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Abstract

The nature of research students has been changing over recent years. This paper considers the issues faced by students who are undertaking a PhD either part-time or through distance learning. These students represent a growing segment of the research student numbers in the UK. However, evidence suggests that these students are at the highest risk of not completing their studies. Important threats would appear to be a sense of isolation accompanied by a lack of communication felt by the students. This paper reviews the formation of virtual teams as a means of increasing communication between students, and also introduces the notion of adopting more recent internet-based tools, wikis and blogs, to support the teams. The question which this paper seeks to address is whether the existing internet-based tools available for social interaction and collaboration are sufficient to support the needs of distance learning research students.

Keywords: Postgraduate study, isolation, team working, social networking

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1.0   Introduction

Postgraduate students who are undertaking a PhD are at significant risk of failing to complete their studies. Research in the UK has revealed that less that 70% of full-time PhD students reach completion within the required timescales, with the situation being significantly worse for those students who are studying part-time [MacLeod, 2005][Park, 2005]. Indeed HEFCE (2005) identified part-time PhD study as a 'high-risk venture'. Completion rates can also be significantly affected by the subject area in which the student is engaged [MacLeod, 2005][Park, 2005].

It has been reported that those students studying humanities and social sciences are at far greater risk of non-completion than those who are studying natural sciences and mathematics. The distinction between the areas of study have been attributed to the maturity of research methodologies within the fields [HEFCE, 2007] that provides a firm base from which research projects in the sciences can be constructed, and also the differences in research cultures between the natural sciences and other subject areas [Wright & Cochrane, 2000]. The latter point shall be explored in further detail within this paper. It is important to note that gender plays no significant role in the

completion rates of PhD students [Booth & Satchell, 1995][Park, 2005], and shall therefore not be considered further within this paper.

Whilst forming a smaller cohort of the entire UK intake of students for PhD study, there is an upwards trend in the numbers of students enrolling for part-time registration, particularly during recent years [HEFCE, 2011]. The aim of this paper, therefore, is to consider some of the issues that put the completion of studies by such students at risk and to address whether there exist tools available on the internet to overcome the identified concerns.

2.0 Method Adopted

In approaching this study, secondary research was undertaken to explore the experiences of postgraduate students. Specifically, projects were identified which concentrated on the experiences of students registered for PhDs rather than other postgraduate programmes. The surveys selected considered study in a range of subject areas in order to draw upon the experiences of students encompassing both science and non-science subjects. The practices that are encountered by postgraduate students in scientific subjects are generally identified as different to those faced in non-science subjects, therefore providing an area of focus in this study.

Following a discussion of student experiences, the technologies available for supporting communication using internet-based technologies are considered. While examining the technologies which are available and the features required to support distance learners, a comparison is made with theory relating to the formation of teams, and specifically virtual teams. The technologies are linked to the requirements identified for supporting distance learners, and the areas in which the provision requires further attention or consideration are explored.

3.0 Student Experiences

A number of studies regarding the experiences of PhD students which have been undertaken have drawn a direct comparison between the experiences of research students over multiple disciplines [Chiang, 2003][Deem and Brehony, 2000][Finlay, 2002]. The consensus view would appear to demonstrate that students in scientific

subject areas will generally tend to work in groups or teams, whilst those researching in non-science areas work independently. As a direct consequence of this, there then exists an impact on the student experience between these broad subject areas.

Students working within teams will experience a structured environment with a clearly defined role in a project that may be running for a number of years [Delamont, 2001][Finlay, 2006]. Typically there will be a project leader, usually the supervisor, and immediate access to a support network which may provide support at a number of different levels, both academic and otherwise. Indeed, most teams will also consist of researchers who possess different levels of experience therefore providing an invaluable resource to the network for new members of a research team.

Students working on an individual research project will generally encounter a very different experience. In this situation, the research student will often be developing their "life work" and their relationship with their supervisor will change dramatically over the period of their PhD as the stakeholder with the greatest level of specialist knowledge becomes the research student rather than the supervisor [Finlay, 2006][Deem and Brehony, 2000][Delamont, 2001].

The vast difference in experience which research students may encounter could lead to a real threat towards the completion of the student's research project. For those students who work on an individual piece of research, the changing nature of their relationship with a supervisor combined with limited access to peers and a support network could lead to the issue of isolation. The role of networking for PhD research students is particularly important, giving the students access to both subject specialist and generalist support [Rugg and Petre, 2004].

