

From e-learning to e-culture: A mentoring process for CPD development

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Abstract

The study uses a mentoring approach to investigate the process of technological innovation from an end-user perspective to understand some of the factors that contribute to sustainable innovation practices within a higher education context. The aim is to bridge the gap between institutional technology innovation policy administration and the work-related factors that inhibit sustained technology innovation.

Studies into the management process of e-learning adoption in Higher Education from a mentoring perspective is scarce, although there is a wide body of literature about e-learning technology uptake and user choice promoting improved learner outcomes. Many research studies report on the role of change agents within change processes but not how the underlying issues of managing the process of change is supported by mentoring.

The research uses a case study approach within a voluntary CPD intervention, to establish the role that mentors as change agents play during the process of technological innovation. The study considered some of the working conditions that might support sustainable innovation development. Activity system analysis and the concept of contradiction (Engeström 2001) is the overarching analytical framework and toolset employed to understand the process of innovation within this context.

The findings provided a valuable insight into the shifting roles of mentors as change agents from the participants' perspective as they work towards their technological objectives. Concurrently, the research scrutinised the relational knowledge of mentors based on an analysis of extrinsic and intrinsic motivational factors using the TPACK framework (Mishra and Koehler 2006). The study identified that relational knowledge of mentors identified as administrators, possessed the emergent content and declarative, procedural, conditional administrative knowledge (DPCAK).

The results contribute to the understanding that a mentoring approach could support technology innovation in the wider context of 21st century HEIs, where technology use is now ubiquitous. However, it is vital that administrator mentors with DCPAK are acknowledged and utilised to support the process for sustained innovative practices. The mentoring approach and the acknowledgement of the relational knowledge of administrator mentors, will offer the means to support quick gains in technological development for the end user and, therefore, better efficiencies for the institutional context to which it is applied.

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Finally, I dedicate this thesis to the memory of my mother, Dorothy Edwards. She was my best friend and confidante. Her eternal love and support will always be my guide for success.

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Abbreviations

ABBREVIATION	Term
AODM	Activity-orientated design method
AT	Activity theory
C&IT	Communication and information technology
CHAT	Cultural-historical activity theory
CMC	Computer-mediated communication
CPD	Continuous professional development
DPCAK	Declarative, procedural, conditional. Administrative knowledge
H.E.	Higher Education
HEFCE	Higher Education Funding Council for England
ICT	Information and communication technology
SDT	Self-determination theory
SEDU	Staff educational and professional development unit
TAM/UTAUT	Technology acceptance model/Unified theory of acceptance
TDPCACK	Technological Pedagogical, Procedural Administrative Knowledge
TEL	Technology-enhanced learning
TPACK	Technological, pedagogical, content knowledge
VLE	Virtual learning environment

Preface

This premise for this thesis emerged from my fascination with teaching with technology that started in the early 1990s. This was at the beginning of my teaching career as a teacher of English as a Foreign Language (TEFL) in H.E. institutions in the UK and Ankara, Turkey. At that time my interest was in computer-assisted language learning (CALL) both through teaching and post-graduate study. At that institution I was responsible for developing blended learning materials for English for Academic Purposes (EAP) courses incorporating audio visual equipment and running a Language Laboratory. My professional development resulted in my gaining a distance learning Master's degree in Educational Technologies and English Language Teaching. Engagement in this Master's course cultivated my concerns about the support with technologies provided for distance learners like myself. For instance, my cohort were trialling communication software for our study programme and we received little training. At the same time, we experienced the isolation of working at a distance without the ability to share any immediate thoughts and concerns about the software we were using to develop learning objects as part of our module assessments. Thus, with the learned experience of technology both as an educator and distance learning student, the frustrations of varied levels of support with technologies for educators and students persisted. This interest further developed when I was employed in a School of Education at a UK university from 2004. My role in the School was IT courses coordinator and lecturer in Information Technology (ICT) for undergraduate courses. The role also included a departmental responsibility for staff development in ICT training.

This experience in the use of technologies for teaching purposes also heightened my frustration between the intuitional launch of new technologies and the lack of pedagogic knowledge of central IT systems staff and thereby the user support provided by them after its implementation. I therefore wanted to understand what motivations could invoke change through supporting innovative practices.

1 – Introduction

This chapter introduces the key areas of literature in relation to the growth of e-learning practices within Higher Education (H.E.). The literature points out that the innovation process is affected by institutional policies to implement new technologies and by work-related barriers that challenge innovation practices. The discussion argues that for mainstream innovative practices to improve, mentoring approaches should be considered. The rationale for research to take a professional development approach to study mentoring to support e-learning innovation is identified.

1.1 Overview

This research study seeks to investigate end-user technology innovation experiences to understand the concerns that contribute to the complexities and issues preventing technology adoption in Higher Education Institutions (HEIs). The aim is to use mentoring strategies to promote successful and continuous innovative practices, and to address issues resulting from institutional e-learning policy diktats and work-related barriers that challenge effective pedagogic technological innovation. Research tends to focus on the products of technological innovation but not the people involved within the process. This thesis uses a case study approach and contradictions revealed through a socio-cultural framework (Engeström 1987; 2014) to investigate innovative practices from an end-use perspective. The research will broaden our understanding of the issues that may hinder the innovation process, by closely examining the actions of change agents as mentors who support end-users during the technological innovation process. The results will provide managers and staff development units with a richer understanding of the management processes involved. The practices revealed may then contribute to the promotion of sustainable technological innovation using mentors as change agents within the process.

1.2 Defining e-learning in the higher education (H.E.) context

The use e-learning in educational contexts has grown considerably since the development of the Internet and the World Wide Web in the 1980s and 1990s, respectively. In the H.E. context, use of educational technologies can now be considered ubiquitous in all areas of 21st century educational settings, and not just the domain of enthusiastic technology early adopters. This development is reflected in the literature and exemplified by the different terminology used to describe it – for example, e-learning and computer-mediated communication (CMC). More recently, the terms technology-enabled or technology-enhanced learning (TEL) have been adopted. The former suggests the use of technology to ‘enhance’ learning, whereas the latter describes the use of technology to ‘support’ students’ learning (Kirkwood and Price 2016: 2). Nevertheless, the appropriation of e-learning technologies to support learning can definitely be seen as a workplace tool with the potential to transform teaching and learning experiences (HEFCE 2005; Laurillard 2007).

Technology now mediates a wide range of educational practices. The depth and breadth of its application for teaching and learning is complex and affects all areas of H.E. working contexts. It is important to acknowledge the deeper penetration of technology into the mainstream portfolio of traditional educational practices and the support required to maintain them. This extends from administrative processes where students’ status is monitored and tracked, through to finely tuned encounters between teachers and learners, or learners and other learners. For example, Bichsel’s (2013) State of e-learning in H.E. report, states that 35% of institutions surveyed, manage e-learning services through an institutional IT service. However, the report pointed out that to be able to support these services adequately, there would need to be an increase of 124% of staff employed who would be primarily dedicated to the support e-learning alone. Also, more than 60% of institutions reported that they needed more staff in the roles of supporters for enterprise IT, professional development staff, course designers and data analysts (Bichsel 2013: 14). These examples illustrate the diversity of technology

support requirements in H.E. This demand requires the utilisation of innovative practices with technologies by staff users who may need the support of experts to be able to develop their practice.

Consequently, if there was pressure to launch any institution-wide innovation initiatives, we must be equipped to respond to the demands of the institution: auditing and responding to the needs and expertise of staff who will be the end-users. In order to promote innovative practices, it might be advantageous to gain an understanding of mentors that are recruited to support these institutional demands and, therefore, promote further innovation. It would also be useful to understand the conditions that inhibit the innovation process.

Much of the literature exploring e-learning adoption in U.K Higher Education (H.E.) is based on funding policies and initiatives promoting developments in educational practice to enhance student learning, e.g. Higher Education Funding Council for England (HEFCE) (2005; 2009). The interpretation of many of these policies within HEIs are made at a top-down faculty level, and individual establishments make their own decisions about the systems and policies they will adopt (Kirkwood 2009). This, in turn, affects academic practice and autonomy in how to complete teaching activities. Furthermore, King and Boyatt (2015) argue that where e-learning strategies exist, they focus on the technology. They do not include consultation with teaching staff, which may lead to tension between institutions and the academics working there. Moreover, Burch and Burnett (2009) assert that a technology-driven approach results in a barrier to adoption. The utilisation of mentors to support sustained technological innovation is the area of interest in this study. The researcher recognised a situation within their own institution regarding the lack of uptake and innovation with new technologies to support the student learning experience. In the researcher's School, there were pockets of innovative practice limited to only a few enthusiastic technology users.

Technological innovation may be inhibited by a lack of technical support, but there may also be other work-related factors that hinder the innovation process. Such factors that impact on the innovation process are further discussed in Chapter 2, Section 2.1.

Training and support is often provided by institutions following the launch of new tools and technologies to support teaching and learning. Staff training schemes that aim to improve technical ability to incorporate e-learning tools and applications into teaching practice, are well documented in the literature. However, these schemes are mainly focussed on the functionality of the technology (Kirkwood and Price 2006; Wilson 2012). Moreover, the literature does not always consider the wider application of technologies and the users outside of the classroom context of educational institutions. In the teaching and learning context, Kirkwood (2009) argues for a clear context for technological innovation and organisational support for e-learning to be constructively aligned with teaching programmes. This approach is well suited in the context of teaching pedagogy. However, in the wider context of technology use to support the student experience across HEIs, there is also a clear need to understand the causes of the slow uptake of innovative practices and to devise a process that promotes more widespread innovation.

Innovation or the support of innovation cannot be studied in a single manner or as a single entity. I therefore wish to explore within this research, a range of practice and practitioners in order to inform the development of a mentoring process to meet this need. Moreover, the research might also consider the extent to which the impact of diverse technology on teaching and learning might be addressed, by giving consideration to how the process of innovation might be supported by expert staff users of technologies. Furthermore, what kind of experience of innovation do the staff have, in the context that is being supported? I have already pointed out that the emersion of technology in mainstream educational practices requires more professional development staff. This role could be achieved by mentors with technological expertise. The

development of a mentoring approach to support the innovation process might help us to understand the forms of resistance and provide a window through which to understand the socio-cultural processes that should occur if innovation is to progress. The next section will therefore explore the role of professional development and e-learning with a mentoring approach in mind.

