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Technology supports distributed team working: the case of T885 *Team Engineering* at The Open University

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Abstract:

T885 Team Engineering *is an innovative postgraduate module in which teams of students work at a distance on an engineering project. The students first meet at a residential weekend where they form into teams. They then work remotely from one another on their project using ICT to communicate and develop their team's interim and final project reports. The ICT elements embedded in T885 are FlashMeeting (a computer-based video conferencing system), and the Moodle desktop VLE which includes a team wiki and a learning journal based on the e-portfolio MyStuff. This paper reports on interviews with students designed to elicit their attitudes to the key issues arising from their experience of using ICT in novel ways within T885. It is shown that ICT is central to the achievement of T885's aims and, in particular, that FlashMeeting has proved pivotal.*

1   Introduction

All professionally-accredited engineering degrees in the UK [1], and many further afield, require that students develop demanding capabilities as team members who can achieve complex outcomes through working together. Open University (UKOU) students working towards an integrated masters (MEng) degree or a postgraduate diploma in engineering focus on these learning outcomes in the final course[1] of their degree – T885 *Team Engineering*. Students are required to demonstrate both independence and interdependence within their team. They are encouraged to become reflective practitioners, reflecting to good effect on the process of the team's engagement together as well as performing as part of the team.

This presents particular challenges where students are studying part-time and are not co-located but distributed across the UK and Europe, meeting together in the same place only twice during the 32 weeks of *Team Engineering*. However the course team[2] has made imaginative use of ICT in order to enable the crucial working relationships of a team to develop at a distance.

It was felt important to research the effectiveness of this focused use of technology. In particular, to investigate its impact on students' perceptions of the study environment, its role in supporting the learning outcomes of the course and whether students used other technologies in achieving their goals on the course. The significance of this experience can be

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[1] Note that the UKOU's degree programmes are modular, and that the individual modules are called 'courses' in the UKOU's terminology.
[2] The UKOU's courses (modules) are developed by course teams which are led by academics and include media specialists and educational technologists.

set within the context of a distance teaching institution where developing soft skills such as team working has hitherto required regular face to face meetings. The experience of *Team Engineering* indicates that technology used imaginatively can overcome this barrier extremely successfully in the context of students in their final course of the MEng degree.

2   T885 *Team Engineering* as the context for the research

2.1   T885: an overview

The design of the course is innovative in that students meet at a residential weekend at the start of the course and get to know each other before forming into teams of circa 5 students. Each team then works together on a project, at a distance, and they meet again at a second residential weekend before submitting their final team project report. During the first weekend a selection of projects is outlined by members of the course team and students choose the one they most want to work on. This is very different from other team-based courses at the UKOU. Typically in these there is some arbitrariness about grouping students together and students may find themselves working with different fellow students at different points in the course. Also, team working only makes a small contribution to the student's assessed work and students may satisfactorily complete such a course without engaging with other students at any stage. In *Team Engineering,* the teams have to work as a collaborative unit throughout the course otherwise, given the design of the assessment, students could fail the course. To date, students have responded very well to working together in this way and team formation has been entirely successful with students forming into coherent units primarily by self-selection. Furthermore, all teams so far have produced satisfactory final project reports and there has been a 100% pass rate.

Hand-in-hand with team formation comes the selection of a project option from a number on offer. Once formed, the team's task is to use regular FlashMeetings (a video conferencing system developed at the Open University) and electronic contact to develop their team's response to their chosen project through interim reports and a final report. The teams have their own wiki and are expected to work collaboratively on the project. They individually complete a learning journal, reflecting on their learning process as an integral part of a team. A second residential weekend is held mid-way through the course. During this second weekend, teams are expected to present a synopsis of their chosen project in both a poster and an oral presentation. Assignments include two joint (i.e. team) TMAs (Tutor Marked Assignment), two team member (i.e. individual) TMAs, and two ECAs (End of Course Assessment) which form the examined component of the course. The ECA comprises a team Final Project Report and an individual team member submission.

2.2   The integration of study and work

The course aims derive from and reflect on students' work and professional context. The twin aims are first to replicate team working – a frequent practice in employment – and bring reflective and developmental processes to it; second to develop a research project implemented through both team and individual working. The course is therefore a form of reconstruction of practices that are commonly found in the workplace, with the aim of adding processes that foster learning and development that usually don't happen in the workplace.