On first inspection, these issues may only appear to affect those students undertaking research in subjects that are considered to be non-science. However, whilst the scenarios above are aimed at portraying a "normal" situation, there are science research students who undertake individual projects. Furthermore, this problem will become far more exaggerated with the growth in numbers of PhD students who are researching either on a part-time or distance learning basis [Fenwick, 1994][Park, 2007].

There then exists a clear need for institutions to consider and address the issue of isolation. Much work has been undertaken in considering staff support and supervision arrangements for research students [Delamont, 2001][Finlay, 2002][Watts, 2008]. One outcome of this work is that a number of institutions now arrange teams of supervisors to support individual students through their studies. An implication from this would be an acknowledgement that the provision of teams, in which students participate, offers a richer environment and level of support, in which the student can engage. Conversely, students are often seen as individuals who are to embark on research projects. If this situation is maintained then there will exist a real need to assist research students in building networks with the relevant research community for both pastoral and academic support [Eley and Jennings, 2005].

One solution to overcome isolation and develop networking amongst researchers may be to implement research student groups or teams with the goal of addressing the isolation or marginalisation which some students experience when studying for a research degree. Additionally, these groups may also assist international students to integrate into departmental activities. At a higher level, a research student group or team structure should aim to develop or enhance the research culture, both at an institutional and departmental level.

4.0 Research Culture

The role played by the research culture in the student experience extends beyond academic support that a department can offer a student and into the social aspects of studying at an institution. Whilst a culture should embody issues determining the selection of research topics and allocation of supervisors, the culture should also consider the climate in which research is undertaken [Deem and Brehony, 2000]. This will include the provision of mechanisms for networking and sharing research ideas. Those students who face the risk of isolation will potentially be marginalised from their institutions as they may become socially or geographically separated from their departments. This problem becomes amplified once students have completed any research training courses at the start of their programmes. In an attempt to

overcome this problem there has been a suggestion that research students should experience a more congenial research culture [Eley and Jennings, 2005].

Clearly for a research culture to exist and grow within an institution there is a demonstrable need for students to maintain contact with each other [Deem and Brehony, 2000]. As highlighted earlier, student contact does not necessarily only need to take place with a single subject or topic area. Indeed there are benefits to constructing more wide-reaching network groups offering many different levels of support, critique and sharing of ideas across an institution and beyond [Rugg and Petre, 2004]. Many students will construct a personal network of support which includes not only members from outside of their subject area, but also members from outside of the academic community such as family or friends. Alongside a need for the groups to consist of members from different areas, there also exists a need for teams to consist of members with mixed levels of research experience. Whilst not defining a team, this leads to an excellent opportunity for individual researchers to interact, share experiences and seek support from peers who may be researching in unrelated topics. Adopting this approach is hugely beneficial, particularly to an inexperienced research student when approaching a supervisor for potentially trivial matters may appear quite daunting.

4.1 Isolation as a Threat to Research Culture

A significant cause of attrition for those students studying either part-time or at a distance from their institution is isolation from both the institution and also from fellow researchers [Ali & Kohun, 2007][Lovitts, 2008]. The students at most risk are those who are undertaking their study as an individual researcher. In this situation, the lack of a support network leaves these students without the academic resource to sustain their research. There is also the likely situation that these students will have a limited pastoral network. Indeed, it has been recognised that the construction of social networks which link students and their departments play a significant role in assisting students achieve completion of study [Austin, 2009].

The aim of overcoming student isolation would not, however, be resolved solely by allocating students to teams. Whilst this may go some way towards addressing issues for students, there is still a risk for those students studying part-time and also at a

distance from their institution of increasing marginalisation from the culture that exists within their department or institution. Addressing this risk will require overcoming the limited connection and communication that these students experience.

An opportunity for resolving the issue of isolation exists through the adoption of internet-based resources as a mechanism for facilitating communication and interaction. However, within this paper there has been a clear need identified to facilitate the creation of teams which enable the research students to build networks. Teams offer a resource for building a network which is effective in providing essential academic and pastoral support to distance learning students. Therefore prior to considering the effectiveness of such tools the issues surrounding the formation of virtual teams, those which are supported by technology, shall be explored.

