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Social, usability, and pedagogical factors influencing students' learning experiences with wikis and blogs

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With a variety of technology-enabled tools and environments to choose from, it is increasingly difficult for educators to ascertain the factors that influence the quality of the students' learning experience and hence make appropriate choices for the use of technology. In this paper, we discuss the role of two technologies — wikis and blogs — in teaching and learning. We provide case studies of two courses at the Open Umiversity, UK and empirical evidence of students' experiences, perceptions, and expectations on these courses. We discuss the context of these courses and the usage of these technologies: The pedagogical underpinnings and the rationale for introducing these technologies; the intended learning outcomes from the usage of these tools; and the extent to which the activities based around these tools have enabled the intended learning and facilitated the learning process. We report on the social, usability, and pedagogical factors that have influenced the quality of students' learning experience. The research reported in this paper aims to provide guidance to course designers and educators for choosing tools, particularly wikis and blogs, for their contexts and for creating value and generating a positive student experience to engender student satisfaction and retention.

1. Introduction

Web 2.0 technologies make it easy for users to contribute ideas and content to a community. There has been growing interest in Web 2.0 technologies in recent years. There are many popular examples, such as blogs and wikis, tagging and folksonomic tools, photo or social bookmark-sharing sites such as Flickr and deli.cio.us. Sites such as YouTube, Myspace and Facebook are part of a growing trend

towards user-generated content and for sharing information and ideas via online communities and social networks. Using simple, web-based interfaces, users can build shared collection of resources such as links, photos, videos, documents and almost any kind of media. The sharing and social aspects of these user-centred technologies provide useful means for creative expression and offer great potential in the context of learning and teaching (Horizon Report 2007). For example, students can collaboratively create resources and materials on a group-project within a wiki environment. Photography students can use Flickr to post, organise, share and critique each other's contributions. There are several case studies and examples in the literature and on the Web about the usage of these technologies in education. However, it is still a significant challenge for educators to integrate them in their courses. Institutions are finding it difficult to make the choices and effectively link the technologies with the pedagogy and learning objectives of a particular course or discipline (e.g., Wilson 2005).

In this paper we discuss the role of two technologies in teaching and learning — wikis and blogs. Wikis help to facilitate student collaboration via co-production of text, and development of argument and consensus by communication of ideas through a shared online workspace (e.g., Parker and Chao 2007; Minocha et al. 2007). For example, a wiki could be used for collaboratively creating a glossary, co-authoring a paper, or writing an essay or a project report. As a result of several contributors adding material to the wiki, a wiki can grow and evolve and, therefore, can address pedagogical objectives such as student involvement, group activity, peer and tutor review, knowledge-sharing and knowledge creation.

Blogs provide a medium to write conversational entries in a Web-based environment which can be shared with its readers. A blog, therefore, facilitates collaborative learning through sharing of views and resources and giving comments on the blog posts. Group blogs, maintained by two or more bloggers on a project, are also common. A group blog can enable brainstorming, discussion on topic(s) of interest to the group (e.g., http://www.corante.com/, last accessed 13th March, 2008), and project management.

We provide case studies of two courses at the Open University, UK (OU) and empirical evidence of students' experiences, perceptions, and expectations in these courses. We discuss the context of these courses and the usage of these technologies; the pedagogical underpinnings and the rationale for introducing these technologies; the intended learning objectives from the usage of these tools; the extent to which the activities based around these tools have enabled the intended learning and facilitated the learning process; and the social, usability and pedagogical factors that influence the student's learning experience.

2.   Blogs and wikis

Weblog (web-log) or 'blog' is a web-based publishing tool which consists of a series of posts by the author(s) on a personalised web page, with posts usually arranged in reverse chronology from the most recent post at the top of the page. Blogs are often created and maintained by one person, but they may also be done by small groups (group-blog), and some may involve large communities of people participating in a single blog (Bartlett-Bragg 2003). People blog for various reasons (Nardi et al. 2004), e.g. for sharing personal stories, events and activities; for facilitating reflective learning, through learning diaries and journals; and as a sometimes cathartic outlet for expressing commentaries, views, opinions, and insights, as well as thoughts, emotions and feelings.

Blogs differ from other forms of asynchronous personal-communication technologies for managing information and for knowledge sharing, such as e-mail and discussion forums (Du and Wagner 2007). E-mails are destined only for the designated receivers, while discussion forums could either be open to the public or only to registered members; the members are allowed to create posts and the forums are generally facilitated by administrator(s). Blogs and individual blog-posts can be open to the public or restricted to a few readers. Depending on the blogging software, users may add comments. However, new entries are only created by the blog owner(s), providing a sense of ownership or control towards the blog and its content. Blogs are, therefore, designed for self-publication and a medium for social sharing and collective sense-making (Oravec 2003; Du and Wagner 2007).

A wiki is an asynchronous collaborative authoring environment — a readable and writeable website in which potentially all the visitors to the site can create new pages or modify existing ones, with optional access control to set limits on authorship. Wikis, therefore, allow distributed teams to write and edit documents collaboratively over the Internet in a shared online workspace. The best known wiki is Wikipedia, an online encyclopaedia that has been written and maintained by thousands of contributors from around the world. The advantage of wikis, as demonstrated in Wikipedia, is that if a contributor makes an incorrect or inappropriate entry or change, other authors or editors can 'roll back' to a previous version or edit and keep the change.

In today's knowledge-based digital networked economy which is a shift from the traditional linear industrial-era models of mass-production and communication, there is an increasing importance of knowledge in economic activities. To prepare the students for the knowledge economy, it is important that they acquire skills of communication, collaboration, team-working and critical reflection. Thus there is a need to shift the pedagogical models from the traditional linear learning paradigms in education and training, to socio-constructivist pedagogical models

(Bruns and Humphreys 2005). Socio-constructivism is a dimension of constructivist learning theory, which involves social, collaborative and problem-solving strategies in teaching and learning (Dougiamas 1998).

There are three main characteristics built into social constructivist scenarios: They use complex, realistic problems; they use group collaboration, interaction and cooperation; and learners are responsible for setting goals and learn through a process of shared understanding, while educators provide guidance (from Merriënboer and Pass 2003, quoted in Schneider et al. 2003: 36–37). Wikis and blogs enable the generation of social constructivist scenarios wherein a group of learners collaboratively construct shared artefacts, create a culture of dialogue, and negotiate meanings and take decisions. Educators are, therefore, realising the potential of blogs and wikis in learning and teaching, when they make use of these tools.

3. The context of the case studies

The Open University (OU) is the largest university in the United Kingdom and the UK's only university dedicated to distance learning with over 200,000 distance learners. The open source Virtual Learning Environment (VLE) Moodle (www.moodle.org, last accessed 13th March, 2008) has been adopted by the University and there has been an extensive development of this VLE to provide the required functionality for the OU. There is a range of ways in which the VLE tools and other web-based elements are being integrated into the courses at the OU:

– Courses which have paper-based materials but have a web-presence with resources, such as course-related web links, study calendar and downloadable (pdf) files of the course materials.
– Courses which have traditional paper-based materials and employ tools such as blogs or wikis in group-working and project work. These courses have an online forum for asynchronous communication with tutors and fellow-students.
– Courses where all the materials are online and students are provided with various tools such as wikis, blogs, e-portfolios and forums to support the communication and collaboration.

The wiki and blog case studied in this paper are situated in the second and third course types listed above, respectively. The post-graduate course 'Software Requirements for Business Systems' in the Department of Computing employs wikis for collaborative activities. The post-graduate course 'E-learning professional' in the Institute of Educational Technology is an online course employing blogs.

There are a number of social, pedagogical and technological challenges currently faced by institutions and educators in the era of technology-enabled learning.