1.3 E-learning and professional development

Institutional professional development centres and courses were set up as part of government initiatives to transform e-learning practices. The purpose of these centres was to promote change in educational contexts; they also served to raise standards in academic practice. The support provided from these centres can range from on-hand academic and professional support through short courses to academic qualifications. However, a number of studies report that the uptake of these short courses is very slow. For example, Schneckenberg's (2009) review of such studies state that the inadequacy of e-learning staff competency is a major factor in the slow adoption of e-learning in H.E. As a consequence, the pedagogical effectiveness of the technical training input beyond the training courses (if they were taken up) falls short because of the lack of immediate back-up when this learning was applied to the work context. Indeed, Ham (2007) questions the usefulness of such courses to lecturers, reporting high levels of professional development uptake in technical skills in e-learning, and less focus on pedagogic needs. E-learning innovation can be transformative in its effect on teaching and learning but it is sometimes thereby a direct challenge to traditional teaching (Garrison and Anderson 2011). For example, moving away from the lecture and coping with new and varying emerging communication and information technologies adds to this sense of challenge. Garrison (2011) asserts that without support courses, e-learning innovation is a non-starter for most academics.

Like other pre-1992 universities, my Institution responded to a HEFCE government funding initiative aimed to transform e-learning practises across the university. This

included establishing its own Staff Educational and professional development unit (SEDU) offering training courses for all staff across the institution. SEDU provided generic short IT courses for staff in support of the utilisation of work-related technologies. As an experienced IT trainer, I noted inconsistencies between institutionally provided training and the absence of just in time follow up support. The guides and training manuals used during the training were, in fact, the follow-up support. On-going face-to-face support was not feasible because this kind of support would be impractical to resource. However, this absence of follow-up support slows down the innovation process that mentors might be able to help speed up. Schneckenberg (2009) reports that take-up of the innovative potential of learning technologies is not fully recognised nor systematically exploited. Moreover, e-learning integration at both the strategic macro-level of operations and the micro-level of educational processes is disappointing. Furthermore, despite the rhetoric and the many reports advocating e-learning developments and the identification of enthusiastic early adopters, the integration of ICT by academics into their teaching is very slow. Schneckenberg (2009) reports:

Technology development tends to outpace strategic thinking and pedagogical design in universities, and the sustainable integration of eLearning into higher education establishments remains a major challenge. (Schneckenberg 2009: 413)

Schneckenberg's assertion identifies the fundamental problem underpinning academics' lack of engagement with technologies. This may be the result of many factors including organisational, pedagogical and personal development issues. For instance, academics are faced with the pedagogic challenges brought about by evolving technological demands of technology-confident students, creating pressure to incorporate more innovation in their teaching contexts. Further, they have to author more accessible learning materials e.g. through virtual learning environments (VLEs) (Schneckenberg 2009).

The multi-dimensional aspect of e-learning strategy discussed by Andrews & Haythornthwaite (2007) points to the interconnection of administration and management, technological infrastructures, pedagogy and social contexts. They argue that a change in any one of these areas has a direct effect on the others. This interconnection will have a direct effect on innovation, and the support that is provided by professional development units. This researcher conducted a literature review and found that there was limited research into the role of mentors with technological expertise able to support professional development practices with technological innovation. Given the rapid development of e-learning technologies, and the demand of HEI staff to use innovative practices to develop their working practices, there is a need to research how support and the professionalisation of support may be provided. A mentoring approach may be able support these developments. The resulting study may find strategies that might speed up the innovation process and result in a more sustained approach to innovation advancement. These areas are explored in greater detail within this thesis.

1.4 The structure of the thesis

This first chapter has introduced the research and explained the structure of the thesis. First, the chapter has discussed the growth of e-learning in H.E. and reflected on penetration of e-learning into the mainstream range of traditional educational practices. Next, the review argues that the support for technological innovation to maintain and develop educational practices could be enhanced by adopting a mentoring approach. The rationale for the research to take a professional development approach to study mentoring in support of e-learning innovation by the users has been identified. The remainder of this chapter provides an outline to the structure of this thesis.

Chapter 2 reviews factors that influence technology adoption practices in H.E. However, the discussion is restricted to e-learning acceptance and professional development. Firstly, institutional factors, including e-learning policies and barriers to the acceptance

of such policy implementation are discussed. Secondly, factors promoting technology adoption and models to support this implementation are evaluated. Next, there is an examination of possible factors that could contribute to technology acceptance by end-users. Finally, there is an evaluation of potential models and frameworks that may usefully support technology acceptance in order to promote sustainable technology adoption based on adopting a mentoring approach.

Chapter 3 evaluates the merits of Activity Theory as the selected overarching theoretical framework through which to evaluate the study.

Chapter 4 sets out the research design and methodology. In this chapter, the ecology of the study is outlined. This includes a description of the ePioneers project that scaffolds this research study. The chapter discusses the socio-constructivist methodology and interpretive case study approach undertaken. Its appropriateness, ethical considerations and trustworthiness of the study are discussed.

In Chapter 5 the data collection methods are outlined.

In Chapter 6, the data generated is processed and divided into three key themes for analysis. These three themes each address a research question. The final section consists of a detailed analysis of four selected project case scenarios chosen to exemplify mentor-mentee relationships based on specific mentor knowledge identified in Key Theme 3.

Chapter 7 interprets the findings and their contribution to knowledge. This includes a discussion of the contribution of mentors as change agents to technological innovation processes, and the social structuring of conditions for innovation to occur. A model is proposed that outlines factors contributing to change agents' influence on technological innovation processes. The chapter concludes with a discussion of the limitations of the research and suggestions for potential areas of future research.

2 – Review of the literature

This chapter sets out the issues relating to technological innovation practices in the Higher Education (H.E.) sector from an institutional and a person perspective. The content will be restricted to issues of e-learning acceptance and the professional development that enables these policies to be implemented. Next, the implications of these changes are examined within a continuous professional development (CPD) context, considering the perspectives of the people involved in the change process. This includes the role of mentoring and coaching as a conduit to change agency within the context. The chapter also reviews CPD models to be able to evaluate how people act within the change process.

2.1 Institutional factors influencing technology adoption

2.1.1 Policy

The growth of e-learning in H.E. contexts has been directly promoted by government funding initiatives to support its development. The rapid developments and incorporation of technology-enhanced learning (TEL) in H.E. over the past decade has been supported and funded by U.K government policies aimed to enhance teaching and learning as well as supporting research and administrative purposes (Price and Kirkwood 2008; 2010; Mayes and Morrison 2008). Contributing factors that influence technology adoption are reviewed in this section. However, the review is restricted to the factors that may have a direct effect on the end-users of technologies in H.E. contexts.

The funding for e-learning developments have been channelled through core funding bodies such as the Higher Education Funding Body (HEFCE) and the Department for Education and Skills (DfES) or the Joint Information Systems Committee (JISC). There has also been support through associated professional bodies such as the Association of Learning Technology (ALT) and the Higher Education Academy (HEA that is now part of AdvanceHE). All of these funding and professional bodies seek to raise the standard of teaching with e-learning but they rarely provide guidance as to how to successfully

integrate policies into working practice. The present research was conducted during one of the earlier tranches of HEFCE funding granted to H.E. institutions in 2005, so there was little evidence in the literature at that time regarding how e-learning policies and their adoption would work in practice. Moreover, e-learning initiatives were novel and restricted to the enthusiasm of e-learning early adopters. One of the aims of the current research is to contribute to existing knowledge by examining the challenges to achieving sustained e-learning innovation practices using a mentoring approach within an e-learning initiative. Outcomes of the research might be used to inform wider judgement about how to influence e-learning development across the institution. The project was conceived with the hope that as a family of case studies, new practice could be cascaded more widely across the institution. This might be a good model for projects across the university. In recent literature, O'Connor (2014) argues that e-learning technology uptake has increased over the last 20 years. However, the literature also suggests that the use e-learning technologies has not transformed traditional approaches to teaching by its introduction. Nevertheless, O'Connor argues that the application of e-learning policies does have a positive effect on technology uptake across HEIs. So, how do these policies work in practice?

There is much more literature at the time of writing this thesis regarding the conditions for successful e-learning implementation. However, this was not the case when the research study was carried out, and so current knowledge could not influence the research strategy at the time. In support of the conditions for successful e-learning implementation, King and Boyatt (2015), for example, contend that successful application requires a cohesive institution-wide top-down and bottom-up approach that offers guidance, resources and recognition to encourage and support staff. Further, the authors argue that staff attitude to technology adoption is idiosyncratic and requires confidence and skills to make e-learning impact on its adoption. Moreover, there is a need for a pedagogy-driven approach to implementation that supports staff in recognising the potential of technology to add value to students' learning experiences.

Kirkwood and Price (2016) assert that effective e-learning adoption directed by policy makers is more difficult to achieve in HEIs than first anticipated by policy advisors. Problems occur with deciding how to implement technologies, and stakeholders are often not clear about how to solve problems as they arise from the implementation. Kirkwood and Price (2016) focus on the teaching context and argue that it is the teachers' beliefs and not the technology that influence how technology can support teaching. Moreover, Kirkwood and Price (2016) identified four main sets of criteria that influence university teachers' beliefs about teaching and/or how these beliefs are practiced:

- The teacher's academic context;
- The student's academic context;
- The departmental context, and
- The institutional context. (Kirkwood and Price 2016: 10)

