, and I think that's quite helpful. Because sometimes if you just read a book, you read it and take it and maybe you learn it or maybe not and that's it. But you have really to think about it and make some research and find different information and put it all together and think about it, and then ... you are more involved into this legal material and sometimes .... you can see new problems. (German male student)

Disagreements led in some cases to the revision of original arguments, with individuals posting corrections to their original posts, acknowledging the input that they had received from other participants:

> I posted something and then I think X corrected me on something, and then I went through it and I was like 'oh yeah you're right' so I just corrected it, but I didn't correct it like, you know, wipe what I had written, I just put 'Oh well I was wrong on this point', so just a correction on that, so it's not like I was wiping it and making it look nicer but I just responded to what was she said and I said I was wrong you were right or something like that. (Pakistani female student)

However, participants pointed to one significant shortcoming in the design of the unguided research task which related to the absence of feedback on individual contributions to the research process and learning outcomes, which students felt would have enhanced their overall learning:

> Well I would prefer actually to get proper feedback, not only like we get on the problem in the class, but also proper feedback every time on our blog or wiki, or at least every some time. You know, we need to know. (Pakistani female student)

> I prefer if we can get individual feedback; that would be very helpful to me. (Chinese female student)

They were also not presented at the end of the cycle with an approved set of solutions for the problems under discussion, which the PBL tutor felt might have

undermined their sense of 'learning through doing'—a core feature of the open discovery PBL approach embedded within the LLM programme design:

> There is a fear that if the students knew they were going to get the … electronic answers every week, that they might have less incentive to use the PBL process to achieve active learning. The idea of the PBL process is meant to encourage the students to learning through doing, active learning. (PBL tutor)

This left students feeling frustrated, without a sense of closure at the end of the PBL cycle that their solutions approximated to the 'right' set of answers that they should arrive at. Given the loose association between the PBL sessions and the formal learning conducted through the seminars and lectures, there was little opportunity within the programme to review the group's solutions and reach a view on their accuracy:

> I think that's the one thing that everyone kind of agrees with. We've all kind of said that throughout … because you put a lot of work into getting the answers but we're not always a hundred per cent sure that they are the answers, so that would be one thing that we would maybe like to improve. (Pakistani female student)

Discussion

Reception of the Study Methods and Tools

The results are striking given the cross-cultural make-up of the cohort and the different learning philosophies which students brought to the programme. The cohort's lack of familiarity with PBL and the open discovery approach, combined with a limited exposure to online learning methods at the outset of the programme, may be contrasted with the positive way in which participants embraced this learning culture as the modules progressed. This runs counter to what we may have anticipated taking place, with students' previous educational experiences and the novelty of the study context representing potential obstacles to the acceptance of the online study methods. Indeed, as Spaulding (1991) has found for face-to-face PBL sessions in medical education, difficulties can arise 'when a group of people of diverse personalities, backgrounds, and ages mix in an intense learning situation'—where students are expected to be 'considerate of each other's learning needs and altruistic enough to help each other find approaches and solutions to the topics under discussion' (p. 42). We might reasonably expect the networked learning approach to further complicate the adoption of PBL study methods for students new to this type of study approach, with computer-based communication offering an additional barrier to participation.

The evidence from the observed modules suggests a different picture, with students gradually embracing the study methods and online learning as they became more familiar with them, viewing the collaborative tools as enablers rather than barriers to group work in supporting the development of critical discourse. It is interesting to consider the extent to which this behaviour was stimulated by a

well-devised assessment model. Slavin (1990) has argued that extrinsic rewards are instrumental in motivating students to work in cooperative learning groups and the assessment model for the LLM programme was certainly devised to recognise and reward online participation, albeit for a collaborative study model. Whilst the course instructor anticipated that the assessment rules governing the conduct of the research tasks would act as a driver for participation and the asynchronous textual exchange serve as an effective way in which international students could share information and overcome language barriers, it was less certain how group members would adapt their style of learning to the online space and use this medium to engage in critical discourse. Focus group feedback suggests that the assessment criteria were not decisive and that the online study methods in themselves complemented the sensemaking and reflection processes that students engaged with in tackling the case problems. On one level the evidence confirms that a strong alignment existed between the targeted study methods and choice of technology, with students using the blog tool in particular as it was intended to be used—to share knowledge and negotiate an agreed response to each of the targeted learning outcomes. On another level, we may detect through the comments of participants a strong intrinsic motivation to participate online. The pattern of asynchronous postings and evolution of a textual record of contributions within the group blog assisted students in reflecting on the problem under review, helping them to keep track of the complex argumentation process, and this was viewed as a more effective way of learning than engaging in face-to-face or synchronous discussion by telephone or web conferencing tools.

Role and Responsibilities of the PBL Tutor

The results are less clear when assessing the effectiveness of the PBL tutor's role in supporting the unguided group work. At face value, the separation of the PBL cycle into face-to-face (guided) and online learning (unguided) components appeared to work well: the evidence reflects how students successfully self-regulated disagreements and opened up their personal contributions for critical comments without recourse to the PBL tutor for support. This finding reflects a key characteristic of networked learning theory in relation to participant control, where the inversion of student and tutor roles is associated with students taking on greater responsibility to manage their online dialogue and collaboration. The PBL tutor's activity consequently remained focused on helping students to define learning outcomes in the face-to-face sessions and overseeing progress updates on the research activities in the midpoint sessions, without recourse to intervention in the online learning space. However, tensions arose over the level of feedback that individuals received on their contributions to the cases, with participants expecting the PBL tutor to offer individual and collective feedback in support of the unguided research task, both during and at the end of the PBL cycle. This perhaps highlights the limitations of the blended design approach for unguided PBL in addressing learner anxiety over

progress and performance—a weakness which has been identified in other studies (Nicolajsen, 2014)—and indeed flags an inherent contradiction in the pedagogic methods employed for the LLM programme as a whole, with the unguided online component located within an otherwise traditional programme format of lectures and seminars and examination-based assessment. With this context in mind, it seems less strange that students would express a need for formal feedback from the programme team on the performance of a participant-controlled learning activity.