Students have displayed a commitment to working within their teams. Having invested significant time and effort in becoming a member of a particular team, and having formed personal relationships with the other team members, each student leaves the first residential weekend with a real commitment to the success of the team. They undertake to participate

fully in all of the team processes. It is usual to see teams quickly establishing a protocol of twice-weekly meetings – one informal 'common room' type meeting and one formal meeting with an agenda and minutes.

2.3 Assessment and learning outcomes

The method of continuous assessment encourages students to keep abreast of the learning process and ensures that any students who may be having difficulties are identified and receive additional tutor support. For a postgraduate module leading to a masters-level qualification, it was anticipated that students would be sufficiently experienced and motivated not to require additional support. Moreover, it was felt that the team-working aspect of the course would ameliorate any problems that individual students working alone might have. This proved to be the case, and students working in their respective teams produced exemplary assignments.

The key skill learning outcomes that course team set out to develop can be summarized as follows.

On completion of the course, students will have demonstrated their ability to

- communicate effectively through written and spoken language with other team members during the project and in the presentation of the individual and team outcomes of the project
- develop, monitor and continually update a plan for the personal contribution to the team project
- negotiate, adopt, review and comment critically on the personal role taken within the team and exercise leadership within the role
- work effectively in a variety of roles as part of a team, exercising independence and leadership when appropriate.

ICT is central to achievement of course aims and one technology in particular – FlashMeeting – has proved pivotal. FlashMeeting is used by the teams for their weekly meetings and this is discussed further below. Moreover, the archiving and re-run function of the software supports vital learning processes in that team members can use the recording and analysis features provided in the software to reflect on the collaborative process once the meeting is over.

2.4 Contextual factors

Contextual factors shaped the pedagogical strategy – postgraduate students must have passed other courses beforehand and it can be assumed they are able to use all the basic technologies of communicating and submitting work electronically. It is likely that they will also have experienced portfolio work previously.

Assessment design imaginatively combines collaborative team work with individual assessment. The team mark for the research project becomes the individual mark, and differentiation in final grades comes through marking the individual reflective practice. The course team feel this form of assessment has worked very effectively.

Students are perceived to be using tools such as My Space etc but it is not clear how. There is an issue around the reliability of 'outside' providers being used for vital course-related documents/resources generated by students.

There are differences of perspective and role clashes around technology development and application. There is a perceived clash of practices within the institution, expressed in terms of the educators on the course team, and the non-academic developers of the VLE. VLE developers stress issues of privacy and identity protection around students putting their profile

details into the VLE whereas the course team want students to see this as part of being in an educational community, where everyone can trust one another.

The curriculum context and the professional practice requirement help to drive an innovative pedagogy. This is a capstone course in the postgraduate engineering programme, which is funded at a higher rate than other master's provision. This can be and is used to fund a small population (30 students in 08/09) course with residential meetings and intensive tutor support. The role of the tutor is very different from other 'conventional' courses in that by using these technologies the tutor can adopt a more informal, and more frequent mentoring support and provide immediacy of feedback whether synchronous or asynchronous.

2.5 FlashMeeting

The teams' meetings throughout the project are conducted using FlashMeeting (http://flashmeeting.open.ac.uk), a lightweight video-conferencing system developed by the UKOU's Knowledge Media Institute, KMi. Unlike other systems, FlashMeeting requires no software installation. In addition, it not only archives the meetings but also provides detailed analysis of the proceedings.

FlashMeeting was chosen because the *Team Engineering* Course Team felt it important to keep the students' team-working, as far as practicable, within the OU domain. What was not seen at the outset was the enormous potential offered by the recording facilities built into FlashMeeting [2].

2.6 VLE wikis

Each team was allocated a wiki in the UKOU Moodle learning environment. All members of the team and their tutor had access to the wiki. In addition each student was given their own wiki that was restricted to them and their tutor alone. All of the wikis were initially free of content or structure. The teams used their wikis for a large range of different purposes including:

- meeting agendas
- meeting minutes
- project planning
- task allocations
- assignments
- assignment feedback (from the tutor)
- project journals

Many of these uses do not require the inputs of more than one person, so it was interesting to see how the teams quickly started using the wiki space as a simple shared document repository [2].