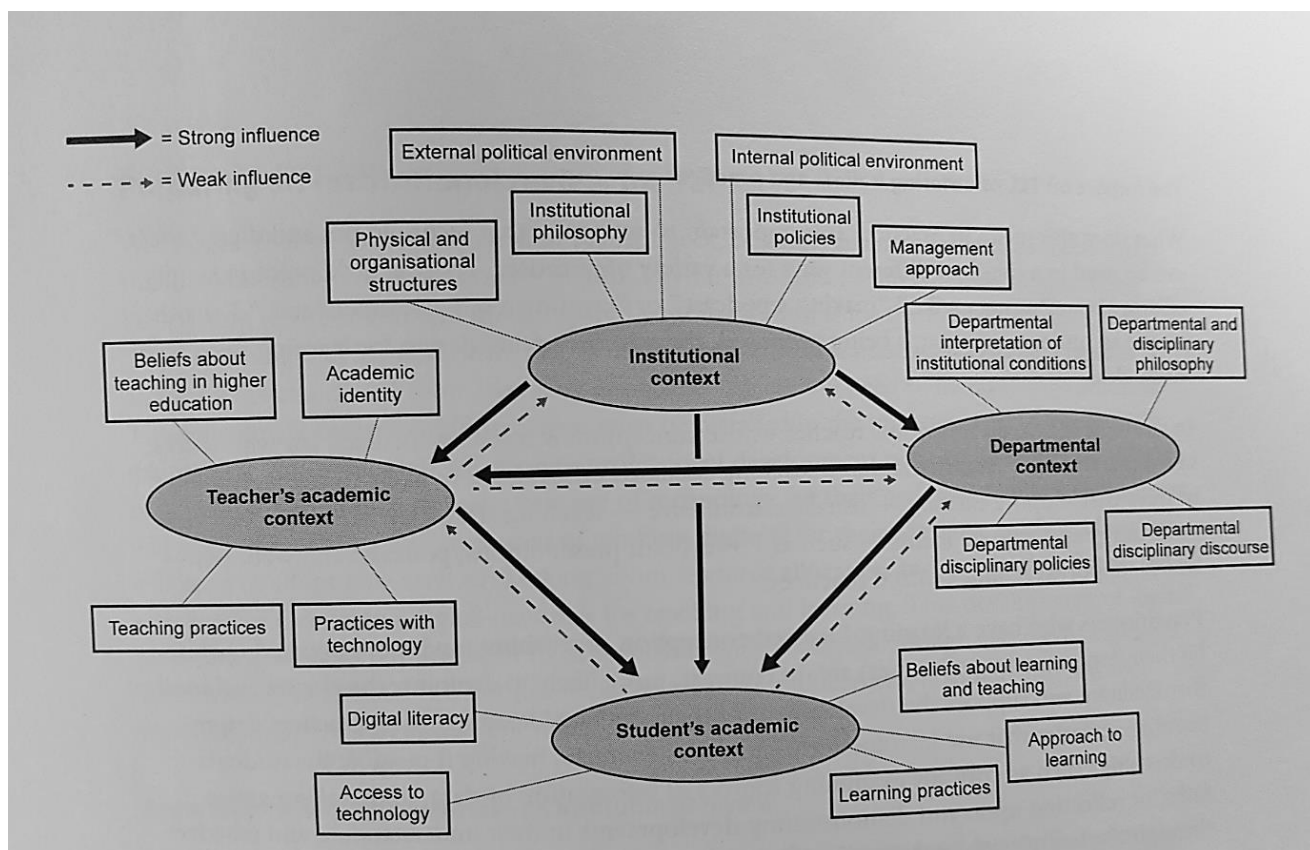


Figure 2.1 Factors influencing teaching and learning with technology in higher education: A heuristic framework (reproduced from Kirkwood and Price 2016: 11)

Figure 2.1 illustrates these four main contextual components influencing teachers' beliefs and practices with teaching and demonstrates their complexity, through the interrelated links and other influences that affect learners and university teachers. From Figure 2.1, there are many complex influences involved when the components are applied in teaching contexts, and these influences are dependent on the user and their aims with using technologies for teaching. However, the current research proposes that educational practice is more systemic in its application, and not just concerned with specific contexts of teaching and learning. The study aims to encompass the whole structure in which the cultural practices of education are located. In Chapter 1, I argued that e-learning is now a fundamental part of H.E. life. Educational practice encompasses the introduction of many new digital technologies. Therefore, I want to find a way to relate the many functions of these technologies that need to be stimulated and supported, if we are to take full advantage of the versatility that technology brings to the context. All staff users

of these technologies, whether they teach, administer or manage the student experience, are deeply embedded within the student experience. Their needs must be supported to encourage them to develop their own innovative practices. The experiential framework in Figure 2.1 provides an excellent foundation for understanding the factors influencing teaching with technology and helps to contextualise the wider influencing factors within the institution. However, for the current study many of these factors were not fully understood or documented succinctly at the time of writing. We are attempting to acknowledge the roles of all staff as intrinsically integrated within the system, and to conceptualise and acknowledge their role as central to the teaching and learning culture.

Bichsel's (2013) report on the state of e-learning in higher education, questions whether e-learning initiatives are now the norm for institutions. Those that do not incorporate e-learning as standard into the curriculum risk losing students to institutions that offer a greater choice of technological innovation into their courses. The inclusion of e-learning into the management of curricula would therefore be advantageous for the institution and its students alike. One of the issues I want to consider within the current research context is how all staff are part of the teaching and learning cultural context. Staff that support the student learning experience (other than academic staff), are not marginal and need to be included into the culture of technological innovation practices. This would ensure that everyone is aware of how their role contributes to the whole, and everyone is aware about how their own practice mediates into these new innovative possibilities. It is not the place of this thesis to consider all the factors influencing technology adoption. Therefore, the discussion will focus on factors that affect the individual when institutional e-learning policies are operationalised.

I have already pointed out in this section that e-learning adoption requires top-down direction, see King and Boyatt (2015). However, at the time of this research study there was no specific top-down direction from the institution concerned. It would therefore be useful to consider any links between aspects of institutional, personal and pedagogic

approaches to technology that foster a sustained approach to its adoption. To be able to investigate these links in this study context requires a clearer understanding of any barriers that constrain technology uptake and innovation development. The question of barriers to technology uptake is explored in Section 2.1.2.

2.1.2 Barriers to technology adoption

Research to identify barriers to e-learning adoption focusses on institutional factors and the people involved, e.g. Birch and Burnett (2009), Reid (2017). Birch and Burnett (2009) argue that there are three forms of barrier to e-learning development: namely, institutional factors, pedagogic factors and individual factors. Further, a lack of specialised and ongoing technical support adds to the problem of how academics are able to integrate technologies into their curricula. Birch and Burnett (2009) also point out that there is a lack of mentors, role models, and technology champions to share experiences, conduct workshops, and to coach colleagues in the use of technology. These issues were observed by the researcher and will be investigated as part of the research study.

Reid (2017) categorises the barriers to technology adoption from an educational technologist/instructional designer view. These categories are defined in terms of: technology, process issues, administration, environment and faculty. The categories identified are the result of a review of articles related to the adoption of instructional technologies and are illustrated in Figure 2.2. Each category in the diagram presents a barrier broken down into constituent challenges identified within the context under discussion. These issues provide detailed information to assist administrators and decision-makers in ways of determining effective e-learning policies.

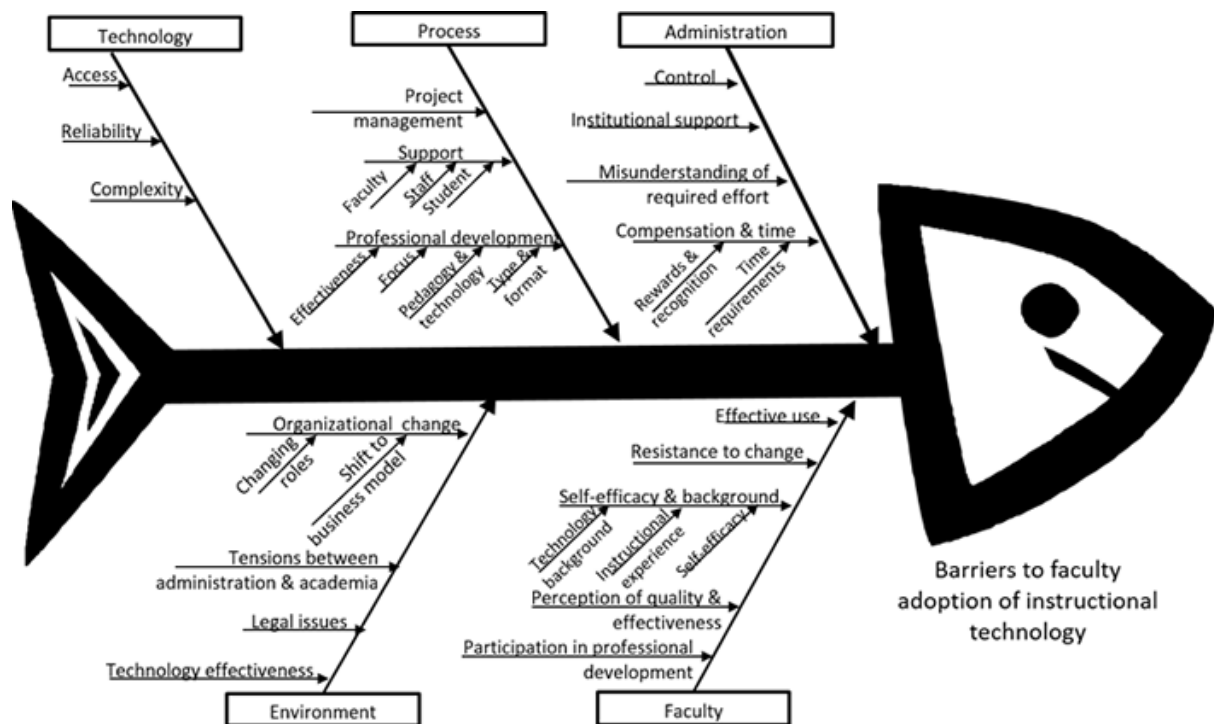


Figure 2.2 Ishikawa diagram of categorized barriers to faculty adoption of instructional technologies. Reproduced from Reid (2017)

Reid (2017) argues that by understanding the types of barriers that may be faced with the introduction of new technologies, it becomes much easier to find the means to develop strategies for the efficient use of technologies. Indeed, these identified categories are useful from a top-down strategic position, but are they also influential in the choices made by individual users for the technologies they use for work purposes? Another strategy to understand technology adoption problems, is from a framework suggested by Abrahams (2010), which also identifies and prioritises issues and barriers affecting technology adoption. This framework, and others like this, were not available at the time of this research as a means to understand the barriers to technology adoption. However, they will be a useful starting point for any follow-up studies resulting from the current study.

