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Developing research degrees online

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Abstract

Research degrees have been changing radically in the last twenty years, with an extensive body of work accumulated on improving the practice of research degrees and on developing skills for independent researchers. However, most of this work focuses on full-time residential research degrees, and little attention has been paid to part-time research degrees at a distance. This paper presents a novel research degree, the Virtual MPhil in Computing, offered by The Open University (UK), supported by a blend of technologies, and designed to address this gap. We discuss the support it provides for the development of student community, research dialogue and progress monitoring of distance research students.

Keywords-component; technologies, research degree; research skills; distance education; research communities

I. INTRODUCTION

In the last twenty years, the nature of research degrees, in particular in the UK, has changed considerably, with a clear shift towards the explicit recognition of a set of skills required to be an independent researcher and their development [1]. According to Metcalfe, among the triggers for change were pressure from the research councils resulting from poor submission rates, lack of scrutiny and quality assurance mechanisms, some evidence of poor supervision, and the changing nature of employment. In response to this need for change, the UK Quality Assurance Agency (QAA) has developed a code of practice for quality and standards in higher education covering, among others, postgraduate research programs [2].

The Open University (OU), UK, has built a comprehensive research student support infrastructure and training programme. As part of this programme the OU launched in October 2009 a Virtual MPhil in Computing[1]. The OU is a market leader in distance higher education, particularly for taught degrees, and the Virtual MPhil capitalises on, and extends such an infrastructure. This is an innovative research degree delivered entirely at a distance supported by a blend of different technologies, designed to better support part-time distance students in Computing.

The vision for the Virtual MPhil is to provide a rich and flexible Virtual Learning Environment (VLE) to foster an online research community, to support the development of research skills at a distance, and to accommodate a large variety of user needs and attitudes to technology. It uses a rich and flexible combination of synchronous, asynchronous and immersive technologies; these include a Moodle-based[2] site integrated with an ePortfolio system, a synchronous virtual classroom system (Elluminate Live![3]), and a purpose-built virtual campus (in Second Life[4]). Users have also the flexibility of using other popular freely available technologies, like free phone calls over the Internet (such as Skype[5]), or social networks (as Ning[6]). The environment provides guidance and support in a rapidly changing technological landscape while allowing for individual users' choice.

Underpinning the technological infrastructure is a view on fundamental requirements for supporting research degrees, based on our track record with part-time research degrees. Since 2001, when we re-designed our research degrees programme, we have focused on delivering three key ingredients (or functions) in our research degrees programme:

1. student community (supporting general research ethos and awareness);
2. in-depth, technical research dialogue, particularly between student and supervisors (developing technical and critical depth) ; and,
3. a research skills development infrastructure that includes progress monitoring (developing general research skills, establishing expectations and maintaining standards).

In adopting technology into our research degrees programme, we consider how each new technology can serve these functions. Addressing this technology-function

1 An MPhil is a recognized research-based degree, in the UK, leading to a Master's award

2 http://stadium.open.ac.uk/stadia/preview.php?s=1&whichevent=711
3 http://www.elluminate.com
4 http://www.secondlife.com
5 http://www.skype.com
6 http://www.ning.com

match has allowed us to provide an online experience comparable to a full-time, face-to-face experience, without requiring a forced duplication from one model to another.

In the Virtual MPhil students, supervisors and their research collaborators come together through the VLE, bringing their expertise and know-how to the community. They are organized around research themes to facilitate peer collaboration alongside the traditional student-supervisor relationship. Considering Sharpe et al's pyramid model [3] for effective e-learners, the Virtual MPhil provides the lower layers of functional access, skills and practices that underpin the 'creative appropriation' by the researchers to determine their own environments and contexts for research. Within our long term evaluation programme we will be monitoring and evaluating how this infrastructure is used and what new practices are developed to make any required adjustments.

This paper presents how the technology-function match is achieved within the Virtual MPhil and discusses the lessons learned and issues raised in dealing with online education of research students. The paper also presents early results of an ongoing evaluation of this research degree.

II. THE CURRENT CONTEXT

Research in Computing at the OU is undertaken under the umbrella of the Centre for Research in Computing (CRC). The CRC is a diverse and vibrant research community that spans the OU, embracing software, systems, knowledge media, human-centred, social and educational perspectives of Computing. It includes over 70 research students who enjoy an infrastructure of seminars, research groups, conferences, labs and other resources; roughly half of these students are part-time and at a distance. Many part-time students work professionally in a Computing-related area. Some part-time students live as far away as Japan or South Africa, and they can find it extremely difficult to attend any of the face-to-face sessions. As a result, students are supervised in a variety of styles, with some attending face-to-face supervision regularly and others relying almost entirely on remote collaboration.