It is intentional that the course does not provide the very latest wiki for the students, but a white wiki space with fairly fundamental features, thereby encouraging the students to determine the 'lowest common denominator' of shared space to foster communication, interaction and innovation rather than collections of specialist software printouts.

3   Research Methods

Research was undertaken with funding from JISC, involving two researchers based in the UKOU's Institute of Educational Technology working in collaboration with the course team. The course website was used to recruit volunteers from the 2008 presentation of the course. The researchers contacted a number of students who volunteered for the study. Five students were interviewed – a first interview to establish their background, a second mid-course, around the time of the second assignment and a final interview once the course had finished. Three students were available for the final interview. The interviews were carried out by telephone using a semi-structured interview schedule. Analysis was undertaken jointly between the two researchers and a coding frame was used to code responses into NVivo.

4   The Qualitative Research Findings

4.1   A Synopsis of the Interviewees

Findings relate to interviews with five students, three of whom completed all three interviews and two were unavailable for the end-of-course interview. Two of the three students were in the 30 to 40 age range and the third was in the 50 to 55 age range. All are men and all had work contexts that related strongly to the course. Their names have been anonymised.

Alan works as an engineer in a chemical plant, in an office with around 20 others. He reports daily use of a wide range of ICT tools, including industry-specific applications such as maintenance management systems. He started his UKOU studies in 2001 and finished his Engineering honours degree in 2006, moving onto the masters (MEng), which he will finish with *Team Engineering*. His goal is to become a Chartered Engineer. He is in the Blue Team, working on the temporary accommodation in disaster zones project. His comment on the course identifies his reaction to the study process – different from others in that it revolves around team interaction – and his enjoyment of the process:

> *I think it's very different to what I've done before. I haven't experienced this type of activity before, collaborating on a project with people you know in different parts of the country…Great experience, really useful not just personally but in a work context as well, and the use of the wiki, flash/course meetings excellent – really, really good.*

Ben works as a Health and Safety Inspector. He is in the Green Team and working on the roller coaster project.

> *I'm using the course actually to, at several levels, to do the course but actually to step back from it and just reflect on team working as well, which I think is probably one of the objectives of the course. It's sort of a personal objective for me as well, just to understand how the dynamics of the team working go on and how they can be sort of enhanced, or even hindered, by you know, the technology that is available.*

Chris is in the 20 to 25 age range. He has a first degree from another university and is studying for the masters in maths and engineering. He works as an engineer for a defence company installing communications in military vehicles and uses ICT socially – ordering, emailing friends etc and has a Facebook account that he doesn't use much. He is studying with only a year of work experience since completing his honours degree. He's a member of the Green Team.

I think it's (team working) as close as you can get. I think it's really good actually. From the way it's presented and I think…the way that everyone's getting used to it.

Dan is in the 35 to 40 age range, also studying a personal development planning course and has completed several other Technology courses. He is working towards becoming a Chartered Engineer. Working as an Assistant Coordinator for a company and responsible for production systems in two plants in the UK, he uses ICT at work for communication (Outlook), Excel, Gantt Charts, Microsoft Visio, CAB systems and a lot of presentations and training. '*…my goals for me were to…obviously interact with the team and the project group…at the moment it's going very well. It's been a really enjoyable experience*'. He is in the Blue Team working on a housing project. His long term plans are to do a PhD and his employer has promised financial support for that as it has for *Team Engineering*. He studies for between 6 and 10 hours a week, mainly weekday evenings and then the Sunday team FlashMeeting.

I think it's certainly supported me more in terms of looking at how other people work as engineers. I think you sometimes when you work as an individual you always look at yourself and how you've performed and you look at your own work and what you could have done better, what you could have done a bit more. Now I'm starting to see what others do and what they bring to the team.

Eric works for a large private sector company as a software engineer. The company is paying his fees and gives him some time off. He uses Skype and Microsoft Communicator for working at home. He started studying with the UKOU in 1996 and this is his 13th course. He has a UKOU engineering honours degree and is studying for the MEng. '*It's for career development*'. He tries to keep work and study separate so does not study during working hours.