Understanding from this review the institutional factors that promote or inhibit technology uptake and innovation will serve to identify some of the individual barriers

that inhibit technology adoption at a staff level. What is missing is the development of a systematic process for understanding the management of technology adoption processes from the wider H.E. perspective to include the administrators, as well as teaching staff who play a very important role in the student experience. This would enable Schools/Departments to understand the conditions for more sustained use of technologies. The literature review claims to have made progress, however this is not specific enough. It would therefore be advantageous to draw attention to the management of certain social dynamics which will (when considered), contribute to a better understanding of optimal strategies for supporting technology adoption. I consider that resistance to sustainable technology adoption is likely to be found in the attitudes and experiences of the users themselves. This becomes a question about innovation acceptance as to, a) How is it possible to understand the challenges experienced by staff to adopt technologies for work purposes? and b) How do you devise strategies to meet their pedagogic needs following the implementation of institutional e-learning change policies?

2.2 Factors that promote technology adoption

The previous section focussed on gaining an understanding of institutional factors and barriers to technology uptake and innovation. This section reviews the literature relating to how innovation is accepted by the users as part of the innovation change process in H.E. contexts. Research to establish a continuum of technology uptake by people includes Rogers's seminal Diffusion of Innovation model (Rogers 2010) Other research in the field includes Hall's Concerns-based Adoption model (Hall 1979) and the Technology Acceptance Model/Unified Theory of Acceptance models (TAM/UTAUT) (Davis 1989; Venkatesh, V., et al. 2003).

2.2.1 Rogers' Diffusion of Innovation Model

Rogers' Diffusion of Innovation model (Rogers 2010) offers a framework in which to study rates of innovation uptake within a given group or context. It is useful because of

its ability to provide a foundation for understanding the factors that influence individual choice over innovation uptake. I include here pertinent aspects of the theory in order to provide a brief overview of the process in which to study people and their relationship with technologies.

Diffusion is defined as:

The process in which an innovation is communicated through certain channels over time among the members of a social system. It is a special type of communication in that the messages are concerned with new ideas. (Rogers 2003: 5)

Rogers categorises the stages of innovation over time as early majority adopters; late majority adopters and laggards (Figure 2.3).

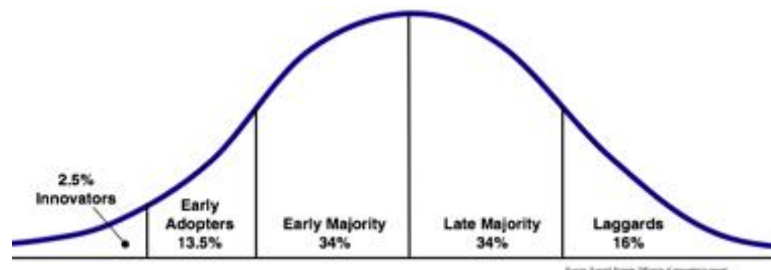


Figure 2.3 Adopter categorisation of the basis of innovativeness (Rogers 2003: 281)

These adopter categories are useful to differentiate between the expert technology user and those with little or no expertise. The adopter categories are often visually represented as S- and bell-shaped curves. The S-shaped curve (Figure 2.4) represents the cumulative plotted number of adopters, while the bell-shaped curve within the same figure depicts the adoption of innovation over time.

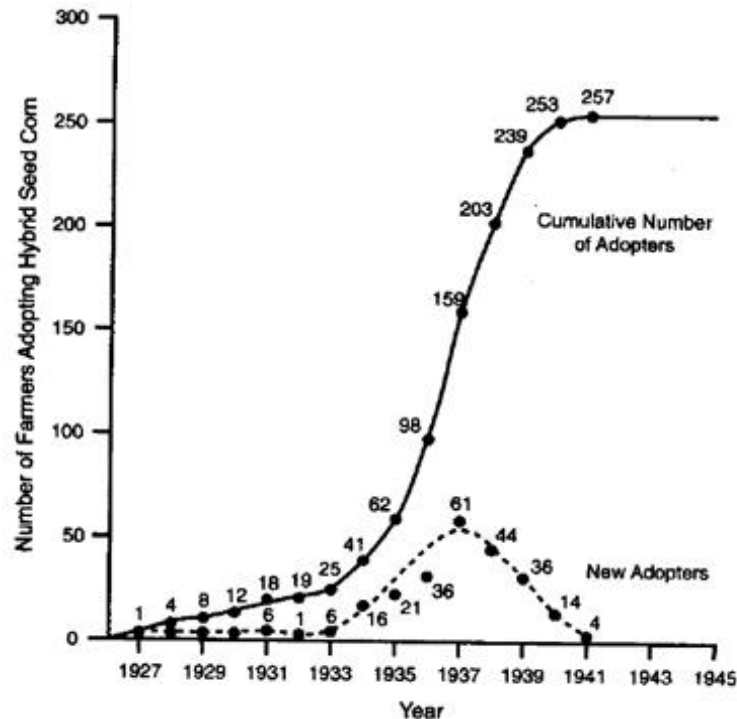


Figure 2.4 The number of new adopters each year, and the cumulative number of adopters, of hybrid seed corn in two Iowa communities (Rogers 2003: 273)

Figure 2.3 shows the normal adoption distribution for members of a social system divided into five adopter categories: innovators, early adopters, early majority, late majority, and laggards, together with their approximate percentages. The communication aspects are how the participants develop and share information and formulate mutual understanding. The diffusion of innovation process is further broken down into four main elements. These elements comprise the innovation, communication channels, time, and the social system (Rogers 2003:11).

Rogers' Diffusion of Innovation theory has been used widely across disciplines to understand and predict change in general terms, but the theory lacks scope and structure making it difficult to frame single studies within its structure (Straub 2009). Straub (2009) also argues that Roger's diffusion theory only provides a primarily descriptive analysis of technology adoption. It does not explain how to facilitate adoption, but rather focuses on why adoption occurs. Understanding the idiosyncrasies in

the choices that users make to accept or reject an innovation might be one of the insights that help explain why innovation is in pockets only. Therefore, it would be useful to understand the constituents of any barriers that impede the innovation process as part of comprehending the factors that might promote the change in innovation practices.

Two theories that have been specifically applied to education research connected to technology adoption are the Concerns-Based Adoption Model (CBAM) (Hall 1979) and the Technology Acceptance Model (TAM) (Davis 1989). CBAM aims to understand teacher change in relation to technology and TAM investigates resistance to new technologies in the workplace. These models are reviewed below to understand the connections between resistance to technology adoption as witnessed for users in an H.E. context.

2.2.2 The Concerns-based Adoption Model (CBAM)

The CBAM model was developed by Hall (1979) and is rooted in the work of Fuller who examined teacher change in a professional development context (Christou, Eliophotou-Menon and Philippou 2004; Hall 1979; Fuller 1969). The role of CBAM is to anticipate cognitive concerns about technology adoption. This model is intended to assist administrators in anticipating how teachers might adapt to change when they are planning the implementation of technologies. It could therefore conceivably be utilised by institutional Information Systems departments to consider how technology might be adopted pedagogically. However, the background to this research has indicated that it is not possible to anticipate what the innovative practices of individuals in a teaching and learning context might be, due to the unique nature of each situation within a particular context. The CBAM was developed and based on the following assumptions:

- Change is a process, not an event;
- Change is accomplished by individuals;
- Change is a highly personal experience;
- Change involves developmental growth;

Change is best understood in operational terms;

The focus of facilitation should be on individuals, innovations and context.
(Hord 1987; in Straub 2009: 633)

These cognitive assumptions constitute three basic components of the CBAM model, namely: stages of concern (SoC), levels of use (LoU), and innovation configuration (IC) respectively. The SoC describes the concerns of teachers as they journey through the adoption process. The LoU provides a breakdown of teacher actions into categories from the lowest level of non-use to the highest category of renewal. This is an indication of when a teacher is transforming and extending the innovation. The model aims to be a diagnostic, not a prescriptive tool; one with three components assisting the change facilitator with strategies to assist innovation adoption. Straub (2009) also contends, "CBAM does not describe the whys of innovation adoption, but, rather, how understanding concerns of a population can facilitate innovation adoption." (Straub 2009: 634)

The CBAM model has been used in educational settings to evaluate teacher resistance to change. This is usually done through qualitative interviews or surveys. It may help organisations to facilitate the implementation of an innovation by addressing the affective and cognitive concerns of teachers. It challenges change facilitators to look beyond their own beliefs about the benefit of an innovation and examine the implications of the change for the staff who are the teachers involved. For example, Christou et al. (2004) surveyed elementary school teachers in Cyprus administering the SoC during the implementation of a new Mathematics curriculum. The findings indicated that there was no linear relationship between years of the teachers' experience of teaching with technologies compared with the implementation of the new curriculum, to the movement of teachers from one stage of concerns to the other stages. Similarly, Cheung and Yip (2004) found that the introduction of a new teaching method was not sufficient to motivate the development of new innovative practices with technologies. The teachers involved in the study were too reliant on their prior knowledge and teaching experience. However, this practice was found to be counter-productive and a concerns-based

intervention was needed to help teachers to improve their practice. Straub (2009) therefore concluded that the CBAM model was flawed in its ability to predict a linear relationship between levels of experience and technology adoption rates. A further limitation of CBAM is its negative perspective and inability to embrace positive perceptions of innovation. Straub (2009) argues that:

Teachers may have resistance to change but they also may have some positive positions on a particular innovation that may coincide with the existence of the concerns. By ignoring teachers' possible preferences for an innovation, this model sells teachers short by portraying them as resistant luddites. (pg. 636).

The diagnostic nature of the CBAM model demonstrates that it has useful attributes in relation to teacher acceptance of technologies within teaching contexts. However, the model does not consider the wider perspective of technologies pervading all aspects of teaching and learning, and the experience and needs of the users that apply them to the student learning experience. There is no evidence that teaching contexts in school are the same as H.E. contexts. Also, as already pointed out, the model tends to focus on the negative aspects of the lack of innovation, rather than developing the positive aspects. For example, a teacher may like a particular innovation although they have concerns about how the innovation might be implemented in practice. This concern may label the teacher as a laggard, but this may not be the case. Further, this research will focus on understanding the attributes of e-learning development in H.E. settings that lead to sustained innovation developments. The attributes of technology acceptance that promote innovative practices are the focus of the Technology Acceptance Model/Unified Theory of Acceptance and Use of Technology Models (TAM/UTAUT). These are reviewed next.