For example, students' perceptions of distance-education and the flexibility it offers in terms of learning in one's own time; unavailability of broadband/internet; hesitation and even resistance of students to participate in collaborative activities; issues such as, is there enough guidance for the course teams to integrate the usage of technology within the pedagogy of the course; how should the usage of technology on a course be justified to the students and tutors; how can the various tools be directly linked with the learning outcomes; how should the activities be designed using the tools to meet these learning outcomes; how effective will the activities in supporting the learning or the learning process be; how to design the assessment for on-line activities; and most importantly, ensuring that the technology is usable and accessible through extensive user-based evaluations before the technology is deployed. We will address some of these challenges in this paper.

3.1 An overview: Case studies of two courses at the OU

The course team of the course, Software Requirements for Business Systems, has been one of the early adopters of the VLE. The course involves teaching systematic elicitation, recording, and communication of requirements of software systems. On a software development project, the elicitation of requirements is generally carried out by a team of requirements engineers or system analysts. In software enterprises, requirements engineers often work remotely from one another and wikis are increasingly being used for collaboratively developing requirements specification documents (e.g., Farrell 2006; Decker et al. 2007). In this course, the wiki activities were introduced to provide students with the opportunity to engage in small-group collaboration to emulate Requirements Engineering (RE) practice. In this paper, we discuss the usage of wikis in RE practice, and the process of integrating collaborative-work and wikis on the RE course. We will draw on empirical evidence to discuss effectiveness of wiki in collaborative learning of the RE processes.

The blogging case study is from a year-long research project that we carried out to investigate the role of blogs in learning and teaching. Our research was student-centred in the sense that we primarily focused on investigating the student-experience of blogging, their perceptions of blogging, and for what purposes they use blogs for. In this paper, we will discuss our empirical investigations of the students' experiences on the 'E-learning professional' course in which a blog was a part of the web-based learning toolbox that is provided to the students (the other tools being wikis, podcasts, and forums). Blogging wasn't compulsory but there were activities in the course materials that suggested blogging and the usage of the blog. In Sections 4 and 5, we discuss the two case studies.

4. The approach to collaboration in wikis in the requirements engineering course

The RE course is a distance-learning course of five months duration. The course describes how to analyse a business problem, identify the stakeholders of the business problem, interact with the stakeholders and develop a requirements specification of a software system that can be used to determine an appropriate solution for a business problem. The course describes RE techniques and a disciplined approach to the RE process. The majority of the students on this course are software professionals who register on the course to update their skills in eliciting, analysing, communicating and agreeing requirements.

In practice, the RE processes of interacting with stakeholders, managing stakeholder conflicts, and removing conflicts, duplicates, and ambiguities from a set of requirements are generally performed by a small group of requirements engineers who discuss and reformulate the requirements in consultation with the stakeholders (Robertson and Robertson 2006). The aim of introducing collaborative activities in a wiki environment was to emulate this experience by enabling a group of students to take the roles of requirements engineers in a software development project. For example, the project (case study) could involve a dental practice setting up its website. The wiki activities involved a group of students contributing requirements to the group-wiki, discussing the requirements, identifying conflicts and ambiguities within the requirements, and resolving the conflicts through discussions from the perspectives of different stakeholders, to produce an unambiguous requirements specification. The wiki activities were designed to be self-managed by the students and required minimal or no intervention by the tutor and thereby avoided any significant increase in the tutors' workload.

4.1 Introducing wikis to students

The assessment on the course involves three tutor-marked assignments (TMAs) and an examination at the end of the presentation. Since not all students were expected to be aware of wikis and/or their role in RE practices, an introductory paper by Farrell (2006) on wikis was included as a part of the first TMA (the first TMA is due within the first month of the course).

In addition, many other introductory papers and web links related to wikis were placed on the course website to enable the students to familiarise themselves with wikis as collaborative authoring tools and specifically on the role of wikis in RE practice (e.g., Damian 2007; Decker et al. 2007), software development (Louridas 2006) and project management applications. It was important for the course team to convey to the students that the wiki activities fit within the pedagogy of

the course, otherwise the wiki would have been perceived by students as yet another online tool that added to the workload on the course. In addition, two guidance documents were given to the students: (a) guidelines for using the wiki; and (b) guidelines for conducting the collaborative activities in the wiki, rules of collaboration on the course, and wiki-etiquette.

Students were asked to participate in their individual groups in an ice-breaker activity in first TMA. The ice-breaker had two objectives: To enable students to familiarise themselves with the wiki environment and to give them an opportunity to introduce themselves to their fellow group members. Each student was asked to do two tasks in this ice-breaker session; add a small biography to the wiki and enter a stakeholder type from a list of stakeholders in the case study. The exercise involved very little collaboration in the sense that little negotiation was required. Care was taken to ensure that there would be no advantage or disadvantage in choosing one stakeholder type rather than another. The choice of stakeholder type was a preparation for the second TMA where each student had been asked to discuss the requirements for the system in the case study from their chosen stakeholder's perspective. The evidence of their individual contributions was included in their TMAs by copying and pasting the log from the 'History' section of the wiki (the 'History' function in the wiki records all the changes and contributions made to a page in a wiki).

4.2 Collaborative requirements engineering

The wiki activities in the second and third TMAs were aimed to provide practical experience of requirements development to emulate real-practice. The activities had been designed around key course concepts so that students could develop shared understanding via collaboration. The second TMA involved each student (in the role of requirements engineer) in a group adding three requirements to the wiki from the perspective of the stakeholder chosen in the first wiki activity. Once all the students had entered their set of requirements, the collaboration involved discussing duplicates, conflicts, and ambiguities with the aim of achieving an agreed set of unambiguous requirements for the system in the case study. Students could also use the forum for discussion while performing this collaboration.

The collaborative activity in the third TMA involved each group checking the accuracy of the requirements developed in the second TMA and specifying a fit-criterion (a quantified measure) for each requirement. The development of suitable fit-criteria can be difficult if a requirements engineer is working on their own, and better quality fit-criteria can be obtained by a group of requirements engineers working collaboratively. Hence, the wiki activity asked the students to agree on a set of fit-criteria. The assessment was based on both the student's own

contribution to the activity, as well as on the product of the activity which is reported in the TMAs. A significant advantage of the wiki is that it records each and every change to the document in the 'History', which means that there is evidence of each student's contribution.

4.3 Research questions

We were interested in the effectiveness of wiki as a tool for collaboration and collaborative learning. Further, we were interested in eliciting the factors that influenced the students' learning experiences. We focused on the following research questions:[1]

> Q1w: Did the wiki activities facilitate collaborative learning as intended?
> Q2w: How might the usage of wiki be integrated with other tools such as a scheduler for organisation, or a group-blog or forum for discussions during collaborative requirements development?
> Q3w: What are the challenges which students face in collaborative requirements development and specification? These challenges might include: Resolving conflicts in the perspectives of different team-members; building trust and shared values; establishing norms for communication; and assigning the roles of the team-members contributing to a wiki (authors, editors, readers, facilitators).

To address these research questions, a set of concrete questions were devised to elicit feedback from students. In the third TMA, the students were asked to report on the reflections that they had been recording in the reflection template throughout the course (Minocha et al. 2007). These reflective questions in the TMA are related to one or more of the research questions listed above:

> Where was your understanding of the RE process enhanced by your involvement in collaborative exercises? (to provide input for Q1w)
> What do you think of wiki as a medium for collaborative work on a distance education course? (for Q1w, Q2w and Q3w)
> Is a wiki a good medium for collaborative requirements development? (for Q1w and Q2w)
> Does collaborative authoring contribute to a better requirements engineering process? (for Q1w)

4.4 Data Sources and Data Analysis

Since the TMA questions (listed 1–3 in the previous section) had 15% marks allocated to it, the majority of students answered it (we had responses from 117 students). Of these responses, we have analysed a random sample of 70 (60%). In this sample there were 13 (18.6%) females and 57 (81.4%) males compared with 20 (17%)

females and 97 males in the full data set. All students on the course were adults studying part-time and most of them were professionals in the software industry.