..they are paying course fees and given me time off for examinations…For all the years I've been doing OU I've always been subsidised by my place of work. I keep the courses very relevant to the work that I'm doing.

4.2   Student perceptions of the study environment

The overall pedagogy of the course was appreciated by all the students interviewed. The students have to work out how they are going to work together and how to develop their project themselves. The Green Team for example was going to visit a fun fair as part of their research for the roller coaster project – '*We're going to do some research at Thorpe Park or Alton Towers* (Eric)'. And the course was both flexible and demanding in terms of requiring interaction across the team on a regular basis. Ben had been able to take one week off work to do an estimated 70 hours study because he knew he would be working off-shore on oil platforms and unable to study much for a period. Another student in the same team commented on how demanding a course it is in terms of synchronizing the team's interactions:

… it's taken a lot of time. It's been the most intrusive OU course I've done. Cause you can't work at your own pace, you're working you know collaboratively as a team and also having to synchronise, er you know, meeting at least once or twice a week. Erm, it's been quite difficult because generally I tend to be very flexible with my studying and er it's been when I've had spare time but this has probably made me more disciplined but that's been the hardest aspect of this course. (---) I'm doing a

lot more work. I sit down and think "what shall I work on now" when I've got hundreds of different things to look and you don't get the "well I'll finish that section and take a break then until the next section", there's just an infinite amount of things to do so.

(Eric)

The environment created by the team process, supported by effective use of technology, evidently built up relationships of trust and familiarity – not unconnected with the regular weekly contact where students could see and hear each other, not just interact via text:

It was an awful lot of work, a very hard course. It took an awful lot of time but it was quite strange towards the end at the last FlashMeeting – it was almost quite sad…

…being able to see people was brilliant cause you can see their expressions. I mean especially when people talking, seeing thumbnail images of people…it was good to see people as you can't very often. It was good to go and see peoples' expressions and emotions…

(Eric)

4.3   The role of technology in supporting learning outcomes

As the interview comments above suggest, students were very positive about their experience of study and central to this was the way in which technology enabled close team interaction. The most important tool here was FlashMeeting. It was weekly meetings that drove their project forward and actually enabled them to achieve the assessment requirements of the course. All students described the way in which these meetings were run with formality but in a fashion that promoted engagement by all working within the team.

…something that I'm used to insomuch as we decided from day 1 that we would have a chair, and a minute-taker, and that rotated throughout the group and that rotation is detailed on the wiki, and you know it's run very much as a meeting would run. The chair sort of coordinates it and you press the buttons to speak and enter the queue. The minute-taker is picking up actions and he's responsible for putting the minutes on and so it's pretty standard sort of format really.

(Alan)

These meetings generated evidence of commitment – some teams held more than one meeting a week, and meetings were typically at least an hour in length. Attendance was usually 100% but the ability to replay meetings was picked out as an important benefit, not only for unavoidable absence from a meeting but also because students could replay meetings and reflect later on the team process.

I like the fact it's recorded and you can go back and…preview the meeting. 'Cause I was late for one of them, got stuck coming home from work and then I went back and watched probably about 45 minutes of the team meeting before I actually joined. It was fascinating to actually sit back and watch it rather than play a part.

(Eric)

one of the meetings I unfortunately missed because I was away and replayed it so it was interesting to see. It was actually frustrating. You hear people say something, 'yeah yeah I want to say something' but the moment's passed…someone said a good point, I can't remember what it was so I'll go back and just play that section and 'oh yeah, ok, I've got you now'. So it is actually quite a useful facility to go back and replay

(Ben)

Reflection played a core role in the course learning outcomes, and prior studies have demonstrated how challenging students find it to reflect on their own learning and study process [3, 4]. However, the ability to watch and listen again to interaction, and the regularity of the team meetings, supported the development of much greater facility in reflection, particularly by the end of the course, as the next comment suggests:

> *The reflection we struggled to begin with, the reflection…We did have a page on the Wiki for reflection and we also had reflection at the end of the Flash meetings as well just to find out how people were feeling but er ..I don't know whether its blokes or something. hahah it's quite painful getting people to comment on reflecting back on the course. Toward the end it got a lot easier, people were being quite honest and open about how they thought it had gone.*