2.2.3 The Technology Acceptance Model/Unified Theory of Acceptance and Use of Technology Models (TAM/UTAUT)

The Technology Acceptance Model/Unified Theory of Acceptance and Use of Technology Models (TAM/UTAUT) are models considering approaches to promote technology adoption, and not to dwell on the barriers that prevent it. The Technology Acceptance

model (TAM) was devised by Davis (1989) to investigate resistance to new technologies in the workplace. The basic model consists of a scale that measures ease of use and perceived usefulness. The scores of the two sub-scales have been shown to correlate with how people use or accept technology especially information systems (Davis 1989). Venkatesh (2003) combined TAM with the eight most prominent models and theoretical frameworks to form a unified model to aid the understanding of technology acceptance. According to a review of literature using the models by Williams et al. (2015), the combination of TAM/UTAUT models has been utilised for research as a theoretical lens in empirical studies of user intention and behaviour. The review evaluated TAM/UTAUT limitations and the potential for future directions when using it in research. I included TAM/UTAUT in this review to consider its application to technology adoption within my research study. It is interesting to note that UTAUT research is most common in business, management information systems and technology fields. Moreover, the model has been largely utilised for technology adoption and acceptance research for e-government, e-banking, e-learning and e-commerce (Williams, Ranan and Dwivedi 2015: 468). For the present research context, it is therefore appropriate to consider its application for educational settings.

The TAM and UTAUT models have been used to theorise technology acceptance, with the TAM proving most useful to explain acceptance in educational settings (Baker-Eveleth, et al. 2006; Cheng-Chang, et al. 2005). The TAM utilises a quantitative approach to understand technology acceptance because TAM used as a tool provides quantitative variables to analyse adoption readiness. For example, Cheng-Chang, Gunter, Silvio, & Cornell (2005) utilised and adapted the TAM model to investigate the underlying relationship between student attitude to using the Learning Management System WebCT and their actual use of it. Revisions to TAM have included the work of Venkatesh, Davis & Morris (2007) in the context of psychology, organisational behaviour and job satisfaction.

More recently, Edmunds, Thorpe & Conole (2012) used TAM to explore the influence of work, study and social/leisure contexts and to gauge attitudes to technology uptake. They concluded that TAM was a valuable model to help in the understanding of student attitudes towards technology use. Marangunić and Granić (2015) conducted a review of TAM literature in the period 1986-2013 and from 85 scientific publications. They confirmed the popularity of the model in technology acceptance research. The review grouped TAM research into three main categories: TAM literature reviews, Modification and application of TAM, and Development and extension of TAM. The authors concluded that the categories identified represented TAM research well, and there was a continuous improvement in the revelation of new factors with significant influence on the core variables of the model. However, there were more unexplored areas that could contribute to the potential applications that could add to the predictive validity of TAM. Further, more research was needed in the areas of moderating the role of individual variables, the incorporation of more variables into the model, investigating actual usage and the relationships between actual usage and objective outcome measures. This conclusion suggests that the number of variables possible within the different contexts makes it difficult for the use of the TAM model in isolation to gain valid outcomes. Moreover, Marangunić and Granić (2015) suggest that the continued need for technology in the professional and private sector means that there will be many more variables to consider in relation to technology acceptance for the foreseeable future. Indeed, in the H.E. sector where the present research is situated, this demand for knowledge about technology acceptance is very apparent as the gap between technology sophistication and user knowledge widens in many areas. The TAM/UTAUT models are a useful provider to theorise technology acceptance. The models have some use in predicting attitude to technology acceptance. Moreover, the models have highlighted that the more research that is done to predict the possibility for technology acceptance in different contexts, the more it is that more variables emerge. This research considers different uses of technologies within educational context. I am also aware that there are barriers

to technology use and innovation. However, the research does not seek to gather numerical data on technology acceptance. Rather, the research is more concerned about supporting people who have already accepted that technology can be usefully applied to their working contexts.

2.3 How people accept technology innovation

In terms of the current research study, the models outlined in Section 2.2 have highlighted how attitudes and acceptance of technologies may be evaluated. Yet the models do not appear to measure shifting attitudes or the dynamics of those shifts *during* the uptake process. What demands further attention are the characteristics of social processes and the perception of agency within them during the innovation process. If agency and process were to be understood, then these would be other variables to be acknowledged. What is of further interest within the present research, is to understand and make visible the attitude and personal motivation of people engaged in technological innovation. This might be achieved by capturing the motivations through a mentoring process. By following the development of such relationships, it will help the researcher to form an understanding of how the context of innovative practices develop in the workplace. In Section 2.3.1, I review the types of personal motivations that trigger positive behaviours in the workplace. The review of personal motivation that follows, therefore, may help in recognising any factors that might contribute to understanding attitudes and motivations to technology adoption and innovation.

2.3.1 Personal motivation

Early adopters of technologies who support other people to enhance their own technological innovations are more likely to understand some of the reasons that restrain the innovation process. In this research I want to understand the place of early adopters as mentors in the role of supporting the innovation process. I want to know if it is possible therefore, to breakdown and understand the motivational factors that drive mentors as early adopters of technologies in this role? According to Birkinshaw (2012),

motivation in the workplace is an internal condition that triggers behaviour and provides direction. These workplace motivations are further classified as intrinsic, extrinsic and internalised extrinsic motivation and are described below:

Extrinsic motivation comes from outside the person—money is the most obvious example, but coercion and the threat of punishment are also common extrinsic motivators. [...] Intrinsic motivation— the need for competence, the need for autonomy, and the need for relatedness to others. The other is the identification of a hybrid third type of motivation they labelled internalized extrinsic motivation. For example, when employees receive promotions, or recognition from their peers, these are externally granted but they are internalized as valuable by the individual, and therefore become intrinsic. The extrinsic–intrinsic dichotomy, in other words, is really a sliding scale with various levels of internalized motivators between the two end-points. (Birkinshaw 2012: 149)

The definitions of motivation above, explain extrinsic motivation to come from external triggers from outside the person, while intrinsic motivation is based on autonomy and relating to others. It would therefore be useful to reveal within the research, any issues regarding the external and internal motivations that drive the participants to innovate, whilst understanding the barriers that hinder the innovation process.

In an attempt to measure human motivation, Deci and Ryan (1985) advocate the utilisation of self-determination theory (SDT), which is based upon the study of human motivation. It is driven by the three human needs of **autonomy** (the experience of choice and volition of your own actions); **competence** (the experience of success from challenging tasks and influence desired outcomes); and **relatedness** (the experience of connection, mutual respect, caring and reliance in relationships with others) (Janssen, van Vuuren and de Jong 2014). Roca and Gagne (2005) determined that the combination of SDT and the Technology acceptance model (TAM) within an e-learning context means that the perceived usefulness, perceived ease of use and perceived playfulness with technologies play an influential part in the perceived autonomy, perceived competence and perceived relatedness of the users. This observation suggests that TAM and SDT may have a positive effect on users' willingness to continue to use IT in work settings but the claim is not substantiated with actual research evidence of

autonomy, competence and relatedness. This research aims to further substantiate these claims through a mentoring approach in order to make the link between the two parts of the argument above.

The literature in Sections 2.2 and 2.3.1 have demonstrated that technology acceptance may be evaluated through models appraising outcomes of the overall acceptance process. However, it is unclear whether technology acceptance has been evaluated *during* the process or as a result of a particular project intervention. Consequently, in this research I want to investigate whether there are different types of motivation at play, if a mentoring approach is adopted within an appropriate e-learning context. Furthermore, I want the research to interrogate the types of personal motivational traits = that emerge whilst people are developing their technology innovation practices, in local workplace settings. This could be achieved in this research by targeting a context where the participants might want to develop their own use of technologies to enhance their individual working practices. The interrogation of the relationships that develop within such a context might be achieved by the use of change agents.

2.4 Change agents within the innovation process

In Chapter 1, I suggested the usefulness of research studying change agents. It would broaden understanding of the adoption of innovative practices. Change agency is the window through which to scrutinise the social processes of the change agent as technology users. What is of interest is the relationships formed by the users and, using these relationships, the possibility of finding out more about the individual users. Making a case for understanding the adoption of innovative practices will include paying more attention to the processes that unfold as innovation takes place. The course of change is complex; therefore, I will focus on the role that change agents can adopt in the process. The research will concentrate on understanding the management and orchestration of the nature of the experience of the mentors during the process. This section explores

change agent roles in general and then considers these roles within a specific H.E. setting by providing a review of relevant literature in H.E. technology-related contexts.

2.4.1 Change agent roles in context

According to Beetham, Taylor and Twining (2001), first generation learning technologists were academics whose role was to champion technology and development and provide the link between technology design and the support of learning and teaching. Second generation technologists have more focused roles: they research e-learning or provide a supporting role for technology users. They are not necessarily from an academic background (Conole, et al. 2007). There may be the potential for mentors to act as change agents but that depends on how their role is defined in practice.

Change agent terminology in H.E. includes, for example, 'champion', 'technology steward', 'mentor' and 'ambassador': choice between these alternatives is determined by the contexts in which they are used. *Table 2.1* summarises several change agent terms and their applied roles in various technology adoption contexts.

Table 2.1 Change agent roles in context

Term	Role	Context
Change agent (Rogers 2003)	An individual that influences clients' innovation decisions directed as desirable by the change agency	Organisation/business programme
Mediator (Nardi and O'Day 1999)	Build bridges between people and tools	Institutional adoption programme; information ecology
Technology steward	Community support	Institution department
Champion (RW.ERROR - Unable to find reference:104; Jolly, et al. 2009)	Overcome resistance of innovation within a company or a hospital context; initiate or implement change in a vocational education & training context	Whole institution, hospital, external projects
Mentor (Clutterbuck, Davies and West-Burnham 2003)	Support and development of protégés	CPD
Coach (Lord, Atkinson and Mitchell 2008)	Support and development of people in jobs	CPD performance and job outcomes

Rogers characterises a change agent working within a change organisation as 'a person able to influence favourably sought innovation decisions' (Rogers 2003:27). Further, change agents influence the adoption of new ideas through diffusion at a suitable pace - as deemed by the change agent - and also to prevent the adoption of undesirable innovations. The change agent positively influences and determines the pace of change in an organisation, business or programme. A further change agent role emphasised by Rogers (2003) as critical to the change process in a hospital context is that of 'champion'. This is a person charged with moving the medical innovation through the hospital implementation process. Rogers defines a champion thus:

A champion is a charismatic individual who throws his or her weight behind an innovation, thus overcoming indifference or resistance that the new idea may provoke in an organisation. (Rogers 2003: 414)

The 'charismatic individual' identifies the change agent as a person with influence over others but not necessarily senior in the role. A study by the Australian vocational education and training (VET) sector (Jolly, et al. 2009) defined a champion as 'someone involved in initiating or implementing change, whether or not they have an official job title recognising that responsibility.' (Jolly, et al. 2009: 9). However, the 'someone' in this context varied considerably, ranging from job roles within the organisation or from those running their own e-learning companies. In both examples the champion could be anyone within the organisation.