Part-time distance students are also often cut off from the rest of the student community, missing out on the richness of daily exchanges with academics and fellow students. This increases their sense of isolation and decreases their sense of belonging. Conversely, the department misses out on regular contact with them, and with the richness and insight they can bring from their professional roles.

Our use of technology has been developed to engage remote students actively in the community, and the Virtual MPhil in particular has been developed to support distance students in overcoming these obstacles, by providing an online experience which is comparable to that of our residential full-time students, in particular when it comes to research skills development, collaborative work and interactions with peers.

III. INDUCTION

A. *Induction in general*

Induction is an important step for all new research students: to gain an initial understanding of the demands ahead, to become familiar with institutional structures and people that have a stake in their studies, and to introduce students to each other and to their supervisors.

At the OU, all new research students receive books [4] on basic skills for organising and planning their research degree, and are invited to attend a face-to-face induction programme of introductions and workshops addressing subjects such as planning research, dealing with different supervision scenarios, and research objective setting. Half-way through their first year of study, new research students also attend a research methods conference with a wide choice of sessions. All students are expected to attend induction, and the CRC runs extra sessions, including on-line sessions, targeted to students who cannot attend the scheduled induction.

B. *Induction on-line in the Virtual MPhil*

While ordinarily research students are welcome on campus by the Pro-Vice Chancellor (PVC) responsible for research, Virtual MPhil students access a special welcome message from the PVC specially recorded for them and available through the Virtual MPhil website. A recording of the on-campus CRC welcome session is also made available to them.

An online synchronous induction workshop (in Elluminate Live!) is used on the Virtual MPhil in lieu of the OU face-to-face induction workshops, and while Virtual MPhil students are given the option to attend the induction on-campus, there is no obligation for them to do so, with the online alternative allowing them not to miss out on the experience.

A series of podcasts is also available to introduce students to the set of technologies adopted and developed by the Virtual MPhil. Specific synchronous training sessions on these technologies are also offered to students and supervisors.

IV. RESEARCH SKILLS DEVELOPMENT

A. *Research skills development in general*

In the UK, research skills training is now an integral part of most research degrees. The QAA code of practice for research degrees[2] defines research program requirements that are now adopted by British universities covering: research skills and techniques, research environment, research management, personal effectiveness,

communication skills, networking and team-working, and career management.

The OU has developed a wealth of resources accessible to all research students, through the university's intranet, with activities for developing and gathering evidence of each research skill. The programme is based on a regular cycle of auditing (identifying existing skill levels), needs analysis (targeting skills for development), planning (specifying how and when the skills are to be developed, and the criteria for successful development), and documentation (selected evidence of each skill is compiled in a portfolio). This cycle is embedded in the supervisory dialogue, and supervisors oversee and assess skills development.

Skills development is also addressed in a series of weekly, on-campus Doctoral Training workshops available to all OU research students in the first year. In the CRC, research students also meet face-to-face on a weekly basis in a seminar for research skills development more specifically targeted to Computing. This takes place during the working day; however, since 2008, an online version of the seminar has also been taking place during evening sessions.

B. *Skills on-line in the Virtual MPhil*

The Virtual MPhil complements the resources offered by the University with a series of online activities that help students develop and assess some of their research skills. These activities are based on questionnaires to test students' achievement (e.g., understanding some characteristics of academic writing, self-assessment of a presentation) or tables to help students achieve tasks (e.g., estimating effort and prioritizing work, justifying research method followed, identifying the main questions to be answered when reviewing a paper). These activities are available from the Virtual MPhil VLE site and can be performed by the students independently.

An interesting example is the development of communication skills, in particular, academic presentations. There are a great number of resources students can use to develop these skills, which are available from the University Intranet, the Library and the Virtual MPhil websites; supervisors also play an important role in shaping the development of these skills by providing specific advice and feedback to their students. However, the development of academic presentation skills by necessity requires some interaction with an audience, hence an element of dealing with questions and engaging in discussions. For most students, this often takes the shape of a presentation at internal and external seminars and workshops. Both probation and final *viva voce* examinations (*viva* for short) are also means to develop and assess such skills.