(Eric)

Students were very aware that their individual assignments required reflection on the team working process that they were engaged in and were conscientious about logging their reflections regularly:

> *So I've got a progress log where I just keep track of what I've been doing and what I've been working on and then any reflection on the team meetings, I tend to make an entry on my personal journal after each meeting. So hopefully when it comes to TMAs I've got something to look back on for you know supporting evidence for the TMA reflection stuff.*

(Eric)

> *I'm quite conscientious about that. Whenever I sort of worked an evening or at the weekend, done a piece of work on the main project I'll go back and just put a couple of sentences on the learning journal but just about my thoughts about it, or recollection, or any ideas. It's quite useful to park ideas. If I come up with something and think I don't want to think about that at the moment but it's a useful thing to reflect on later, so I'll just put a little note to myself think about that later and I'll go back and review that occasionally.*

(Ben)

> *I generally go on to the OU website in my lunch and I'll have a look see there and do various things, and do the learning journal and you know, spend my lunch doing that…I'm religiously completing my journal which is getting quite big now.*

(Alan)

The team members were also learning to apply the wiki in ways that enabled them to achieve their goals more effectively. Comments on the discussion pages do not show up in the wiki history, so one team put their updates into the body of the article page itself:

> *We're going to move away from the comments and just make the updates in the wiki body itself because then it appears in the progress file and you can see when people have done updates…as soon as you edit it you can see just by clicking on the wiki changes if someone's been working on the wiki, where if they've made a comment you have to go looking for comments.*

(Eric)

Students are required to submit both team and individual assignments and it was possible for them to pinpoint a moment in the FlashMeeting transcript in order to make a particular point

in their assignment, whether about the role that they played or the contribution of another team member:

> *…and also the recordings were useful for the assignments because there were group assignments and in the individual assignments they wanted justifications and examples of plans that you were making so I used a lot of links to FlashMeetings so the tutor could…sort of see examples…you could link to particular meeting and then just put in a time stamp at what point in the meeting I was talking about.*
>
> (Eric)

Students also used other technologies that enabled more informal and spontaneous connections with each other, notably using Skype:

> *FlashMeeting was more formalised. Skype we used as, you know, 'how do you feel about this?' you know, it gives you ideas on that you know. And it was just, you know, OK you can do that on email but it's different on email. You can't get across the way you want it to do, not like in words, as you can, you know, listening to someone.*
>
> (Alan)

All interviewees commented that the ICT used on the course was essential – that the course could not be delivered without it. All reported that they were enjoying the course and this related to the newness of this way of working – the contrast with their own working environment yet aiming for the team working that is also central to work:

> *I think the whole course has been quite positive. I'm actually really enjoying it. I really like it. It's a new way of working, new way of studying so I would say….the whole course has actually been very enjoyable.*
>
> (Ben)

In addition one student also reported using the OU Library and the Ref Works tool:

> *We've used that* [the UKOU Library] *extensively. That was a new thing as well actually. We did the introduction to the OU Library on the initial residential weekend which was very useful. I learnt new tools there such as Ref Works…I used it for the last TMA. It took me a bit of getting used to but then…I liked what it did. I can be a bit tortuous.*
>
> (Alan)

4.4 Connections between study and work

One of the effects of the course pedagogy and its use of technology was the way in which students could make very effective connections between their study and their work experience, as this student comments:

> *…I think it's an excellent course. ..for me it reflects what happens really…living in the real world in so much as you often don't have the luxury of meeting face to face, you've got to…network with people…in different parts of the world. Particularly you know, in the company I work with…and some of the tools I've learnt on [the course] has been really good for that. So I think it's a really useful course, yeah…without a doubt it's been of benefit. .. I think if the OU tried to make it more structured and regimented you would lose some of that learning experience…I'm happy with the opportunity that this course gives us for learning. I think it's an excellent course, and*

> *it certainly offers things that you know are not run of the mill, but things you can apply to your own work context.*

<div align="right">(Alan)</div>

Working as distributed teams was found to be productive of reflection on both generic processes of team working and on the potential of technology to connect and enable collaboration across distributed teams in the work place.