For settings where people work with technologies in local contexts, e.g. a library, Nardi and O'Day (1999) introduce the concept of the information ecology focusing on people, tools and their relationships. Within this context the term 'mediator' is used in place of change agent to describe people who build bridges across individual boundaries.

However, the impact of the mediator role may be overlooked where management focusses on the mechanics of technology implementation and not whether it is successful. Wenger, White and Smith (2010) identify technology stewarding as the change agent in the CoP innovation model context with the definition:

Technology stewards are people with enough experience of the workings of a community to understand its technology needs, and enough experience with or interest in technology to take leadership in addressing those needs. (Wenger, White and Smith 2010: 25)

Technology stewards act in liaison within the community and provide support but there is no evidence of their expertise with technologies. The different change agent roles identified within technological change process contexts are representative of Fullan's (1999) argument that within an education setting, anyone working in an environment committed to improving it is a change agent. However, this assertion does not specifically define the role. Fullan's reasons are that no one person can comprehend the complexities of change in dynamically complex systems and so it would be implausible to leave change decisions to other people. Further, and more importantly, the conditions in which the change process occurs cannot be established by management in isolation (Fullan 1999: 39). Fullan's change agent assertion illustrates the difficulty of determining change agent roles.

A more recent study in the H.E. context identified change agents as 'ground-force staff' with duties encompassing training, support, mapping technology in curriculum design, and driving learning and teaching and change initiatives with technologies (Buchan 2014). Buchan does not identify specific roles but focuses on the environmental factors and adaptability factors impacting on the individual and the institution's uptake and use of technology.

This review of change agent roles highlights the difficulty in determining a precise definition of a change agent. All the definitions above show that varying context is an important factor in establishing the precision of the role. Buchan (2014) implies that institutional setting and the flexibility of the participants involved to adapt to the learning environment, determine the specificity of the change agent role within a given context. Furthermore, adaptability encompasses the whole complex view of the learning environment and acknowledges multiple contextual factors. Both positive and negative factors can have an impact on individual and institutional uptake and use of technologies

within a changeable H.E. environment (Buchan 2014: 108). It is therefore possible that the specific nature of the change agent role is a suitable window through which to monitor that role within a mentoring context. The relationship between the mentor and the mentee could be monitored in order to understand the actions and the processes of innovation of the users in that context. The next section therefore explores the notion of mentors as change agents in relation to technological innovation.

2.4.2 Mentors/coaches as change agents

'Mentoring' and 'coaching' are terms that are easily recognisable in H.E. and their techniques are widely used in teaching and learning contexts. They are therefore easily acceptable terms that fit the purpose of supporting e-learning innovation in a more personalised manner than 'IT training'. The manner in which mentoring and coaching fit into an e-learning supporting role may depend on the roles they play within the context. The mentoring/coaching literature is reviewed here to form a view of the concept for supporting technological innovation and, ultimately, to determine how mentoring/coaching roles fit the context as change agent roles.

Within the literature, mentor definitions vary (see Bova and Phillips 1981; Bryne 1991; Ehrich 1995; Darling 1984; Roberts 2000). The notion of 'mentor' in a US context is based on a mentor as a career sponsor and door opener; whereas in the UK, the role is one of guide, counsellor and coach (Poulsen 2007). Clutterbuck (2011) defines modern mentoring as a partnership between two people of differing experiences, thus:

A mentor provides support and development, tackling issues and blockages identified by the mentee. It is a positive, developmental activity in which a mentee can ask apparently naïve questions in an unthreatening atmosphere, and the mentor helps them grasp the wider significance of whatever is happening. (Clutterbuck 2011: 2).

Similarly, the notion of coaching is analogous to an instructor or trainer and its informal meaning relates to a tutor guiding a student through an exam (Harper 2001). The concept of coaching and mentoring each offers a different approach to the management of learning. They each conjure up different expectations in different contexts, for

different people. It is therefore feasible that the notion of mentor/coach can be offered as a role for people to support e-learning innovation within a pre-determined context. The fluidity of defining the mentoring role is noted by Rhodes & Beneicke (2002), who argue that in corporate learning there are no uniform definitions of coaching or mentoring. In a teacher-training context the Training and Development Agency for Schools (TDA) (2008), defines mentoring and coaching as follows:

Mentoring is defined as being concerned with 'growing an individual', both professionally and personally. It is linked with professional and career development and is somewhat characterised by an 'expert-novice' relationship.

Coaching is defined with a narrower remit than mentoring and relates to specific areas of performance and job outcomes. (Lord, Atkinson and Mitchell 2008: iii)

These definitions offer the flexibility to apply to an H.E. e-learning change context where personal development is a consideration. In fact, for the purposes of this research I propose the use of a baseline definition, adapting the definition above as follows:

A mentor is a person who helps to grow an individual personally and professionally while adopting a flexible coaching approach based on individual need. (Lord, Atkinson and Mitchell 2008: iii)

Given the discussion about the need for flexibility of the change agent role in pre-determined technology innovation contexts, I wanted to be able to allow that same flexibility for the mentor role. This adapted TDA definition, therefore, provides a generic formula for evaluating the perceived understanding of the mentor role from both the mentor as a change agent and the mentee perspectives. This flexibility of definition concurs with Clutterbuck's (2014) notion of mentoring relationships. Every relationship functions within a context that may be formal or informal. Each mentor pair brings with them a set of expectations about its behaviour, purpose and the expected outcomes of the relationship (see *Figure 2.5*).

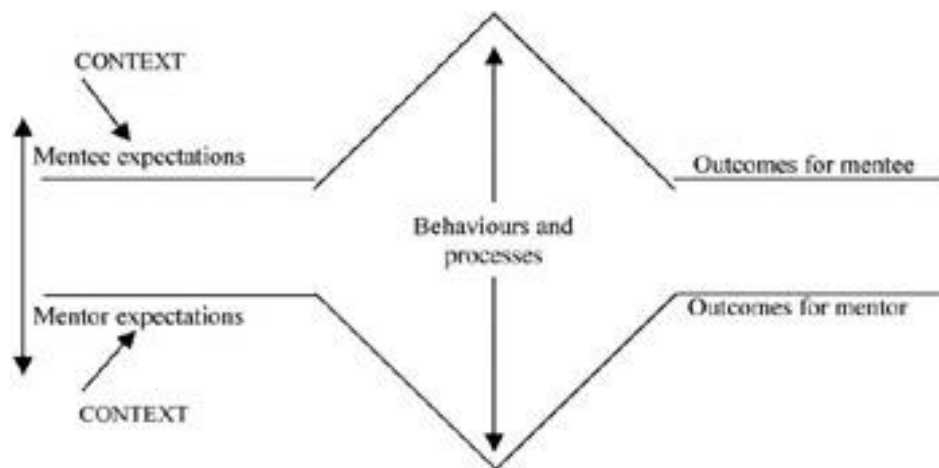


Figure 2.5 The context of mentoring. Reproduced from Clutterbuck (2014: 15)

As depicted in *Figure 2.5*, Clutterbuck argues that every relationship must be considered as functioning within a context. In formal mentoring for example, this would include the culture of an organisation, the structure and purpose of the mentoring scheme and the background of the mentor and mentee. The mentor and mentee have their own expectations regarding role, purpose, behaviours, and likely outcomes that contribute to the relationship. Expectations will be influenced by the context. The interactions between the parties are mutually influenced by each other's behaviour within the process.

Ultimately, the effectiveness of the process will have a strong influence on the outcomes that need to be effective, in order to foster a more long-term relationship. This explanation sums up the complexity of the steps involved within the mentor-mentee relationship. An understanding of the requirements of all of these constituents, are helpful when formulating questions about the mentor role within a change process. More importantly, an analysis of the mentor actions within the mentor-mentee relationship, will elucidate the value of mentors as potential change agents within the technology innovation change process.

Further analysis of the types of mentor roles within the literature reveals potential types of mentoring approaches that allows a comparison of those approaches when supporting a technology innovation initiative. The terms mentor and coach overlap in meaning and

researchers acknowledge the confusion, making suggestions of how better to define the terms. For example, Clutterbuck (2014) claims that mentoring and coaching share some tools and approaches. However, they can be differentiated. Coaching is focused on performance within the current job and the development of skills whereas mentoring is focused on long-term goals and developing capability. These differences are shown in *Table 2.2*.

Table 2.2 Coaching contrasted with mentoring (Clutterbuck 2014)

<i>Coaching</i>	<i>Mentoring</i>
Concerned with task	Concerned with implications beyond the task
Focuses on skills and performance	Focuses on capability and potential
Primarily a line manager role	Works best off-line
Agenda set by or with the coach	Agenda set by the learner
Emphasises feedback to the learner	Emphasises feedback and reflection by the learner
Typically addresses a short-term need	Typically, a longer-term relationship, often 'for life'
Feedback and discussion primarily explicit	Feedback and discussion primarily about implicit, intuitive issues and behaviours

The focus on long-term goals and development is more pertinent for the present research context, as this will be helpful to better support a sustained development of e-learning skills and application. Brockbank and McGill (2006) approach mentoring based on philosophical activity, approach and intended learning outcome. They identify Functionalist, Engagement, and Evolutionary mentoring models (*Table 2.3*).

Table 2.3 Mentoring Models and Approaches (Brockbank and McGill 2006)

Mentoring Role	Purpose	Process	Learning Outcome
Functionalist	Prescribed agreed activity that may or not be agreed to by the client	Directive	Improvement
Engagement	Prescribed agreed activity that the client may or not be aware of	Humanistic process and respects the client's subjective world	Improvement that leaves underlying values and systems unchanged
Evolutionary	Goals generated by and for the client	Person-centred	Transformation

Of the three models and approaches highlighted in *Table 2.3*, the Evolutionary mentoring model is the most flexible in terms of negotiation between mentor and mentee. Within this model the focus leans heavily towards personal mentee transformation. This transformation concurs with the notion of taking ownership of technological innovation, with the mentee becoming much less reliant on mentor support with the technology. Within the current study, the observation of actions between the participants may reveal how the mentor as change agent facilitates how the mentee takes ownership of their personal development with technology innovation.