Along with the reflective accounts in the third TMA, we collated and analysed discussions by students on the forum (70 in all), direct e-mails from students discussing their wiki experiences (15), and e-mails from tutors (14 — an average of 2 e-mails per tutor), discussing their perceptions of the wiki activities, and their experiences with students in their tutor-groups.

Using the research questions to guide us through the collated data, we (the first author and a colleague on the RE course) performed an inductive analysis of the various accounts of students' and tutors' experiences and their perceptions to identify the emerging themes, sub-themes and the inter-relationships between them. This involved:

–   Collecting the forum discussions and e-mails from students and tutors pertaining to the wiki tool and collaborative activities into a Microsoft Word© document.
–   Extracting the reflective accounts from the answers for each of the questions in the TMAs into a Word document.
–   Reading the different sociological accounts in detail to gain an understanding of the positive accounts and the obstacles that had been described in the data.
–   Identifying the emerging themes for both the positive accounts and obstacles, guided by the research questions. From these emerging themes, the top-level common themes were identified. The lower-level themes were found from multiple readings of the data.
–   Analysing the accounts in e-mails and the discussion forum in a similar way.
–   Identifying the themes and sub-themes in the sociological accounts derived from e-mails and forums.
–   Validating the cataloguing scheme through dual-coding by the two independent researchers or coders in order to ensure that the sorting criteria were operationalised effectively and that the sorting process was consistent.

The process was iterative and the two researchers met to examine any discrepancies. These were resolved through discussion, and the sort criteria (the themes) were merged and documented. Following this, another subset of data was sorted independently using the agreed criteria. Again, any discrepancies were resolved, and the sort criteria were updated accordingly. This process was repeated one more time (three sorts overall) until discrepancies were minimised. Each time, the categories of themes and sub-themes became more concrete and more fully articulated. Finally, the entire data set was sorted using the stabilised sort criteria, and the two independent sorts were compared for consistency.

5.   Evaluation of the wiki case study

The purpose of investigating the first research question (Q1w) 'Did the wiki activities facilitate collaborative learning as intended?' was to evaluate these key aspects:

– The pedagogical effectiveness of collaborative activities in a distance-learning environment;
– Whether and how the understanding of the RE process was enhanced; and
– The effectiveness of wiki as a tool for collaborative authoring.

We will now present the various themes and sub-themes that emerged from the data for each of the aspects of Q1w and of the other two research questions (Q2w and Q3w).

5.1 Collaborative learning

The following sub-themes for collaborative learning emerged for Q1w:

Understanding of the course concepts: There were several positive responses of which the following are representative of the benefits that the students have stated in terms of knowledge-sharing and learning:

> …A more comprehensive list of requirements may be achieved as some will be included in the list that may not have been thought of by an individual. I realised a couple of requirements that I had not thought of myself when analysing the appointments system [the case study].

> … The simple fact that my requirements were going to be viewed by other members helped me to think clearly about specifying my requirements. This, in turn, led to me writing less ambiguous requirements.

Peer review and feedback: The students mentioned benefiting from comments received from fellow students during the collaboration. The old adage 'two heads are better than one' is truly apparent during the collaborative exercise. This can be seen visibly when one author posts an item on the wiki and subsequently other authors make comments as to its correctness.

Clarification of own contributions and understanding: The inputs and views from fellow students facilitated the students to clarify their understanding of the course content related to the collaborative activity.

> …Even though I understood exactly what I was trying to specify, it wasn't until I received feedback, and, indeed, gave feedback that I realised that some of what I had written was open to misinterpretation.

Re-interpretation and self-reflection of one's contributions: Students felt that peer-review and assessment helped them to re-assess their understanding of the course concepts and to reflect on their individual contributions and learning:

> …The collaborative activity allowed me to see how the others addressed this question and evolve my own contribution and understanding based on these.

> …The discussions from this activity helped me to reflect on my own views and potentially modify them (and the requirements).

Integration of multiple viewpoints: The students appreciated the role of multiple viewpoints in clarifying understanding:

> …The collaborative approach incorporates more views; [if] properly managed, this usually leads to better results.

Aggregation of group knowledge: The students acknowledged the collaborative construction of knowledge within the group. The first quote also outlines the role of wiki in RE.

Anyone involved can submit new ideas, change existing content if incorrect and take issue with points raised. Because everyone's contribution is identified it empowers everyone involved. The group knowledge quickly becomes aggregated in one place instead of being dispersed throughout multiple communication channels. This improves requirements engineering since the quality and tempo of team interaction via the wiki has been enhanced.

However, students had mixed perceptions about collaborative activities: They were positive that collaborative activities were a way to bring students involved in distance-education together, but some perceived collaboration as being onerous and not in sync with OU's philosophy of flexible (open) learning and learning in one's own time.

5.2   Obstacles to collaboration

Loss of flexibility in study patterns: In a part-time distance-learning environment of the OU, students have the expectations of studying in their own time and any collaborative activity is considered to be a burden:

> …I tend to study once every few weeks and do several chapters at once — basically, I organise my studying around my life. Now … I'm being asked to organise my life around my studying.

Participants require prompting and organisation outside of the tool via group emails. Participants are not always available at convenient times e.g., holidays and business pressures. Enthusiasm to participate will drop when other work pressures

are high and students may do as little as possible. When pushed for time, participants may not want to argue a point in order to finish the exercise quickly.

The following quote highlights several interesting aspects and is representative of several comments that we received on the loss of flexibility in part-time distance education due to collaborative activities that were assessed and had to be completed by some specified deadlines:

> … The ethos of the Open University is that you can work in your own time, to your own time scales, in your own way (as long as the TMA deadlines are met). Forcing people into collaborative work produces a strait jacket that works against that flexibility.

Waiting for others to contribute: Collaborative activities on the course required everybody to contribute well before the deadline to give sufficient time for giving feedback to one another and achieving an agreement towards the final product the group has to produce. Waiting for others to contribute was one of the main obstacles in the positive experience of the students.

Non participation and late participation may have a negative effect on others within the group. Groups may split into early participating and late participating sub groups. On the other hand, some students felt that the asynchronous environment of wiki was an advantage in allowing group-members to contribute at a time that suits them:

> … In terms of collaborating on an OU course, the benefits seem to outweigh the disadvantages; it is difficult for all people collaborating to be able to arrange a pre-determined time to collaborate, so using the wiki as collaboration medium is quite effective.

Then there were issues of peer-reviewing and critiquing (as is common in group-work). Some students just weren't professional and felt they had the right to criticise other students work without being constructive.

5.3   Collaborative authoring

This account provides inputs for the second research question (Q2w): 'How might the usage of wiki be integrated with other tools such as a scheduler for organisation, or a group-blog or forum for discussions during collaborative requirements development?' The following sub-themes emerged in our analysis:

Availability 24x7: Students mentioned the advantages of wiki being web-based and accessible 24x7 which helps in supporting remote collaborations similar to other asynchronous tools such as forums and e-mail. The advantages are that it is easy to use (no training required), simple to access (you only need a basic pc), and

available 24 hours a day 7 days a week, which makes it ideal for students who have to work at odd hours.

Group-work: Some students found that the wiki facilitated collaborative working:

> … It is difficult to see how our group could have produced and reviewed a set of requirements in the space of 2–3 weeks without the Wiki.