> *and I'm using the course actually, to, at several levels, …to step back from it and just reflect on team working as well, which I think is probably one of the objectives of the course. It's sort of a personal objective for me as well, just to understand how the dynamics of the team working go on and how they can be sort of enhanced, or even hindered, by…the technology that is available. ..FlashMeetings and wikis they are a very new experience for me. ..obviously at work I have used video conferencing and we have bulletin boards. So the facilities provided on the course, FlashMeetings and wikis, are really just extensions of those. So they're not radically new but I suppose the actual detail of how we use that is slightly new.*

The course aims to foster student capabilities in team processes that are core to the role of the engineer in the workplace and students clearly felt that had developed both personally and in terms of their understanding of work and collaboration relationships with others.

> *It's certainly supported me more in terms of looking at how other people work as engineers…when you work as an individual you always look at yourself and how you've performed and…. what you could have done better…Now I'm starting to see what others do and what they bring to the team. And also how they interact with other people. And that's been important for me because I need to sometimes sit back and let other people have more involvement…I've now started to learn that it's important to get all members and have the right structure work for everyone and have fairness in the team.*

<div align="right">(Dan)</div>

> *I've been using ICT for a long time so I was already a confident user, but just I think the thing that I can take from it is this collaborative style of working using Flash, Wiki etc. It definitely has applications within an industrial setting. If I was to work on a project with other engineers in different parts of the world with the company that I work in, that would be great.*

<div align="right">(Alan)</div>

Another student reported that he felt now far more experienced in using technologies that could be applied in his work place and these technologies had been the focus for his learning:

> *I think what it does do is give you confidence to approach you know conference meetings more comfortably if you hold them outside just your group. So say if we were to hold FlashMeetings now, or conference calls and conference meetings, video conferencing, in work more then I'd certainly be comfortable with that. I'm far more comfortable than previously. And the use of wikis as well. I mean, you know, I'm sure the use of wikis will expand and I'd be comfortable with that. It's very similar to some of the blogging that people use but it's just developed more now.*

<div align="right">(Dan)</div>

4.5   The relationship between study and work ICT uses

All students evaluated their course experience in relation to their work context as well as their personal interests. While most were not immediately applying their studies to work, they all saw the relevance of both the process knowledge around how teams work, and the use of tools for a way of team working that all found innovative.

> *I want to move to Chartered [Engineer] status.*

Interviewer*: have you started to do anything differently in the way you study?*

> *It's very different to what I've done before. I haven't experienced this type of activity before collaborating on a project with people you know in different parts of the country. I've never done that before…It's a new thing for me definitely. Great experience, really useful not just personally but in a work context as well, and the use of the wiki/course meetings excellent really, really good.*

> (Alan)

In some cases students saw distributed teams as likely to develop in their work in future. One commented that his company was going to have offices located in India and remote group working was something he might need in future.

> *…I see the video conferencing being useful and also the wiki style of doing things…having people work in different time zones and different things around the world is happening more and more. We tend to do most of our testing in India…but there's talk of more development of co-development happening between us and the Indian department so that would be probably quite useful for that really.*

> (Eric)

Three students commented on the way in which they used their work experience directly in the course, and sometimes prior UKOU course study:

> *If anything I suppose it's the other way round. I'm using sort of knowledge and experience I have from my working life to inject that into the course. It doesn't.... If you like in roller coaster design I'm going to be responsible for the sort of safety, health and environmental stuff. So I can use my work stuff as Health and Safety Inspector to inject that into the project we're doing. And also picking up from some of the OU courses I've done on environmental stuff, so injecting that as well.*

> (Ben)

> *We're using some tools which definitely have application [to work] such as quality function deployment and product design specification. They certainly have uses…I just finished studying T881* Manufacture Materials Design*. These were tools within that course which have direct relevance to this project, so I've brought them across and introduced the team to these, who also had used them in their work or they've come across them from study…*[Interviewe*r: and will you use those in work as well?*] *.Yeah, definitely.*

> (Alan)

All did bring their experience of their work context into their comments on team working however. They were aware of the way in which their existing work experience fed into the team process. One student compared the UKOU teams with his experience of work teams which had been intensive, co-located teams working together continuously on the same project:

…although I think we are working well together I think there are problems with it and I was trying to think of well why is that so. Think of other teams that I worked with and I think that the teams I've worked with successfully are people that you're together with. You're focused on a task that you're trying to do and you're living and breathing that almost, you know, you're just focusing on that task…And you're working on it and I think the synergy develops from that. I think one of the problems with T885 is that we, for one thing we are all distance learners, so our only interface is through ICT. But also the other thing, I think which is crucial, is we are part-timers. So you are not focused on the project all the time… some people only work on it at weekends. So you don't get any input from them throughout the week, because obviously they have jobs to do. And I think that is one issue which I think is actually quite problematic on the course. The very fact that we are part-time, distance learners and not actually focused on doing the task and being physically co-located and just concentrating on that task.

(Ben)

Eric had worked in teams for many years but '*always co-located; it's the first sort of real project I've done where…the team's been spread about all over the place*'. His comments on FlashMeeting highlight the way in which the technology enforces new forms of turn taking and control of meetings. However, the familiar methods of setting agendas in advance and rotating the role of chair across the team were also in place:

It's quite interesting. We schedule a meeting. We have a meeting every Sunday night, sometimes during the week as well. Erm and we draw up an agenda for it and we all take different roles for the chair… But the unusual thing about it is you have to, er you can't all talk at the same time. So you, one persons talking and one person, you know, joins a queue to talk. So it's not like a discussion you would have in a room because you can't sort of interrupt, you don't get the sort of back and forth dialogue. It can, you know, if you're not careful, it tends to end up in sort of a collection of mini speeches about different subjects… I was late for one of them, got stuck coming home from work and then I went back and watched probably about 45 minutes of the team meeting before I actually joined. It was fascinating to actually sit back and watch it rather than play a part…but we do use the chat. Just trying to get five peoples input on a subject quickly is quite laborious 'cause you have to go round in turn and each person speaks.

(Eric)

…we had this team wiki site and…a lot of our interaction is through that. ..you post up documents, or thoughts or comments and people come back to you so it's very much a communications tool…I think it's actually a very powerful tool. We have various sections on there. There's a page called 'notice board'… and then we have various pages…project plan, diagrams. I have my page for health, safety and environment and people can see what I've been doing on that. ..you can go in and comment on stuff. So I think actually it is a very powerful tool.

(Ben)

…there's some quite experienced people involved in the group and I think those who have experience of industry…can also take the lead and structure how meetings should be held. ..I think we felt that this was something that we needed to do and it's something I pushed forward because I chaired the first two meetings as project leader and said…have a rota so that everyone gets the opportunity to chair and minutes as well and it's structured and worked quite well.

(Dan)

For several students the team working had been the most positive experience on the course so far and there were signs again of this connecting to the relevance of what they are learning to their work context in future:

> *…for me it's seeing a team work together with commitment every week and meeting those people on a weekly basis. It's something that we take for granted at work…but when you're working on a separate project outside of work it's been really enjoyable. And also to develop yourself as a person…working in a team you know, I have enjoyed the experience.*

(Dan)

The responses here often combined both the learning about group process and the use of ICT tools. Using a new tool that students could see was broadly relevant to their work was closely connected with the enjoyment that all the students said that they found in the course. Although there were some qualifications, both the wiki and FlashMeeting were being very actively appropriated by students to suit their needs. On a course where the detailed decisions about what to do and how to do it are taken by the student teams, students were using each tool intensively to progress their projects.

The wiki is structured so that each member of the team has a page where they can locate their contributions to the project, a page for the agenda setting before each FlashMeeting, a notice board and so on. One team made a cut-off point beyond which the agenda could not be changed, because inputs were coming in right up to the meeting. A link to the actual FlashMeeting was also put up so the wiki provided an efficient access route into the FlashMeeting recordings:

> *We have a page for the team meetings. So that the team meetings are there and you can go in and look at the agenda and there's the connection on that page as well to the meeting itself, so you can access you know the video of the meeting, or log in to the meeting when it comes up when we hold the meetings. So yeah it is a powerful tool. I really like the wiki and I use it a lot and I think the other guys do as well so…. It is one of those things that I don't think you can do this course without some facility like that.*

(Ben)

This team (the Green Team) had meetings that lasted for well over an hour and were trying to keep them shorter, but without much success. Nevertheless, the technology was seen as vital to the learning on the course. However the commitment to using this technology was evident – the team had at least one meeting a week, so this means that over the whole course, students could have had about 30 meetings online.