5.0 Overcoming Isolation

The aim of this section is to consider the creation of virtual teams of research students. Huczynski and Buchanan (2007) define a virtual team as a team "that relies on technology-mediated communication, while crossing boundaries of geography, time, culture and organisation to accomplish an interdependent task". In this situation, the definition is slightly more flexible as the interdependency between the team members is not as strong in order to accomplish the required task, which is the successful completion of a programme of research. However, supporting the individual team members in their goals to complete their study programmes will require crossing those boundaries of dispersion to build a team offering support.

It is important to note that not every team will function in the same way. Indeed, the separation of the team members across each of the boundaries could well be different for each team, and also within a single team as it evolves over a period of time. Shin (2005) argues that there is a continuum of virtualness and that the greater the dispersion of the team members across one or more boundaries increases how virtual the team is. This implies that any institution wishing to implement virtual teams of research students will need to carefully monitor and manage the interaction of the team to ensure that successful communication can be maintained if there is a sudden shift in the levels of dispersion across the team.

6.0 Virtual Team Dynamics

One of the greatest challenges to adopting a virtual team approach in order to increase the level of engagement between research students, their peers and their institutions lies with the management of the teams themselves. Duart and Snyder (2001) note that the critical success factors include the appropriate selection of IT tools to support the teams, the competency of the members within each team, the culture in which the team operates, the leadership of the team, training of team members and the standardisation of the processes which the team uses to communicate and interact.

Many of these success factors play a large role in encouraging the team members to participate actively in their respective team. It is vital that team members are both responsive and responsible in their interactions. If the level of interaction between team members declines, then a level of mistrust and resentment builds, ultimately leading to a breakdown of the team. Indeed, should a level of mistrust arise then the underlying goal of building the team will never be attained, as the student team members will not feel able to approach each other for advice, support or critique of ideas [Ali & Kohun, 2007]. To address this, a culture that encourages interaction between team members must be developed. Reinforcement of this culture can be provided through the development of agreements and procedures within teams, for example to determine an adequate period of time between messages being received and responses being actioned.

A possible threat to the functioning of the team lies with the attitudes and perceptions of the individuals who make up the team. A particular danger may arise if there is a perception that the individual has a greater level of importance than the team itself [Tajfel & Turner, 1986]. The role of the virtual team is to offer a network of support for the team members. However, the team must not restrict the individual student's ability to undertake their research projects. It is important that a balance can be struck between the perception of the team and the perception of the individual team member as the former can contribute towards the well-being of the individual and the latter can contribute towards the creativity and criticality of the individual [Huczynski & Buchanan, 2007].

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Managing an individual's perception of team membership is, in part, reliant on demonstrating the worth of the team to the individual alongside the value of the individual's contribution to the team. The development of this perception may not solely be restricted to within the team, but may also extend to comparison with the functioning of other teams [Tajfel & Turner, 1986]. The potential for developing a positive view of a virtual team, and the notion of virtual teams as a mechanism for offering a support network within an institution, can evolve from the creation of a virtual research culture. This would offer an excellent opportunity for teams to contribute towards each other's development as part of an ongoing process to encourage and support research within an institution. The development of such a culture will be explored in the next section. Clearly, a means of offering a framework by which the team operates is critical to the success of the team.

One of the key features of the virtual teams is that they should consist of an ever-evolving membership. As students complete their PhD study they may move out of the team and new students may be allocated as they embark upon a programme of research. This is a critical point at which the perceptions of the students may need refining for the onward success of the team. Moscovici (1984) offered the concept of social representation theory as a means of facilitating the influence of the team dynamics towards the individual. Social representations define the operation and beliefs of the team and an approach of communicating those to the incoming team members. Whilst these representations may evolve over a period of time, they should at least provide a method by which the new team members can orientate themselves towards the operation of the virtual team.

Further difficulties in managing the research students allocated to teams may arise due to the different backgrounds which the students may have come from. The variation in backgrounds may arise from cultural differences or from functional differences [Duart and Snyder, 2001]. In addressing the issues that may arise when constructing multi-cultural teams, Smith and Berg (1997) identified eight polarities, phrased as questions, which offer a starting point to resolving conflict within the team. The suggestion from this work is that the cultural differences between team members offer a foundation for discussion to explore the cultural differences from the team members' backgrounds so that the team forms a greater understanding of the cultural

background of its members. An example of the latter may be those students who are researching in diverse fields. In much the same way as outlined above, those students from a scientific or engineering background may feel more comfortable working and interacting within a team as it is closer to normal practice than those students from other fields. Developing a culture and protocols for interaction may provide a step towards overcoming these issues.