Face-to-face research students are given many opportunities to practice and get feedback on the development of these skills, e.g., by presenting in research group or departmental seminars, in the weekly research students forum, and in the yearly research students conference. Virtual MPhil students are provided with comparable opportunities mediated by technology. In particular, they can present to an audience in the virtual Second Life campus, or by using an Elluminate Live! virtual classroom either in the online research students' forum, or in a session organized within their research theme. Both technologies allow for synchronous voice and text communication among many participants, and the sharing of visual resources, like a slide show, both necessary for a meaningful presentation and question and answer session to take place. Students are also offered the possibility of undertaking an online mock viva before their final viva.

The Virtual MPhil VLE includes also an ePortfolio system for collecting evidence of skills development, and progress report. ePortfolios are personal online spaces for the collection, creation and sharing of resources; for engaging in reflective writing; keeping learning journals; creating and storing personal information; and presenting evidence of work [5]. The OU has its own ePortfolio system, called MyStuff, which is integrated in the VLE. For the Virtual MPhil, the ePortfolio is seen as one vehicle for monitoring and supporting student progress, which can contribute directly to regular progress reviews (as required by QAA[2]).

V. PROGRESS INFRASTRUCTURE

A. *Progress in general*

Progress Reports: The OU's Regulations require research skills development and progress to be monitored, for all students, on a regular basis in 6-monthly reports. Skills development is documented and assessed as part of the progress report, as is the progress of the research project and the development of the thesis, The progress report is structured as a dialogue between student and supervisors, with oversight by the postgraduate tutor.

Probation: Evidence of skills development is one of the elements of all research students' probation[7]. Probation assessment consists also of a report, a mini-viva and an oral presentation with a question and answer session.

B. *Progress on-line in the Virtual MPhil*

Online students use the same tools and conform to the same procedures as face-to-face students for progress reporting and probation. However, Virtual MPhil students can do their probation viva on-line.

VI. RESEARCHER COMMUNITIES

A. *Community in general*

In the CRC researchers and research students are mostly associated with research groups (e.g., Software Engineering

7 Probation for part-time students is done within the first 22 months of study and only after successful completion is their degree registration confirmed.

and Design, HCI, etc), which are the basis of more focused communities of researchers with similar interests. Seminars, invited speakers, research projects, bidding and joint paper authoring are typical activities within these groups, and research students are encouraged to participate actively, for example, by presenting their work to, and getting feedback from, experienced academics and peers within the group.

An annual CRC research student conference was introduced specifically to bring part-time students onto campus, and to give them an opportunity to meet and socialize with academics and students across the centre. The conference incorporates discussions about research issues and skills as well as presentations of students' research. Academics are encouraged to (and regularly do) attend to act as session chairs and discussants, so that students meet researchers outside their supervisory relationships. Key sessions of the conference are recorded and made available on the student wiki.

Research students are also strongly encouraged to create links with fellow students for social support, for example, to review each other's publications, to prepare and lead some of the CRC seminars, to meet socially and develop friendships.

This can again be very difficult to replicate for distance research students. These students miss out on the community of research students in the university and in the CRC and may do their whole degree without having ever met or contacted any fellow students. Although they are encouraged to attend at least the annual research student conference some of them find it difficult to do so, as they are mostly in full-time employment.

B. Communities on-line in the Virtual MPhil

Fostering a sense of belonging in distance students is not an easy task, nor is it something that can be achieved through regulations; at most it can be facilitated and encouraged. Rugg and Petre [6] discuss some of the ways that networks can be built, and some of the tools they suggest require coffee and chocolate biscuits.

We have structured the Virtual MPhil in a way that we hope will encourage the fostering of a community spirit and the sense of belonging for distance research students. Students register as part of a research theme, which consists of all research students, supervisors and collaborators within a similar area of research. Each research theme is encouraged to use technology to support their community and make it accessible to distance students; some have created their own social network for all researchers, collaborators and students, others make extensive use of our Second Life virtual campus for supervision. The recognition that an element of fun is a contributor to a healthy community was one of the factors that motivated the design of the Second Life campus: as well as virtual spaces for research, we provide spaces where students can meet socially, have some fun, share a virtual coffee, even have a boat race or a balloon ride together.

The Virtual MPhil has also benefited from the experience of running a regular online seminar for research students using Elluminate Live!. This has been an important tool in engaging distance students with the flexibility of gearing the discussions to the particular needs of these students. An annual online conference is also being planned, to provide an online equivalent of the residential event.