Saving costs of travel: Students mentioned how wiki-based collaboration can help reduce travelling costs for face-to-face team meetings in RE practice. Online wiki-based collaboration will be less expensive than hosting meetings at a site to which each travel member needs to travel (and possible stay in hotels).

History and evidence of contributions: The wiki has a history function that keeps a record of the changes that are made to the wiki by the different authors in the collaborative activity. This function has been particularly useful for assessment. Students were asked to post the entries on the History page as an evidence of their contributions towards the process and product:

> …With the ability to quickly assess the modification history, it is also possible to easily track changes.

> …It [wiki] allows a history and audit trail of documentation to be automatically maintained and referenced in the future therefore enabling traceability of requirements through to development.

While investigating research questions Q1w and Q2w, our analysis uncovered several technological obstacles with the wiki.

5.4 Technological and social obstacles

One of the obstacles was related to the usability of the user interface design of the wiki environment. The editing window in the wiki was small and couldn't be enlarged. The students reported that the small window didn't provide enough context and content for the document being edited. Students had to scroll the content up and down while they were entering text in the wiki via this editing window.

> … However, I feel that the wiki tool we used is quite limiting. The editing window was very small and it was difficult to get your formatting right.

The poor navigation within the wiki was another obstacle:

> … It is a time consuming tool to use, as navigation is poor, for example one must always return to the root before viewing another branch …

The students had to keep going back to the wiki to check if any new contributions by other group members had been made:

> … It would have been good to have some mechanism for requesting alerts on certain pages to save you constantly having to check.

> … It would have been useful to have perhaps an RSS feed, or e-mail notification option available which notified other users of changes.

This sociological account is representative of the various user interface design issues with the wiki environment:

> … I feel more effort should be invested in looking into how the user experience of the wiki can be improved.

Next, we analysed the data for (Q2w): How might the usage of wiki be integrated with other tools such as a scheduler for organisation, or a group-blog or forum for discussions during collaborative requirements development?

Lack of synchronous communications within the wiki environment: Over half the students in our sample mentioned the need to engage in some form of synchronous communication for discussion and debate ranging from face-to-face sessions to telephone conferencing. Many suggested the use of a forum so that there could be identifiable threads of communication. Indeed, some groups did engage in some form of synchronous communication:

> … It is slow as a communication medium…. A wiki is not a flexible discussion medium.

> … I do not believe that a Wiki can be used in isolation when collaborative working, rather it should be adopted alongside other more traditional methods e.g., telephone conferencing and face-to-face meetings.…face to face meetings should take place at various points in the requirements process in order to ensure that the process is managed correctly and difficult issues reviewed.

Thus, the students were generally in agreement with our own view and the views expressed by the tutors that while a wiki has strengths in recording decisions and for supporting collaborative authoring, it needs to be supported with a medium for synchronous discussion medium to facilitate timely decision making (face-to-face meetings are not possible in this distance-learning course).

In TMA 02 we had a split of the communication methods that the group members wished to use, half used messaging and half used the group discussion wiki. Members using the messaging would occasionally post comments on the wiki whilst doing the bulk of their work on messenger:

> … So I've learnt that you should pick the right method of collaborative communication in the right situation.

Perceived lack of socialisation: Another major obstacle was the relative lack of socialisation between group members. The students do not meet face-to-face in this course and, therefore, it is only through online socialisation activities that the students get to know one another. Whilst there was an 'ice-breaker' in the first TMA, this has proved to be inadequate and several students have commented on the difficulty of working with a group of relative strangers.

Where project teams already know and understand each other, electronic communication is fine. Where strangers do not, all non-verbal communication is lost, leading to misunderstanding and potential conflict.

Finally, some students felt that for a smooth process towards production of a consolidated artefact (a set of requirements), individual student members should have pre-defined roles.

To optimise collaborative authoring (and therefore the quality of the output), roles and responsibilities for authors are required, in order to ensure that issues such as identifying dependencies and conflicts between requirements can be fully resolved.

In spite of the obstacles, students felt that the wiki did meet their needs for collaborative requirements development:

> … It [wiki] centrally brings all the requirements together for all to see and update constantly. It allows more experienced Engineers to have an input in remote projects that in the past would have required reports to go back and forth, whilst losing time and competitive edge.

For the third research question (Q3w), 'What are the challenges which students face in collaborative writing and requirements development?', we uncovered a number of obstacles in the sociological accounts. The obstacles that the students experienced ranged from not having synchronous communication mechanisms which they felt were vital for negotiation and for arriving at a consolidated set of requirements in requirements development, to not having 'rules' for collaboration, and not having formal 'roles' in the group about managing the collaborative process:

> … A much better medium … would be a face to face meeting, as members of the group can discuss in real time and come to an agreement much more quickly.

As there is no specific owner for the collaborative work, there was a dependency on one person voluntarily pulling all the strings together, for example in TMA02 to incorporate all the suggestions into the final presentation. This is an extra burden

for one person. Further, they felt that a wiki might become unusable and unmanageable for a large project:

> … The course wiki became difficult to follow at times so a project of any size would quickly become unusable. A moderator/administrator may be required if the project is large scale.

> … In medium or big ones [projects] one will probably lose the audit ability. There are missing some fundamental functions like a real professional version control, for example…

These observations by students are in sync with those reported in (Friske and John 2007) where wikis have only been suggested for early requirements elicitation. Therefore, this observation was an indication of students' understanding of the RE process and the role of wiki in collaborative requirements development.

In the next section, we discuss the students' perceptions and experiences with blogs in the second case study. The various factors which have influenced the pedagogical effectiveness of wikis and blogs and, therefore, students' learning experiences, will be summarised in the final section of the paper.

6. The use of blogs on the 'E-Learning Professional' course

The E-Learning Professional course is an on-line course designed for professionals engaged in post-school education and training, wanting to understand the issues involved in the evolving practices of e-learning and, in particular, personal and professional development using online tools, resources and e-portfolios. This course attracts a wide range of professionals from across the globe who work in education and who are keen to develop their professional expertise in e-learning. In the course the students examine debates about professionalism in e-learning practice and appraise the usefulness of tools for personal and professional development. They build an example e-portfolio to provide evidence of their own competencies. The key learning outcomes of this course are: Reflection on the role, practices and skills of teaching in e-learning, and on what constitutes good pedagogy; evaluation of specific technologies and their uses for learning and teaching; and developing the skill of reflection in the context of personal development.

6.1 Introducing blogs and other e-learning tools to the students

The students were presented with suggested reading resources, week by week, and the activities were designed to enable them to reflect upon their own practice in the light of what they had read. The course provided the students with

various e-learning tools — blogs, podcasts, forums, wiki, and e-portfolio, but the course didn't prescribe a technology for a particular application. The students were provided with on-line documents guiding them on the usage of these technologies. One of the aims of the course team was that students evaluate the provided technologies for themselves and the students then decide on the applications of these technologies in their learning, teaching and training activities.

6.2 Reflective learning and blogging

Reflective learning and reflection-on-practice form the core themes of this course. Since the course is targeted for educators and trainers who have joined this course to become e-learning professionals, one of the learning outcomes of the course is to 'reflect on the role, practices and skills of teaching in e-learning, and on what constitutes good pedagogy'.

Reflection is the process of stepping back from an experience to ponder, carefully and persistently, its meaning to the self through the development of inferences; learning is the creation of meaning from past or current events that serves as a guide for future behaviour (Daudelin 1996). One of the goals of reflective learning is to encourage professionals to recognise the routine, implicit skills in their practice, which tend to be delivered without conscious deliberation or a deeper questioning of the wider situation or context within which the practitioner is operating.

The course suggests that reflection can be performed in the blog or in the forum. During the course, students completed three TMAs and also created and collected various pieces of evidence (e.g., personal reflections documented in Word© or their blog or in the forum) of their competencies in the areas of technology, communication, research, and practice on the course. The students were expected to assimilate evidence (from reflective accounts) towards these competencies in the e-portfolio which was submitted for end-of-course assessment.