Central to the successful operation of a virtual team will be the establishment of group norms [Mayo, 1945]. The norms set out a level of expectation on the team members defining acceptable levels of behaviour and action, essentially offering a framework by which the team will operate. There must be flexibility in the framework to allow the team to refine their set of norms. It should also be noted at this point that with the identified variation in construction of teams, it is likely that there will be some differences between the agreed norms of behaviour within each team. However, the framework should set out a baseline of expected behaviour to assist the development of the team.

7.0 Virtual Research Culture

It may also be desirable to consider the creation of a virtual research network across departments and also across an entire institution. In this context, a virtual organisation would be constructed in which "networks of workers and organisational units, linked by information technologies which flexibly co-ordinate their activities and combine their skills and resources in order to achieve common goals without requiring traditional hierarchies of central direction or supervision" [Huczynski and Buchanan, 2007]. The role of the organisation is to enable each of the participants, who could be individuals or teams, to act autonomously. However, the overall organisation is aimed at aligning itself as an institutional representation and one in which the virtual participants are all active members and contributors. Developing a virtual organisation such as this would then assist in overcoming a number of the issues highlighted earlier in this paper, particularly in assisting the students to develop a relationship with their departments and institution.

In terms of managing such virtual organisations, both the assets and the mechanisms for management need to be considered. Either can be considered to be tangible or virtual which led Warner and Witzel (2004) to develop a classification for the management of organisations. In the Higher Education context, one might consider virtual management to be via email or other computer mediated communication, tangible management to be via face-to-face meetings, virtual assets may be knowledge or reputation, and tangible assets may be academic papers or dissertations. An example of Warner and Witzel's classification is given in Table 1 below, along with samples of management styles and assets.

Management	Assets	
	Virtual	Tangible
Virtual	Use of Wiki or bulletin board to discuss ideas across departments/institution	Group collaboration writing a paper using email or blog for review and/or comments
Tangible	Presentation of research ideas to audience from across institution	Student-supervisor meeting for production of dissertation

Table 1: Management and asset classification [Warner and Witzel, 2004]

8.0 Internet Tools and Technologies

The selection of appropriate tools to support a team for the tasks which they are undertaking is highlighted as a critical success factor. Duart and Snyder [2001] offer a taxonomy which provides a breakdown of the different types of interaction that the team may encounter.

TIME

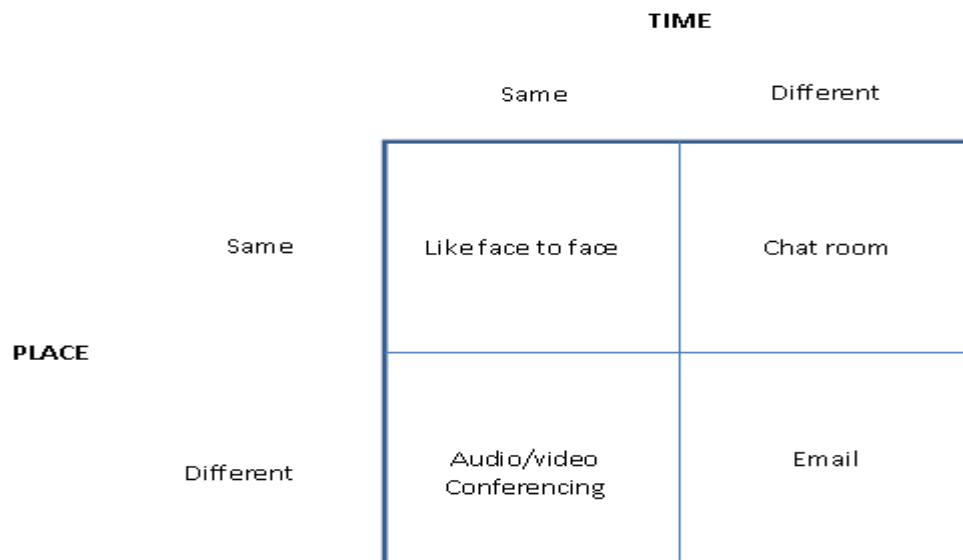|	Same	Different
Same	Like face to face	Chat room
Different	Audio/video Conferencing	Email

PLACE

Figure 1: Types of interaction [Duart and Snyder, 2001]

This model breaks the interaction between members of a virtual team into location and synchronicity groupings. However, the choice of appropriate tools to support tasks is far more complex due to the wide-ranging set of available IT tools for communication and interaction between distributed parties. Several applications exist on the Internet which support social interaction and yet also provide a greater structure for the interaction which is taking place.