There is an emerging body of research focusing on tutorial responsibilities in supporting online PBL activity—specifically strategies for mitigating student anxiety in tackling collaborative group work. Danielsen and Nielsen (2010) have reported on the different dimensions of instructional support for PBL and how they may transfer over to the networked learning environment, highlighting the varied roles which tutors may adopt in managing student learning as 'expert', 'process oriented supervisor' and 'therapist'. Aside from facilitation and group-management skills in supporting student learning and ensuring that they remain on task as autonomous and critical thinkers, the experiences of the LLM students in this study shed light on another challenge, namely, how to recognise and validate individual contributions within participant-controlled activities, providing reassurance that students are on the right track in their research activities. This highlights a dilemma regarding the role of the tutor in supporting students, specifically the boundaries of the tutor's role in providing feedback to the group whilst at the same time stepping back and ensuring that the hallmarks of an unguided learning process are being respected. Danielsen and Nielsen (2010) argue that for a group to be functioning effectively, it should be constantly reflecting on action through a heightened sense of awareness regarding its study and work style. The tutor's task as a 'process supervisor' is to ensure that students remain aware of their working practices, enabling group members to reflect on their progress and become more self-assured in terms of their learning trajectory. For a purely self-guided design such as the LLM model, this is more challenging to realise, as the group processes should already be firmly embedded as part of the working practice of the group before individuals go online, with the tutor's role peripheral to the online collaborative activity once it is underway. Corrective action, if it is needed, must be prompted from within the group in regulating its own working practices, with students unable to rely on interventions from the tutor to keep on track.

A related challenge also focuses on closure at the end of the PBL cycle—selecting assessment and feedback methods which are consistent with a participant-controlled study approach, enabling students to review the progress of their learning without entering into the territory of more directive pedagogic practice through the communication of 'right' or 'wrong' answers. In this respect, peer review and peer assessment methods may have much to offer participant controlled inquiry, implicating students in the evaluation of their individual and collective learning, giving them the space to draw conclusions on their progress in addressing the learning outcomes identified at the outset of the PBL process.

Conclusion

The research reflects a preliminary step in the evaluation of the online delivery of an unguided PBL research activity for a small cohort of students over two modules of a study programme. Whilst acknowledging the limitations of this study, the results nonetheless indicate the potential for online tools to support reflective thinking and the elaboration of knowledge through self-managed learning, contributing to the emerging evidence base of blended design approaches for PBL (Donnelly, 2010; Savin-Baden & Wilkie, 2006) and networked learning research studies (Ryberg et al., 2006). In particular, the findings reveal how a group blog space may serve as an effective forum for evidence gathering and presentation of solutions in relation to the targeted learning outcomes, reflecting situated cognition—i.e. learning based on the 'thinking through of real-life problems' (Wheeler et al., 2005, p. 127). As students became more familiar with the learning methods, they displayed a greater willingness to engage in critical discussion and negotiation towards an agreed solution, reflecting the higher-order learning that was targeted in the PBL activities.

The findings suggest that a blended design approach based on networked learning principles for the online component of a course can offer the conditions for unguided group research to flourish, but that success is contingent on a number of factors being addressed. The study confirms the findings of other studies (e.g. Portimojärvi, 2006) that the alignment between the targeted study methods and the technology made available to learners is critical to their acceptance of the study methods: the chosen technology should be 'fit for purpose' and perceived by participants as enabling for student-directed learning to take place. The positioning of PBL within the overall programme culture is also important—specifically the relationship between the study, assessment and feedback methods for the PBL activity and the overall programme culture: the extent to which they complement and reinforce each other will shape the reception of the learning methods and the accompanying expectations over the level of feedback and pedagogic support that students should receive.

However, as Goodyear (2001) has observed, there is no actual determinism between course design for networked learning and the nature of the learning that may ensue—much will depend on the human dynamics in making use of the virtual space to support interaction and collaborative learning. For an unguided PBL design approach, this places the burden of responsibility on the PBL group itself to regulate and maintain effective group-intensive interaction, maximising opportunities for shared and interdependent learning online to take place. This requires learners to find their own intrinsic motivation to engage in collaborative and interdependent learning and develop the competencies to navigate the virtual space effectively. For novice learners this is a challenging undertaking to face, particularly the adjustment to self-directed learning strategies within an unstructured learning environment.

To address this challenge for novice learners, the key perhaps lies in managing the transition from structured to unstructured study through the simulation of problem-oriented learning methods in a controlled and formative way first, in this way allowing opportunities for the PBL tutor to provide feedback on individual and group performance in tackling the problem—focusing on process and outcomes. By simulating learning methods, students may be given the space and time to adapt to the new ways of working, developing their awareness of PBL methods and the skills and confidence to work effectively as a group online. Following this approach the induction phase assumes a critical role in helping to reduce the distance that students need to travel in acquiring the skills and mind-set to engage in problem-based inquiry. As we have observed in this study, with a cursory induction based on the undergraduate-guided PBL model, the adjustment can take time, with mature postgraduate students gradually adopting the study methods and use of the collaborative tools to build their knowledge and understanding as they became familiar with the networked learning approach, whilst still exhibiting signs of anxiety over their performance and the value of individual and collective learning in addressing the learning outcomes. With a scaffolded introduction, we may anticipate a speedier embrace of the learning methods, with participants more attuned to student-directed inquiry through online collaboration, with greater willingness and capabilities to engage in self-regulated learning inquiry.

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