Brockbank and McGill (2012) attempt to clarify further their earlier definitions of mentoring/coaching roles and propose a situational model as a re-evaluation of their mentoring/coaching framework:

This situational model clarifies the confusion about the two terms [mentoring and coaching] and ensures that when practitioners offer coaching or mentoring they and their clients are clear what is meant. (Brockbank and McGill 2012, pg 9.)

The new framework is made up of quadrants divided into two dimensions: namely, ownership of purpose and learning outcome as outlined in Figure 2.6.

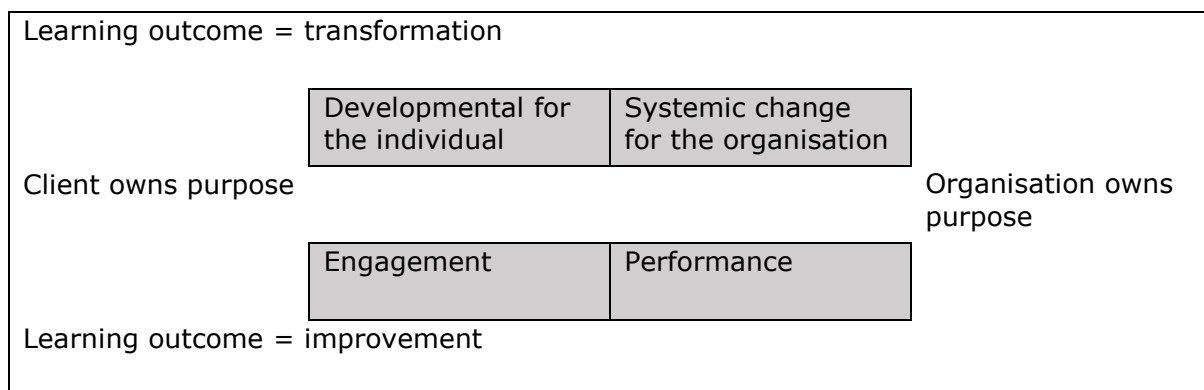


Figure 2.6 Situational coaching or mentoring. Brockbank and McGill (2012: 13)

The Developmental approach replaces the Evolutionary Mentoring and Knowledge mentoring approach. Whereas Evolutionary mentoring was mentoring with goals generated from mutually agreed activities between mentor and mentee, the Developmental approach acknowledges and respects personal knowledge and experience

of the mentee, and their ability for creating personal ownership of their learning objectives. This, in turn, leads to transformation. As previously discussed, the notion of taking ownership is important for technological innovation and this is more apparent where Developmental mentoring acknowledges mentee knowledge and experience during the process.

It can be concluded that the numerous definitions of mentoring and coaching offered in the literature lead researchers to contend that mentoring and coaching definitions, and subsequent relationships between the two, are subject to debate. In a potential research setting, the researcher must be aware of the context and meaning of mentoring roles to be able to apply them to emerging technological innovation contexts

This review of the mentoring and coaching literature points out the value of mentoring and coaching approaches within a pre-determined teaching and learning context. Conversely, it also points out the difficulty of formulating an agreed definition of mentoring and coaching, as well as understanding the different roles within a particular context. I think that there is no single definition of mentoring; the type and nature of mentoring should be left to the discretion of the parties involved. However, I still contend that the mentoring definition, I have highlighted above is necessary to provide a literature review benchmark that is flexible enough to use against any definitions of mentoring that might emerge from the study. The confusion around mentoring and coaching approaches suggests that they must be personalised according to knowledge/need/context. This is a reasonable assertion given the nature of mentoring and coaching in practice. Nevertheless, the review has highlighted the potential relevance of fostering a mentoring/coaching approach to support technological innovation based on the knowledge and expertise of the mentors involved. However, within the literature there is little evidence that this approach has been studied in the context of professional development for technological innovation, whether this be voluntary or not. Consider the scenario of a group of people willing to develop their practice with technology voluntarily as part of their professional development in an H.E.

context. In this setting, it is reasonable to evaluate the merits of professional development models. The evaluation will be useful for assessing the notion that professional development opportunities might promote a more widespread adoption of technological innovation practices within a pre-determined working context. The next section, therefore, appraises professional development models to ascertain their usefulness for this outlined scenario.

2.4.3 Continuous Professional Development (CPD)

The previous section considered the literature regarding mentoring/coaching roles and their application to generic as well as educational contexts. It concluded that context, knowledge and expectation were key to understanding the specificities of the role. In Chapter 1, Section 1.3, the researcher concluded that professional development with technologies is often hindered by institutional pressures and time constraints that resulted in a lack of innovation in practice. In this research, I would like to explore any potential links between peoples' motivation and mentoring and coaching. Such links may help to elucidate any barriers to technology uptake. Thus, the provision of a context where people are open to the idea of developing their practice with technologies whilst being supported by mentors, would be a suitable environment in which to study the process of technology innovation.

Continuous Professional Development (CPD) definitions vary and range in contexts from quality maintenance and accountability to 'life-long' learning in both professional and personal contexts (McMillan, McConnell and O'Sullivan 2016). It is defined by Megginson and Whitaker (2003) as "a process by which individuals take control of their own learning and development, by engaging in an on-going process of reflection and action" (pg 3). They stress that CPD is required because job security is no longer dependent on where you are employed, but also upon the skills, knowledge and experience we possess.

Kennedy (2005; 2014) provides a framework (Figure 2.7) for nine key CPD models that allows for the comparison and analysis of CPD policies.

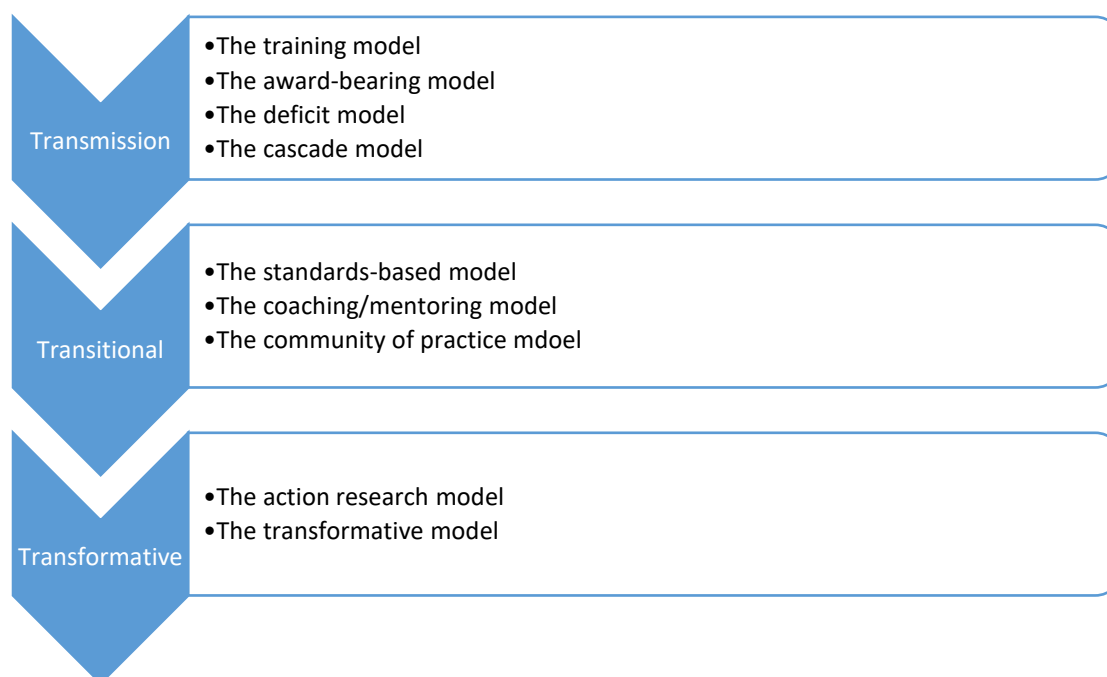


Figure 2.7 Spectrum of CPD models. Source: Kennedy (2005; 2014)

The framework illustrated in Figure 2.7 shows a spectrum organised in three broad categories. These identify their individual potential capacity for transformative practice and professional autonomy. Teachers can use these categories to evaluate their own teaching practice. From the nine models proposed (see Appendix 9.4), it is coaching/mentoring within the transitional stage that articulates relationships between people. Further, it is the transformative models that relate to the ability of people to take control of their own personal development in practice. This would be a key element of interest within the study context.

The Kennedy CPD models (2005) provide an indication of perceived purpose presenting a choice for people in which to transform their practice. On the other hand, Fraser, Kennedy, Reid and McKinney (2007), argue that change through different forms of CPD is better understood by interpretation of the range of factors that might impact on CPD.

These researchers suggest the utilisation of a combined framework of three different methods of understanding CPD:

1. Bell and Gilbert's three aspects of professional learning (amended);
2. Kennedy's framework for analysing models of CPD;
3. Reid's quadrants of teacher learning.

Bell and Gilbert's three aspects of teacher learning (Figure 2.8) suggests that the motivation for change starts from a personal desire for professional learning, which may be affected by positive or negative factors within a particular context. The Kennedy framework (Figure 2.7) is based upon changing intellectual and motivational aspects of learning together with functional development. Reid's quadrants of teacher learning (Figure 2.9) analyses professional learning opportunities utilising formal-informal and planned-incidental quadrants. A discussion of the attributes of each model follows below.