Students were provided with a blog that was hosted on the OU server and visible to other students on the course, their tutor and anyone else to whom the student gave their URL. The blogs could not be located with an internet search engine. The content of the blogs was not assessed unless the student chose to submit some posts as part of their final e-portfolio. For some of the reflective activities on the course, capturing reflections in a blog were suggested on the course but not prescribed. The students could choose to reflect in word-processors on their own personal computers or keep a traditional paper-based diary, or assimilate the reflections in the e-portfolio, if the students didn't choose to share their reflections on-line such as in a blog or in a forum. Students were free to use the blogs in any additional way they wished, whilst adhering to the OU computing code of conduct and guidelines for working in online environments.

6.3 Research questions

Whilst there have been several studies about how blogging can support learning (e.g. Burgess 2006; Farmer 2006; Hunan et al. 2005; Williams and Jacobs 2004), there are also those that report difficulties. Problems have included haphazard contributions to blogs, minimal communication between students through their blogs and poor quality of reflection on the course materials as evidenced in blog content (Krause 2004). Homik and Melis (2006) reported that students engaged in only a minimal level of blogging which was just enough to meet the assessment requirements. Other issues from an educator's perspective have included the need for students to have developed skills in selecting appropriate material to include in their blog; the problem of plagiarising from others' blogs (e.g., Oravec 2003); and their ability to manage the tension between publishing private thoughts in a public space (Mortensen and Walker 2002).

Analysis of the various challenges has tended to focus on students' technological abilities and/or their level of compliance with activities that have been designed by their educators. It appears that little attention has been paid to exploring students preconceptions about whether blogs and blogging could support their learning, and their accounts of actual blogging experiences on their courses. Our research has been student-centred in the sense that we have primarily focused on investigating the student-experience of blogging and these research questions:[2]

> What are the functions of blogs and blogging in their learning? (Q1b)
> What are the obstacles to blogging? (Q2b)
> Which social and pedagogical factors and their inter-relationships influence blogging? (Q3b)

6.4 Data sources and data analysis

Following approval from OU's Human Participants and Materials Ethics Committee, recruitment notices were posted on the course website towards the end of the course. The notices emphasised that we had no expectations about the amount, quality and type of blog posts that students had written, and that we were interested in how they had found their blogs useful. We received 15 positive replies from 13 females and 2 males with a mean age of 47.7 years, range 29–55 years (the course as a whole consisted of 36.4% male students and 63.6% female students with most between 30–60 years of age). The participants were resident in the UK (10), Philippines (1), Canada (1), Spain (1), Cyprus (1) and the US (1).

Each student gave consent that we could access, read, analyse and use anonymised quotes from their blogs. We analysed the blogs prior to interviewing students; the blogs varied in length (from one post to around 50 posts). Analysis of

the blog-content helped us to identify the themes of blog-usage (e.g., reflection, sharing photos, for catharsis, evaluating a paper) and addition blog-author-specific-questions for interviews (in addition to the generic protocol that we have developed). It was not necessary to develop a coding scheme at this stage of analysing blogs; our aim was in identifying broad types of usage as quickly and efficiently as possible. Analysis of the blogs was followed by an audio-recorded, semi-structured, telephone interview with each student. Interview questions in the generic protocols were derived from the literature and also from our research questions. The students were interviewed by two co-present researchers (the first author of the paper and a colleague) using a conference telephone; one led the interview and the second researcher had an opportunity to ask the interviewee for any additional elaborations at the end of the session.

We adopted a grounded theory approach (Glaser and Strauss 1967) for the analysis of the data. The data consisted of the blog-content, interviews-data, and course-descriptions and details of course-activities. We focused on the identification of emergent themes and hierarchy of sub-themes based on the lens (research question) that we use to analyse the data, in the same way as described in Section 4.4.

7.   Evaluation of the blogging case study

The purpose of investigating the first research question (Q1b) 'What are the functions of blogs and blogging in their learning?' was to evaluate the various functions for which the students used blogs for and the pedagogical effectiveness of blogs and blogging in reflective-learning. Since the course team had been non-prescriptive of the usage of the blog (unlike the wiki case study), it was important for us to find out for what purposes students used blogs for, because students' perceptions of the blog's contribution to their learning will depend on how they used or perceived the blog and the blogging activity.

We will now present the results of our analysis of blog content and interviews with course teams, tutors, and the students to answer each of these aspects of Q1b and of the other two research questions (Q2b and Q3b).

7.1   Usage of blogs on the course

The students used blogs for a variety of purposes:

Course-related activities: The students conducted the course-related activities in the blog: For example, summarising papers — while some students presented their criticism and personal opinions on the readings, some students merely stated that they were not sure of the views being expressed by the author.

> … I would argue that his analysis hints at but does not fully recognise one of the features of the social consequences of the information revolution: the pace of change, and the quantity of unexpected but significant consequences.

> … Is his view completely justified? No doubt he thinks so… but I'm not so sure.

One student mentioned in her blog and, thereafter in the interview, how summarising papers and writing about other related resources in the blog helped her to synthesise ideas:

> … Thank you Jenni for the resources: on research skills at <URL>… on reflection and CPD at <URL>. This chimes with some of the remarks made by Perkin [an author of a paper that the students were asked to read in the course] about people's distrust of experts: that's another evening gone off topic… but beginning to pull some threads together.

TO-DO lists: Students prepared to-do lists or reminder-notes in their blogs. For example, one blog post had this list:

> … Moodle to-do; Set up user accounts for a teacher and a pupil;
> Explore Hot Potato [nickname for the e-portfolio software] quizzes and email links through CGI;

Resolutions: Some Blog-posts were for declaring resolutions or for reinforcing their near-future plans:

> … I must learn to be more reflective. [Repeated four times]

> … I'm soooooo behind with the course already (still to do my 1000 words from week 2) so after tomorrow it'll be pedal to the metal to catch up.

> … This course is relentless! ….I feel the weight of it. I don't want to lose the weak grasp I have of the course… but… slip!

Planning (what are the next steps) on the course: The course website had a week-by-week study calendar. Students wrote about their progress and which activities they were planning (based on the calendar):

> … So I am going to use the week 16 activity to create a podcast using a new desktop microphone (approx £14), the free software XXXX, some copyright free music and a free web host and aggregator.

> … This week I'm trying to both complete my Wk7 [week 7] assignment on portfolio products and prepare my first TMA for submission, as I've suddenly realised it's due in next Monday!!

A repository for resources: Students had collection of links related to the course or of related interests such as news items on new technologies. Some students had links to blog posts of other students often accompanied by some critique or an

account of what additional insight or perspective had been obtained by looking at a fellow-student's blog-post, or whether/how the fellow-student's views were in agreement or disagreement with their views.

Self-motivation: Some students had written in the blog to self-motivate themselves if they were lagging behind in their studies or other commitments (for example, this student is also a tutor on another course at the OU):

> … Note to self: Sort out your time management issues! You can't do everything other than marking just because you like everything other than marking just that tiny bit more. Right. For the next hour I am doing nothing but mark, then I will reward myself with a cup of tea and time for bed.

Reflecting on their experiences of working through course-activities: To introduce students to podcasts and to enable them to explore their potential in their work-practices, students were asked to create a podcast and transcript, and post it on the blog. In addition to including the transcripts and the podcast on the blog, some students also give an account of their experiences:

> … The first lesson was horrible, with a lot of technical inconveniences and problems. I was too nervous and the lesson I had prepared had not been well timed. But I started to think about how to solve all of those inconveniences. So I centred in trying to see the lesson from my students' point of view.