The wiki was seen as having worked well and providing a good way of submitting the team TMA. By the end of the course, trust had built up sufficiently to enable individuals to feel confident about editing each other's work, which many student users of wikis are unwilling to do.

> *It was interesting to see how the group changed as we started off working on our own bits but towards the end we were much more of a team and were editing as we did our final project report on the wiki until it was almost complete and then we moved it over to word documents for final editing and … people were really getting stuck in towards the end and it worked really well... I don't know whether it was just a team of old or we gained people's trust, they knew people wouldn't be offended*

(Eric)

The team collaboration was also picked out by another student. He felt he had learned both about himself and about how to handle teams differently in future:

> *I think it's certainly supported me more in terms of looking at how other people work as engineers. I think you sometimes when you work as an individual you always look at yourself and how you've performed and you look at your own work and what you could have done better, what you could have done a bit more. Now I'm starting to see what others do and what they bring to the team. And also how they interact with other people. And that's been important for me because I need to sometimes sit back and let other people have more involvement because sometimes they'll let stronger members of the time to continue to push and drive and they can sit back and be somewhat away from the limelight so to speak but also not committed too much. I've now started to learn that it's important to get all members and have the right structure work for everyone and have fairness in the team.*

(Dan)

5   Conclusions

The interviews provide a wealth of evidence of a course that all were enjoying and learning from (all presentations to date have achieved 100% retention and 100% pass rates). The perception of this learning as valuable was related largely to two things – the group/collaborative process, and the use of new ICT tools. These enabled something quite new in distance education and e-learning, which is the construction of a group project largely by means of study at a distance, using a range of forms of online interaction. Group members relied on each other and were assessed in large part on the quality of their shared project report. Reflection individually was also stimulated by the FlashMeeting video conferencing system, which supported review and critique of interaction processes and team working. Extracts from the interviews presented support the following conclusions:

- the overall pedagogy of the course was appreciated by all the students interviewed

- the environment created by the team process, supported by effective use of technology, evidently built up relationships of trust and familiarity – not unconnected with the regular weekly contact where students could see and hear each other, not just interact via text and email

- the technology enabled close team interaction – the most important tool here was FlashMeeting

- weekly FlashMeetings drove the project forward and actually enabled students to achieve the assessment requirements of the course

- the ability to replay meetings was an important benefit, not only for unavoidable absence from a meeting but also because students could replay meetings and reflect later on the group process

- reflection played a core role in the course learning outcomes, and the ability to watch and listen again to interaction, and the regularity of the team meetings, supported the development of much greater facility in reflection

- team members learnt to apply the wiki in ways that enabled them to achieve their goals more effectively

- the ICT used on the course was essential – the course could not be delivered without it
- enjoyment of the course related to the new ways of working – in contrast to students' familiar working environments
- the course pedagogy and its use of technology enabled students to make very effective connections between their study and their work experience
- students clearly felt that they had developed both personally and in terms of their understanding of work and collaboration relationships with others.

The interviews provide evidence from students of a course that all were enjoying and one in which they had engaged with in a productive learning experience. The perception of this learning as valuable was related largely to two things – the team/collaborative process, and the use of new ICT tools. The response to the two main tools, FlashMeeting and the wiki, was extremely positive. The course would not have been possible without them and both offer students ICT applications they felt they could use in future. These students were all IT proficient before they started the course, and while that means that the learning curve for new tool use was low, their appreciation for the tools is evidence of the integration between tool and task.

6   Acknowledgements

References:

[1] Engineering Council UK (2008) *The accreditation of higher education programmes. London*: ECUK.
[2] Endean, M., Weidmann, G., Armstrong, D., Moffatt, J., Nixon, T. and Reuben, R. (2008) *Team project work for distance learners in engineering – challenges and benefits.* Engineering Education, **3**(2), 11-20.
[3] Cowan, J. (2006) Collaborative *and reflective professional development: A pilot*, Active Learning in Higher Education, 2006; **7**; 63
[4] Moon, J. (1999) *Reflection in Learning and Professional Development*, London: Kogan Page

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