Given the innovative nature of the programme, particularly the use of a virtual world, we have instigated a long-term programme of monitoring and evaluation which, among others, aims to collect experiences and best practices in the use of technologies on the Virtual MPhil: such collection will be made available to students and supervisors to help them decide which technologies best serve which purposes, based on their specific needs and preferences.

VII. EVALUATION

The methodology used for the evaluation of the Virtual MPhil is a long-term, three-stage programme that aims to assess the suitability and effectiveness of the technology offered to support the main processes of the programme, and to collect reliable data on workload for both students and supervisors.

The first stage, prior to the October 2009 pilot, included a programme of user evaluation and testing, with feedback loops into further development and customisation; it involved participant observation in live sessions, and interviews with volunteer Computing research students and supervisors, as well as eliciting the opinion of advanced and expert users of our technologies.

We are now in the process of conducting a second evaluation stage, covering the first year of the MPhil programme, where significant activities (induction, initial stages of supervision and research skills development,…) will be evaluated, feeding into an early project review at the end of year one. This will cover all the different technologies used and assess their uptake and their effect on supervision, research skills development and contributions to making students feel part of a wider research community.

In the follow-up stage, activities will continue to be sampled on a regular basis to guarantee coverage of all significant processes, till the first cohort of students reaches completion of the degree, at which point a programme life review will take place.

In the first stage, a questionnaire was sent to academics to elicit experiences of the use of technology to support supervision, enhancing research skills and building a research community for research students (MPhil / PhD) at a distance. The results of the first phase of evaluation showed that different technologies were used for distinct supervisory purposes; also different technologies suit different people for

different tasks for different reasons. There was also an indication of a will to experiment and/or have fun alongside serious research activities.

These early results indicate, at this stage, that a wide set of technologies should be made available and that experimenting with the use of technologies, such as 3D worlds has potential benefits, in particular to add the fun element to collaboration at a distance.

A questionnaire was also sent to students supervised at a distance. A primary concern for students was a lack of feeling of connection, both with the supervisor and the wider student community. Again, as for supervisors, students used a variety of technologies.

From these early results, we feel reassured that offering a wide range technologies in the Virtual MPhil has been a good choice, and in fact finding ways to expand the available technologies even further might be beneficial. For the available technologies, we will also be building a set of good practices and improve guidance offered to support choice of technologies.

VIII. Related work

The literature on supporting research students at a distance is scarce and most of it was written a few years ago, before many important technological advances, such as virtual worlds, social networks, etc., and their widespread use.

Stacey [7] describes a 'virtual campus' for Doctor of Education (EdD) students, but her experiences are limited to asynchronous, text conferences in FirstClass[8]. Harbon and England [8] have more recently looked at the practice of a research degree at a distance; however, they focus on the development of the relationship between student and supervisor, not on the support offered to students for skills development nor on the overcoming of the isolation of a student from a researchers' community. Unwin [9] reports on his experiences of using information and communication technologies to "deliver a supportive distance-based model of supervision". His approach was to include distance students in face-to-face peer supervisory meetings through audio and video-conferencing, rather than organizing peer supervisory meetings with all students attending online. Unwin reports that distance students found this extremely challenging and that he was disappointed by the lack of uptaking of distance students of Moodle facilities for peer interaction. In his approach, support for distance students' induction and training was limited to mainly sending them copies of handouts of face-to-face meetings or arranging meetings that they could also attend.

In view of what is reported in the literature the Virtual MPhil appears to be unique in having focused entirely on the support of distance research students and their training, without assuming that they should ever be present for face-to-face activities (other than for the final viva), or be happy with a mixed-economy of ICT-based participation in face-to-face meetings.

8 http://www.firstclass.com/

IX. Conclusions

The OU, in the UK, has a long tradition of distance education. For research students, in particular, it has built a comprehensive support infrastructure and training programme. The launching of the Virtual MPhil builds on top of that infrastructure providing a platform of technologies to better support those research students entirely at a distance in their research skills development and integration in the research community. By offering synchronous, asynchronous and immersive technologies and building guidance, processes and best practices for these, it offers researchers a basis for the exploration and development of research environments that best support their needs and preferences.

Although the long-term evaluation has only just started, the early feedback we have already collected is reassuring in supporting our offer of a wide range of technologies. Through its long-term programme of evaluation and feedback from users, it is hoped it will also act as a repository of best practice guidelines in distance research degrees support [10].

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