A student reflected on the group-work:

> … I found the Group Work one of the most difficult tasks during this course due to different facts, for instance: lack of planning, coordination, effective co-operation and discussion… But I think the greatest failure was the ignorance of how important each of us is in this kind of work.

Self-Reflection: Some students 'reflected' on their own learning and activities and used these reflections for planning the next steps:

> … I think I have put some reflection into practice in my e-Portfolio and my Blog, but I need more time and practice for it to be more beneficial for my own development. I also realise that the more I practice writing about my own reflections, the easiest is for me to find a way to express them more clearly and briefly.

Socialisation and expressing moods and emotions via images: Most students posted photographs of self, or of family, or of family pets on the first few blog-posts. When we asked these students in the interviews about the rationale for posting these pictures (since the course team had not suggested this), the students felt that exchanging pictures was a way to introduce themselves, as an ice breaker, or to start the process of socialisation with group-members with whom they would be collaborating later on in the course on a group-activity.

Generating a community or a self-help study group: Some of the students used their blogs to share their experiences with the course materials or with the technologies on the course, or to exchange ideas/thoughts on what they were currently reading. The analysis of the blog-content revealed that if a student posted his displeasure on some aspect of the course or any technological obstacles with the tools that were provided by the CT, there were quick responses from fellow students in the form of personal experiences, thoughts or just expressing empathy. For example, when a student posted a message that she was facing usability obstacles with the e-portfolio tool, she received 9 comments on the same day. For example:

> … I am not impressed by [tool] either. I was a bit disappointed that we are not using the ePortfolio tool the OU is developing as part of Moodle [VLE environment] :-(

> … I love the way you talk crazy to yourself — it helps keep me sane! Keep up the ranting…

Another student mentioned the problem of reading online and having to print the materials to read them:

> … Well I have started reading the ePortfolio material and have confirmed my dislike of reading online so have taken to printing out chunks of material.

This student mentioned to us in her interview that this blog post (posted early on in the course) invited several comments from fellow-students and receiving comments made her aware that people were indeed reading her blog:

> … I'm with you guys on this. I find it almost impossible reading online and have already accumulated a fairly weighty folder of articles covered in notes and scribbles… I wonder when my boss will start to notice the ever decreasing supply of printer paper though…

Another student criticised the online course and its various components which she feels aren't tightly integrated and received comments supporting her views:

> … It's all too virtual. I keep having to look at my notes, the website, and rack my brains to check what this week required.

> It's all over the place. Have to use course website, conferences (several), wiki, blog, e-portfolio.

> … Quite frustrating in many ways. We haven't got the idea of using the wiki yet — seems more like conferencing.

7.2   Pedagogical effectiveness of blogs and blogging

The course materials suggest recording regular reflections on learning. We analysed the data to investigate whether students found blogging effective for reflection [to answer research question (Q1b)].

Our interviews of the tutors on the course revealed that students found it difficult to reflect on their learning: First, some students were not sure what reflection on learning meant; what it involves; how reflection is carried out; and what is its significance to their learning and the rationale for individual and group-reflection in their blogs. So instead of reflecting on their learning in the blog, they wrote about the obstacles to reflection that they were facing:

> … I find very difficult to get to grips with [reflection] no matter how hard I try. It goes so much against my learning style that I find it a chore rather than beneficial still that is part and parcel of becoming a better learner. If I do go on to become a teacher at some stage it'll be a very important practice for my students so I must get myself more warmed up to it!

> … Must admit I gave up a bit on the reflecting week apart from my attempt at blogging I haven't drawn up any structured ways to upload to my blog — I'd feel much happier if I did have a bit of a clue about what we should be thinking about when reflecting.

> … I think this my problem with it so far — I can't see the joins — the relationship between practice or action and reflection is much more interleaved for me.

The student from whose blog we have taken the last quotation (from the set of 3 quotes given above) stopped using the blog for reflection after a month in the course and started using a structured template for reflection in a word-processor and storing the files/reflections in her on-line portfolio. However, she did realise the usage of a blog beyond reflection — as she said in her blog:

> … However I do hope to add a few entries to the blog just to keep me in touch with the technology.

Analysing her blog posts it has been clear that she perceived an audience of fellow-students who read her blog and she felt committed to them (the readers). At the end of the course, she posted a farewell message:

> … Thanks for listening over the past few weeks and sorry I didn't use you all that much, but reflection and me don't mix well!

Since one of the learning outcomes of the course was that the students should be able to 'evaluate specific technologies and their uses for learning and teaching,' we asked the students whether they would be employing blogging in their teaching

and learning in future. This also helped us to assess whether the students perceived the role of blogging in their professional contexts (Q1b).

Students, who were teachers, did recognise the role of blogging in their role, for sharing experiences with colleagues, and specifically as a means of communication with students who are distance-learners and integrating blogging and podcasts:

> … It is a good tool for the teacher. It is a good means of communication because sometimes you think of some teaching improvements, you can write your thoughts to communicate to other people [colleagues]…..

> … I am always thinking of new possibilities …..I can record things in the podcasts and I can write the transcripts in my blog, or pieces of news, or dialogues. There are a lot of possibilities.

Some could see the potential of blogging as a tutor or teacher but were concerned about the effort involved to maintain it.

> … I thought I'd then keep one as a tutor and put useful stuff there. But it's just too much effort.

Some school-teachers could see the potential of blogging in keeping a project-log, for sharing and providing it as a repository for students:

> … At ICT A level, particularly as there's a lot of project development work and part of that is keeping a log of how a software development project works ….. I think the sharing is important…

> … Kids could use the blog for a collection of these [web-links], maybe an image, a paragraph an idea. With comments about it; we maybe have a class[group]-blog that everyone could add to at school or from home. So other children can see it and comment. It would create a rich tank of information.

Some educators in higher-education and students on the course felt that the public nature of the blogs might be an obstacle for their student-researchers, as they might be reluctant to blog on their research ideas.

No scientist will write without a restricted readership. They may be afraid they may leak their research results in their blog. One educator was finding it hard to convince her fellow-colleagues about the potential of blogging for their students:

> … I am trying hard to get blogs where I work but it is difficult. They're [fellow-colleagues] not really interested, probably because they just don't get what it can do. … they are worried about plagiarism.

7.3   Obstacles to blogging

This part of the analysis in our research programme relates to our research question (Q2b). Out of the 15 students that we analysed, 4 students didn't feel positive towards the blogging experience.

Hesitation of writing in a public space: One of them didn't feel comfortable with the public nature of blogging and writing in a public space. Another felt that learning logs are personal accounts of one's learning and that the course shouldn't suggest/prescribe the activities that a student should/could carry on in a blog. She also held the view that blog-posts shouldn't be assessed:

> … I don't think that the institution should feel like it [learning log] belongs to them and I don't think they should tell you what to write in it. I know in some courses in the XXX [where I live] the students are given credit for writing blog entries. I don't think that's the correct way to approach a blog at all. They should be independent and come from the heart.

One student posted those reflections in the blog which she felt would be of interest to readers but chose to record personal reflections (which she was hesitant to share in a public space) in the e-portfolio:

> … I also did some reflections in my e-portfolio. I wrote a kind of reflection about the problems I found in my portfolio [software], how I was improving, what I discovered that I knew. But that kind of reflection was private it was just for me. I thought that no one was going to read it, I did it for myself. I wrote in a kind of different way in the blog because [I] thought that some people were going to read it and were going to comment. Probably they were attracted by what I as saying.

Unclear role of blogging on the course: One student couldn't see the purpose of the blog and how it fitted within the course:

> … I couldn't actually see what use it would have or how I would use it. I couldn't picture it as a major part of the course at all.