Consider, for example, the aspect of "different time, different place" interaction from the model. Email offers a basic asynchronous mechanism through which two or more people may communicate and share ideas. A communication trail exists through the storage of previous messages which have been passed earlier in the communication. However, there is no structuring of the ideas that may be presented through the conversation and referring to earlier ideas may require extensive searching through earlier emails to find the relevant notion. There is no concept of indexing through emails other than using an appropriate subject line. The resulting lack of structure in communication could itself increase the risk of attrition as postgraduate research students undertake their studies [Ali & Kohun, 2007].

Whilst there is a need to provide tools that support different types of tasks, it is also therefore essential to build a cross-referencing structure for the output of the teams. There is a need to ensure that the students using the tools possess the appropriate

skills to both use the tools and to be able to select an appropriate tool for the team to use in a given task. Growing numbers of online tools are becoming available for collaborative working online. Pertinent here is the growing interest in wikis and blogs to support education and research online.

Wikis can be defined as "open access databases that allow users to participate by adding and editing each other's material" [Bach et al., 2006]. Wikis offer a structured means of being able to provide and share thoughts with a group of interested parties and operate on a community basis. The benefit of this approach is that incorrect or inaccurate postings to the wiki should be corrected by the interested community or group in a short period of time, and therefore leads to a self-organising norm in the group behaviour [Long, 2006]. This latter point is a desirable effect and was identified earlier when considering virtual teamwork. A wiki, then, provides an asynchronous and structured framework in which a group or team can work collaboratively.

A blog, on the other hand, can be considered as an online diary [Bach et al, 2006]. The key distinguishing feature of a blog is that a chronological order is placed upon its entries [Mason, 2008]. In other words, as a new item is posted to the blog then older items are pushed further down the entry list. Unlike a wiki where the structure is determined by the content of the posting, the structure of a blog is determined by the ordering of the postings. However, blogs also facilitate interaction between an individual and team as comments or feedback can be appended to an entry, if permitted by the author. Clearly this is useful for reflective tasks which can have major benefits to postgraduate study [Bach et al, 2006][Barbera, 2009].

Both tools offer benefits and increased opportunity for interaction between students via the internet. One of the additional beneficial features of both tools is that neither of them requires specialist knowledge nor training to use [Bach et al, 2006]. Both tools are being broadly considered as support mechanisms for researchers [Mason, 2008]. Determining which tool is most appropriate for particular tasks is a matter of considering the output that will be generated by the team and how that material will best be structured. Crawford (2006) offers a useful guide to both technologies and factors which can be used to select which is most useful for a scenario. However,

these should not be considered as mutually exclusive tools. There is strong interconnectivity between wikis, blogs and other internet tools (such as RSS to provide real time feeds of updates of a web site, wiki or blog) [Crawford, 2006], and so the decision may concern when to use the tool rather than which one to use.

An impact of introducing tools such as these may be the creation of an additional role for supervisors. It is simply not sufficient to make these tools available without any further support. A specific threat to the successful implementation of electronic communication to support geographically separated team members is a lack of participation in interaction by the team members. Finlay (2002) reports on the experiences of online doctoral students and highlights the concerns raised by students when others in their cohort group failed to make use of the available online tools. The outcome is a level of disappointment and lack of trust in both the available tools and in the other team members. This would lead to a failure of the online team. A potential solution may be to introduce a responsibility of e-Moderator to the supervisory role [Bach et al, 2006]. Core to this role would be the engagement of the team members in discussion and interaction using the online tools available.

9.0 Social networking

Whilst wikis and blogs enable individuals to share information using the internet, there are aspects of communication which are missing, especially when compared to face-to-face communication. Social networking can be defined as a web-based service in which users construct profiles which they may or may not share with other users, and in which users have the ability to create connections with other users which can be traversed [Boyd & Ellison, 2007]. It is this latter part of the definition of social networking which makes the distinction with other web-based resources [Donath & Boyd, 2004]. Whereas wikis and blogs enable users to share information, social networking offers features which can positively impact on the construction of virtual teams as the team of research students would be bonded by a common goal, as discussed above. At present, there has been limited research regarding the impact of social networking in supporting academic activities [Greenhow, 2009]. However, there is emerging support from research in this field to indicate the benefits to be gained from adopting such tools to support learners who are geographically and

temporally distributed, primarily derived from the inter-personal communication between the parties involved [Brady et al., 2010].