One student felt strongly that the courses with online components should provide guidance about the usage of these technologies:

> … Providing users with realistic expectations about the technology they are using, alternatives and workarounds in case of interrupted access is I think an important part of learning online. How else do we approach building resilience in learners and teachers to technological failures?

Lack of interpretability between the tools: In this course, the students were expected to collect evidence towards the various competencies into the e-portfolio for assessment. The students were unable to link to the various blog-posts — so they

had to copy and paste from the blog into the e-portfolio and some student used workarounds, but this duplicated/additional effort was time-consuming and frustrating, and also one of the reasons for student to abandon blogging and instead create and assimilate the reflective accounts within the e-portfolio itself:

> … We couldn't put a link to our blog in the eportfolio. I had to take screenshots and paste it in. It was duplication.

> … I assumed that as a blog is an ongoing living thing, I could include it in my eportfolio. I was surprised to realise that I couldn't do that. Cutting and pasting seems feeble, you lose the whole atmosphere and nature of a blog.

Realising that porting or connecting to blog from within the portfolio is not possible, some students wrote their critical reviews of papers or personal reflections in a word-processor and then posted them on to both the blog and in the e-portfolio.

> … Some weeks we had to read some documents so I copied and pasted my critical review over to my blog. So some of my blog posts are quite formal. Sometimes I didn't know what to write.

> … I wrote them originally in a word doc as I knew I would have to upload it into my eportfolio. I did it like that because blog posts needed to be converted to word to go in the eportfolio anyway.

Unclear roles of the various tools on the course: Since the course guide mentioned blog as a personal learning journal, the students viewed it as a personal-space for their own learning, thinking, planning, note-taking, reflections and opinions. Further, the course doesn't prescribe that students should visit each other's blogs. The tutor was not expected to visit the blogs of his students. If the students had any queries or wanted to discuss a course-related concept, they preferred to post a message on a course-forum or the tutor-group-forum rather than creating a blog-post. In at least one tutor-group that we are aware of, students actually stopped blogging completely and discussed in the tutor-group forum of 15–18 students, as they were assured that the tutor will intervene and guide the discussions in the forum if required, but he was not expected to visit each individual blog which would anyway have resulted in disjointed discussions spread over several blogs.

The difficulty of having several technologies on a course is that tutors as well as students can find it hard to keep track of the information, discussions, and the knowledge being constructed in various tools. The other issue is that at the end of the course, the student was keen to take-away the course-resources provided by the course team and the knowledge that was created, shared, and stored during the course's tenure. Therefore, there was a technological challenge of how these materials can be exported as pdf. files or other formats for later use by the students.

7.4 Factors that influence blogging

Analysis of the data (primarily via interviews) for the third research question (Q3b) — 'which social and pedagogical factors and their inter-relationships influence blogging?' — has shown that there are four key factors and that the combination thereof influences the blogging behaviour. The four influencing factors are:

– perceptions of, and need for, an audience, that is, who do they perceive as their readers and does the fact that somebody might read their blog matters to them;
– perceptions of, and need for, community, that is, do they want to be or perceive to be a part of the community — e.g., self-help study group or a community of practice;
– comments from other bloggers, that is, are they expecting comments on the blog-posts?;
– presentation of the blog, that is, to what extent they care for aspects such as grammar, spelling, titles of the blog posts, careful proof-reading before posting, and referring to literature sources as per a particular style.

Two students regarded their audience as a potentially valuable resource of ideas, constructive criticism, and links to further resources. They conceptualised their blogs as being a collection of resources, ideas and thoughts, and in this way their blogs portrayed their views. Community was important to these students and they aimed to be part of as large a group as possible. They sought and welcomed comments from other people and found them beneficial:

> … Sometimes they [comments] gave me new ideas or different points of view about my thoughts.

These students said that they paid attention to checking their spelling and grammar as well as making sure that their posts made sense as they wanted to make their blogs places that others would want to visit.

Three students were extremely sociable and used their blogs to reach out to other members of a small, exclusive community of other students on the course that had evolved over time. All of these students used their blogs for academic purposes but also used blogging as a source of emotional support:

> … Without the blog I don't know where I would have been. I don't think I would have completed it actually. I think quite a few other people would say something similar. It is impossible to exaggerate the importance of the blog. … When I think in my mind, where did the course happen, predominantly the location was the collective blogging space.

They said that they were not inhibited by writing in a public space and often wrote for their audience, or at least bore them in mind; they adopted an informal, warm and friendly tone and were not overly concerned about checking their posts for grammar and spelling mistakes.. All three of these students explicitly addressed their audience in a variety of ways that made their blogs engaging, such as using writing techniques to draw readers in ("it's a bit long, don't be put off", and "read on if you want to discover more of my adventure"). These blogs represented not only the students' views in comparison to others, but also their emotional and personal lives as students.

There's always a danger with an online course that you get detached and lose interest and you can get to a stage where you say 'I don't need to do this, it's not school, I could stop' whereas the blog seemed to provide an outlet for those feelings. You could write down all your rants and raves and then carry on.

Comments were very important to these students; they wanted and expected comments and read them all:

> … If you're in a classroom nine times out of ten you realise there are other perspectives and one might be the one you want to pursue, rather than the one you originally had hold of. That same thing happens with blogging. That bit of it can't come out of you reflecting on your own learning, it becomes much much more richer, it's an extra layer of reflection [on top of your own].

This group of students said that not only were the comments useful for aiding their own understanding, they were also an important source of both academic and emotional support:

> … It helped me feel as if I wasn't struggling on my own, made me feel more connected.

There were four students who engaged in self-sufficient blogging practices. They stated explicitly that their blog was mainly for themselves and that their audience was not of great importance to them.

> … When you write a study blog it's very personal and you mainly write it for yourself, and any course-mates who might look in.

> … The blog was for me and not for anybody else. I could also demonstrate to my tutor that I was alive and working.

These students' blogs were personal and they did not expect or seek comments and rarely read or responded to any comments that they received. However, they were concerned with the presentation of their posts.

> … It was a bit alarming having the tutor come in and comment because it felt like a more private space. I though, oh I should have been more careful what I wrote.

> It was confidence boosting when people said nice things. I felt a bit irritated when someone asked a question or made a point I couldn't follow.

We found that there were four students for whom blogging caused various degrees of anxiety as they felt that their own inexperience as learners and users of technology, and their lack of confidence and potential incompetence would be revealed to others. They all expressed discomfort and varying degrees of self-consciousness about writing in public:

> … Blogs are very public and I don't like that. I don't believe that my work is of public interest.

The content of their blogs was usually well executed and formal and none of these students explicitly addressed their audience. They said that they did not seek involvement in the course community and reported that comments were useful but unexpected. Three of these students were less concerned with style and more concerned with controlling content. The third made sure her posts were "polished".

> … Potentially, I did leave some things out, because I was worried that I had not got the right end of the stick and didn't want to look stupid

There were two students that didn't blog as they couldn't find a purpose of blogging and its role in their learning. One of them seemed happy with their traditional techniques of learning logs:

> … I highlight and write pencil comments on paper documents…blogging is not very suitable and useful for me.

However, both of these students said that they did read other blogs and left occasional comments. The evaluations of the two case studies in Sections 5 and 7 have helped to identify the factors including obstacles that influence student's learning experience. In the next section, we summarise, along with some examples from the two case studies, the pedagogical, usability, and social factors which have emerged in these two case studies. Some of these factors are in fact generic and could be applicable to technology-enabled learning environments other than wikis and blogs. These factors relate to: (a) integrating the technology within the course; (b) clarifying the role of the technology within the pedagogy of the course to the students; (c) providing guidance about the usage of the technology and related social norms; (d) ensuring usability of the technology; and (e) designing for socialisation in on-line collaborations. The research outcomes will provide guidance to course designers and educators in the choice of the technologies and for the design of the activities for integrating these technologies within the pedagogy of their courses.

8. Discussion

Several lessons have emerged from the evaluation of the two case studies in this paper. We have learned that there are key success criteria for introduction, design, and implementation of technology-enabled learning. Examples of these criteria include direct link between the learning outcomes and the activities the technology will support on the course; clarifying the role of the technology to the students; considering the requirements of tutors and students before and after the implementation in terms of staff-development and guidance/support documents; ensuring that the technology is usable by conducting user-based evaluations before the technology is deployed; and ensuring that there is a provision for early socialisation in collaborative activities.

Integrating the technology within the pedagogy of the course and justifying its role to the students: On the RE course, it was challenging to introduce collaborative activities where students had worked through the course materials on their own on other courses in the programme. However, the course team emphasised the pedagogical role of the collaboration in learning and development of communication and team-working skills, as well as the importance of wiki-based collaboration for gaining transferable skills for industrial practice. This helped the students appreciate the role of wiki on the course and the benefits of collaboration. To further emphasise the role of wiki in RE and requirements development, readings (papers from conferences/journals) on global software engineering were included in the course materials.

Consequently, the evaluations have indicated positive student learning experiences in terms of understanding the course content and the process of collaboration: Students expressed in interviews and reflective accounts that wiki-based collaboration had facilitated their learning and that they became aware of the various issues and challenges of team-working in virtual teams in real-world software engineering projects. Their reflections of the process of collaboration (in their reflective answers in the TMA) enabled them to raise issues and propose solutions for effective virtual team collaboration: For example, synchronous communication should accompany asynchronous collaboration; need for 'roles' such as a facilitator, moderator and/or editor to manage the collaborations; and 'rules' or norms are required for effective participation and collaboration.

On the e-learning course, the students were aware (from the course description) that they will be evaluating various technologies in the context of their learning and teaching. The students used blogs in various ways but their usage of the blogs didn't match with the course team's intention of blogs as being reflective personal-learning journals. However, having used the blogs on this course or being introduced to the blogging made the students aware of the technology and their

personal explorations have enabled them to devise strategies on how they would use blogs in their teaching. So in a way, the learning outcome — 'evaluate specific technologies and their uses of learning and teaching' — was achieved.

Guidance and supporting documents: On the RE course, guidance related to the usage of the tool, performance of collaborative activities in the wiki environment, social norms of collaboration, and the ways in which the individual contributions and group-work will be assessed was quite prescriptive and structured. As a result, there were no queries from students on the purpose of the tool, how to use it, and so on, and they could, therefore, concentrate on the collaborative activities and on the underlying course concepts.

In contrast, on the e-learning course, guidance on key pedagogical and technology-related aspects to the students and tutors was rather open-ended, limited and non-prescriptive. For example, apart from some web-based resources on reflection, there was no advice on the interpretation of reflection, role of reflective-learning, usage of blogs in reflective learning, and how blogging can be used in conjunction with other tools such as wikis and forums. The students were introduced to the tools and given some suggestions on the possible applications. For example, the course guide stated: "you will be encouraged to use personal blog (web log) as a learning journal to record and reflect upon your course activities, professional practices and development needs as you progress through the course."

The students on the e-learning course seemed to struggle with some fundamental aspects such as how to reflect on learning and the benefits of reflection. The suggestions of reflecting in a blog and using blog as a personal journal in the course material raised further concerns for some students — especially related to the public nature of the blogs. Our interviews of tutors provided further insights of student-concerns: Although the tutors felt that the fast-pace of the course could have been one of the reasons that students didn't reflect effectively, they felt that course teams need to provide more guidance on reflection; reflection should have been tightly defined, and guidance on reflective-learning via blogging should have been given. As the tutors mentioned in the interviews to us, that samples/case-studies of reflective accounts would have further helped the students.

Reflecting in a personal diary is different from reflecting in a public space. Therefore, if the course team had intended the blogs to be reflective on-line diaries, students would have benefited from guidance on how to reflect in a public space; should they invite comments and ideas, who is their audience; are they expected to build a community or be a part of the community?; and how individual reflection in a personal journal is different from group reflection with fellow-students in a blog?

Our empirical investigations have revealed that one of the tutors on the e-learning course kept a regular watch on all the blogs of students in his tutor-group

(he had book-marked all the blogs), while another tutor felt that looking at the student's blog would be like trespassing in somebody's personal space and so she never visited any of her students' blogs. Yet another tutor was unsure what her role was and, therefore, left it to her students to prompt her if they wanted her to look at her blog post. Therefore, guidance to tutors on the intended learning outcomes, how blogs should be used by the students and monitored/commented by the tutors, and the clarity in expectations from tutors would be helpful for consistent support to the entire cohort of students on the course.

Ensuring usability of the technology: As with every technology, usability is a key attribute for a positive user experience. As we have seen in the wiki case study, poor usability of an educational technology can over-shadow the pedagogy and disrupt the learner experience. Almost all the usability obstacles with the wiki tool discussed in this paper have since been addressed by the OU's VLE team.

Designing for socialisation in on-line collaborations: In both these courses, the students did not meet face-to-face. It is only through online socialisation activities that the students get to know one another. This socialisation is required to facilitate networking, group-working, peer-reviewing and peer-critiquing and commenting. Since both the courses have a short presentation period (around 5 months), there is little time to allow students to engage in essential socialisation activities. Ehrlich and Chang (2006) state that co-ordination of work in distributed teams is accomplished through spontaneous informal communication and an important precursor to informal communication is awareness of other team members: What they are doing, and when they would be available for collaborative work. Although the ice-breaker activities that we have suggested or discussed may help in developing 'awareness' of one another in both the courses that we have analysed, the duration of the two courses may not be sufficient for the development of trust and shared understanding.

Face-to-face communication can promote relationship building (Peters and Manz 2007) and can generally help expedite negotiations and decision-making. Face-to-face meetings are not feasible in these distance-education courses, so at the OU we are considering generating the sense of presence of fellow-learners in the virtual space through real-time interactions within a 3-D multi-user virtual environment (MUVE). 3-D MUVEs provide virtual worlds which have avatars (digital surrogates) that move around within the digital world and interact with others and with the objects in real-time in a virtual environment. Second Life (www.secondlife.com) is an example of 3-D MUVE which can offer realism, immersion and interaction, and a sense of presence for the 'avatars' which may facilitate relationship-building which is an antecedent for effective operation of a virtual team. The OU is planning to set up work-spaces and activities in Second Life (SL) for real-time interactions such as: Ice-breaking tasks; holding meetings

in SL and making notes/keeping records of transcripts of conversations in SL (for reporting in TMAs); and attending live events in SL. Other synchronous technologies that could be considered are audio or web conferencing tools such as Lyceum (http://lyceum.open.ac.uk, last accessed 13th March 2008) and Elluminate (http://www.elluminate.com/, last accessed 13th March 2008) for real-time interaction and early socialisation in the course.

To address the problem that the students faced in scheduling time for collaborative activities, the next cohort of students have been asked to consider a simple meeting scheduler (e.g., http://www.meetomatic.com/calendar.php, last accessed 15th March, 2008), to plan a schedule for collaboration and synchronous communication.

We are continuing to monitor the students' experiences with technology-enabled learning through an iterative cycle of feedback-improvement-evaluation. The feedback is being collected through interviews, formal university end-of-course surveys and reflective accounts of students to evaluate how effective the technologies are in meeting the learning objectives and the students' expectations. We intend to present our further evaluations in future publications.

Notes

1. The Q1w, Q2w, …, refer to research questions related to the wiki case study.

2. The Q1b, Q2b, …, refer to research questions related to the blog case study.

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