Of particular relevance to this study is the observation that the adoption of social networking can overcome the feelings of isolation that students who are at a distance from their institutions can develop [Bai, 2003][Vaughan et al, 2011]. However, integrating social networking as a support mechanism for supporting distance research students is accompanied by an additional set of issues. Most notably the issue of mistrust, as discussed earlier, is an acknowledged problem within social networking in educational environments [Vaughan et al, 2011]. Furthermore users of such networks, when set within an educational context, require support and additional tools, such as notifications, to assist them with the tasks which they need to perform [Pollara & Zhu, 2011].

10.0 Future Work

This paper has presented proposals regarding the support of research students to overcome the risks of attrition related to isolation. To date, there has been little research relating to the use of social networking to support postgraduate students. A significant proportion of the proposed solution in this paper would appear to lie with the adoption of social networking as a means of engaging research students and facilitating the formation of groups. In doing so, the requisite support networks can be constructed. Adopting these tools is not without risks, as has been identified, and there is a clear need to create frameworks within which the groups can operate. Without such frameworks then mistrust and negative perception of the mechanisms may develop which would negate the positive impact that could be developed.

As a route to developing a framework, the next stage of this study will consider the requirements related to supporting research students. Access has been gained to a cohort of postgraduate research students who are distance learners. The cohort meets at selected periods during the year, but is generally geographically separated. Research will focus on the factors affecting the communication between the members of the cohort and also the factors affecting the potential isolation that the students may be experiencing. The output from this study will feed directly into the design of a

framework to support communication between distance learning postgraduate learners.

11.0 Conclusion

The nature of PhD research students has been changing over the past decade or more. Whereas, traditionally, a research student would attend an institution on a full time basis and work within a department, there is an increasing shift towards part-time and distance learning students. This movement in the model of study brings with it a set of issues which may provide barriers for a student to successfully complete their programme of research, and ultimately may result in the failure to complete their dissertation. A number of these obstacles have been highlighted in this paper to demonstrate the necessity to rethink strategies in supporting PhD students.

Whilst recent effort has considered the supervisory process from the supervisor viewpoint, this paper aimed to consider the student viewpoint by considering mechanisms to assist the student in developing a support network. As the students are often studying at a distance from their institution and maintaining an on-site presence on a part-time basis then tools, techniques and issues surrounding the creation of virtual support teams, and ultimately virtual research departments, are a major focus in moving forward to address the issues identified.

The research question which this paper sought to address was to consider whether the web-based tools which are currently available offer sufficient functionality to support the needs of teams of distance research students. The key issue identified in this paper that requires consideration is the development of an environment which would reduce, if not overcome, the sense of isolation that distance learners can develop without contact from their peers or institution on a regular basis. The integration of social networking into a web-based environment offers potential to provide a mechanism for support. However, if the use of this technology is not supported by a framework or rules which will assist the virtual teams to function then, as discussed previously, there are a number of significant issues which would limit the impact of the tools on the group's function and therefore diminish the benefits of forming the group. Ensuring that the team can operate efficiently and effectively requires frameworks to be developed in which the team members understand how to behave

responsibly within the team and develop a level of trust in their peers. Without this level of trust the team is at risk of becoming dysfunctional. Developing group norms enables the team to communicate their expectations to each other and also to any new team members who may join at a later point in time as the team evolves. This can be done either formally or informally. Once the intra-group norms have been formed, then inter-group norms may be established to facilitate communication between the virtual teams within the institution.

For any internet tool to be successfully deployed there are two factors which need to be carefully considered. The first will relate the appropriateness of a tool to a specific task. Using the wrong tool will hinder progress on the task or, worse, prevent the task being completed. The second factor is ensuring that the appropriate skills and management are in place for both the tools and teams to successfully work together. This may require a changing role for the supervisor and additional effort for the students to interact. However, in adopting a model of virtual team working using internet-based tools there is an opportunity to address some of the real threats to completion which part-time and distance learning research students face.

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