The Bell and Gilbert CPD model (1994), is founded upon considering teacher professional development based on interrelated personal, social and occupation aspects (Figure 2.8). The important features to consider when using this model are based on each of the three characteristics:

- Personal
- Consider teacher beliefs and attitudes
- Address motivation and interest
- Social
- Nurture relationships between individuals and groups
- Contexts should be supportive to allow experiment and risk-taking
- Occupational
- Need strong links between theory and practice
- Intellectual stimulation and professional relevance are needed

Figure 2.8 The Bell and Gilbert Model (Bell and Gilbert 1994) Adapted from Fraser, Kennedy, Reid & McKinnon (2007)

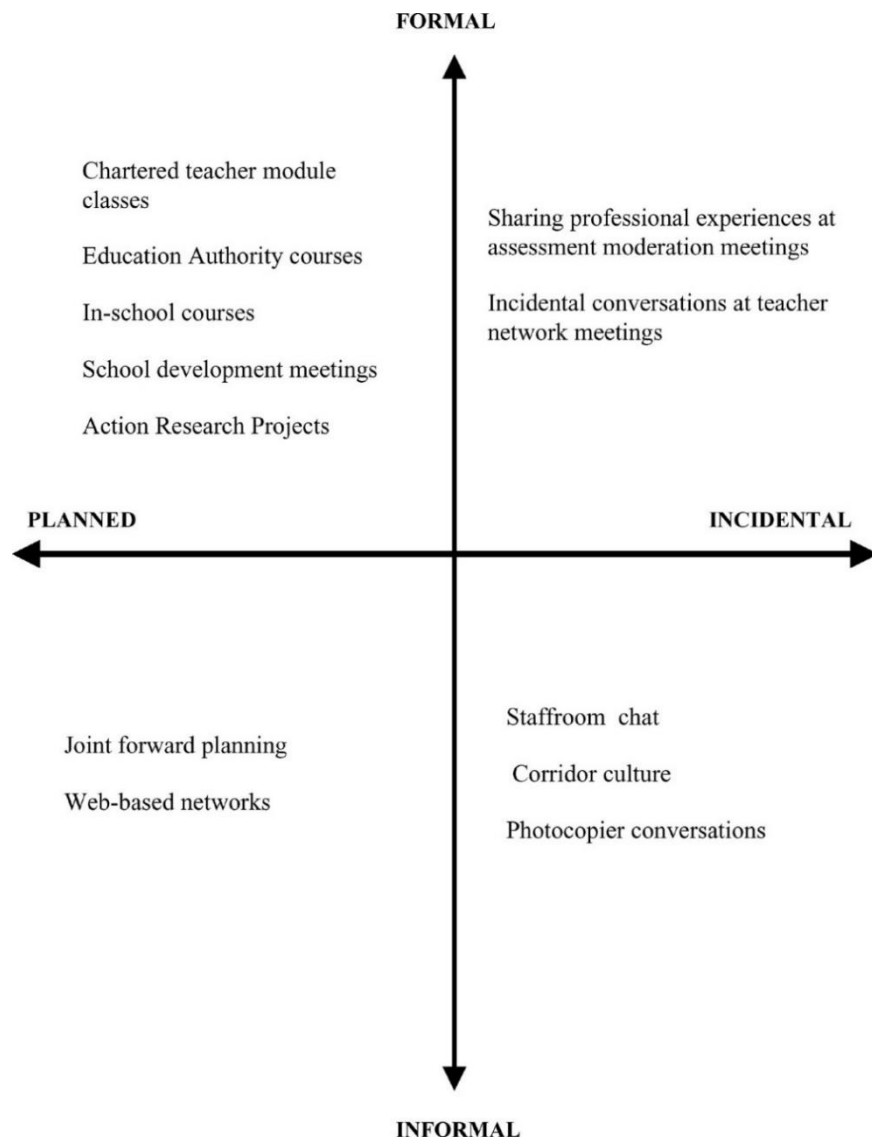


Figure 2.9 Reid's quadrants of teacher learning. Adapted from (Fraser, Kennedy et al. 2007)

Reid's quadrants (Figure 2.8), is constructed from two dimensions: formal and informal and planned-incidental. Formal opportunities may consist of taught courses, i.e. those occasions external to teacher control; whereas informal opportunities are teacher initiated, e.g. networking. On the other axis, the planned opportunities may be formal or informal, but they are typically pre-arranged; incidental opportunities are spontaneous and unpredictable and may occur over a coffee break, for example (Fraser, et al. 2007).

Table 2.4 Summary of CPD Frameworks. Adapted from Fraser et.al. (2007)

Framework	Terms of categorisation	What is being categorised?
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Bell and Gilbert's three aspects of professional learning (amended)	Personal/social/occupational	<i>Domain of influence of professional learning</i>
Kennedy's framework for analysing CPD	Transmission/transitional/transformation	<i>Capacity for professional autonomy and transformative practice supported by the professional learning</i>
Reid's quadrants of teacher learning	Formal/informal Planned/incidental	<i>Sphere of action in which the professional learning takes place</i>

Table 2.4 summarises the three CPD frameworks outlined, and highlights their usefulness for using these approaches to examine different aspects of CPD. Each framework targets the specific CPD goals for the participants and, together with the Kennedy framework, they provide CPD evaluation methods that are dependent on the goals of the individual participants. These frameworks offer useful attributes to evaluate the impact of the changes on the person and their working practices. However, no single framework possesses all the attributes allowing evaluation of CPD practices with technology innovation. Moreover, the frameworks focus on goals and outputs, but they do not consider the knowledge that participants possess prior to the development of their practices. With technology innovation practices, variation of knowledge is wide and therefore needs to be evaluated to be able to provide effective mentor support. In Section 2.5 , technological knowledge in relation to educational practices is evaluated through the relevant literature, with the aim of understanding how innovation practices develop in relation to technology adoption.

2.5 Technological Pedagogical Content Knowledge (TPACK)

Educational researchers share an interest in the relationships between teaching and student outcomes. An obvious issue to explore, therefore, is the link between the

influence of teacher knowledge and how this is taught in relation to the final outcome. The same argument in the H.E. context can be applied to teacher pedagogic knowledge and how technology is used within this context. However, how these concepts can be evaluated, and the outputs of success measured, requires a model able to link these concepts together. The significance for this research is to be able to understand the relationships between technology knowledge and the output of innovative practice during the innovation process.

Shulman (1986) introduced the notion of pedagogic content knowledge (PCK) because he considered that the emphasis on a teacher's subject knowledge and on pedagogy had been treated as mutually exclusive domains in research around this subject (Shulman 1987). PCK occurs where content and pedagogy intersect and reflects how aspects of subject matter are organised and adapted for teaching purposes by the teachers themselves.

A second kind of content knowledge is pedagogical knowledge, which goes beyond knowledge of the subject matter per se to the dimension of subject matter knowledge *for teaching* [author emphasis]... Pedagogic content knowledge also includes an understanding of what makes the learning of specific topics easy or difficult: the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning of those most frequently taught topics and lessons. (Shulman 1986: 9)

It is the ability to instinctively know what makes learning easy or difficult that is of specific interest because it may help to understand how to support the process of technology adoption and innovation. Koehler and Mishra (2006) extended Shulman's model, proposing the Technological pedagogical content knowledge (TPACK) framework. They considered that literature relating to frameworks that articulate the link between technology pedagogy and knowledge were lacking. The TPACK framework (Figure 2.10) attempts to identify the knowledge teachers require to be able to integrate technology into their teaching while addressing the complexities of the knowledge required to teach. The researchers define TPACK as follows:

TPACK is an emergent form of knowledge that goes beyond all three "core" components (content, pedagogy, and technology). The technological

pedagogical content knowledge is an understanding that emerges from interactions among content, pedagogy, and technology knowledge. (Koehler and Mishra 2009: 66)

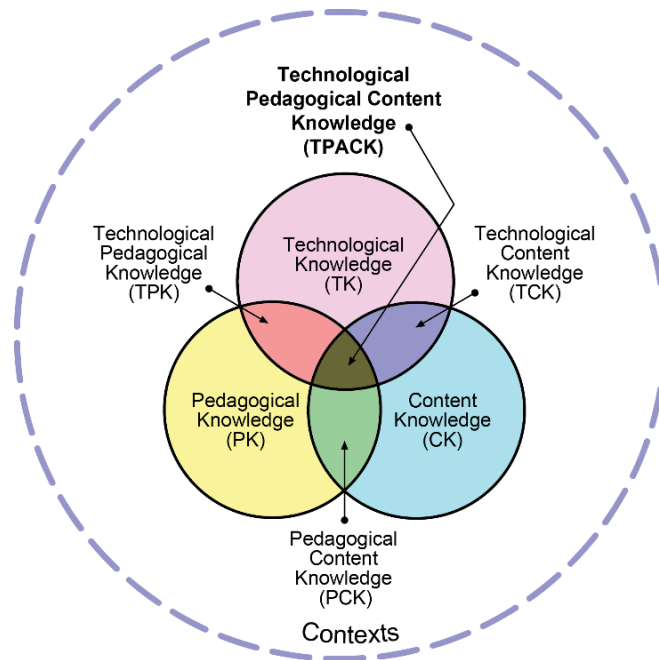


Figure 2.10 The TPACK framework and its knowledge components (Koehler and Mishra 2009). Graphic obtained with permission from <http://tpack.org/>.

The uses of technology in the classroom changes the nature of teaching and they thereby play an important role in the understanding of PCK. Mishra and Koehler (2006) contend that the TPACK framework can evaluate the complexity of integrating technology into subject-specific instruction. This framework is not new, but I think that its articulation of the three main elements makes it a useful way to understand the knowledge relationships between mentor and mentee, albeit not in a subject-specific context. The TPACK framework focuses on the relationship between content, pedagogy and technology as central to effective teaching with technologies. The interactions between and within these components account for the quality and range of technology integration. Koehler and Mishra (2009) argue that each domain in Figure 2.10 should not be considered in isolation but instead grouped into several components: content knowledge (CK), pedagogical knowledge (PK), pedagogical content knowledge (PCK), technology knowledge (TK), technology content knowledge (TCK), technological

pedagogical knowledge (TPK), and technological pedagogical content knowledge (TPACK).

The model is not without its critics, however. For instance, Brantley-Dias and Ertmer (2013) argue that researchers unintentionally place heavy emphasis on technology within the current TPACK model although Mishra & Koehler explicitly state that this was not their intention (Mishra and Koehler 2006; Mishra 2011). The technology is a means to an end while the user innovates how the technology should be utilised in context. Brantley-Dias and Ertmer (2013) believe that because technology is more firmly embedded within different aspects of teaching pedagogy TPACK should not be viewed as a separate knowledge category; it should instead form part of, or be contained within the category of PCK. This is exemplified in Figure 2.11.

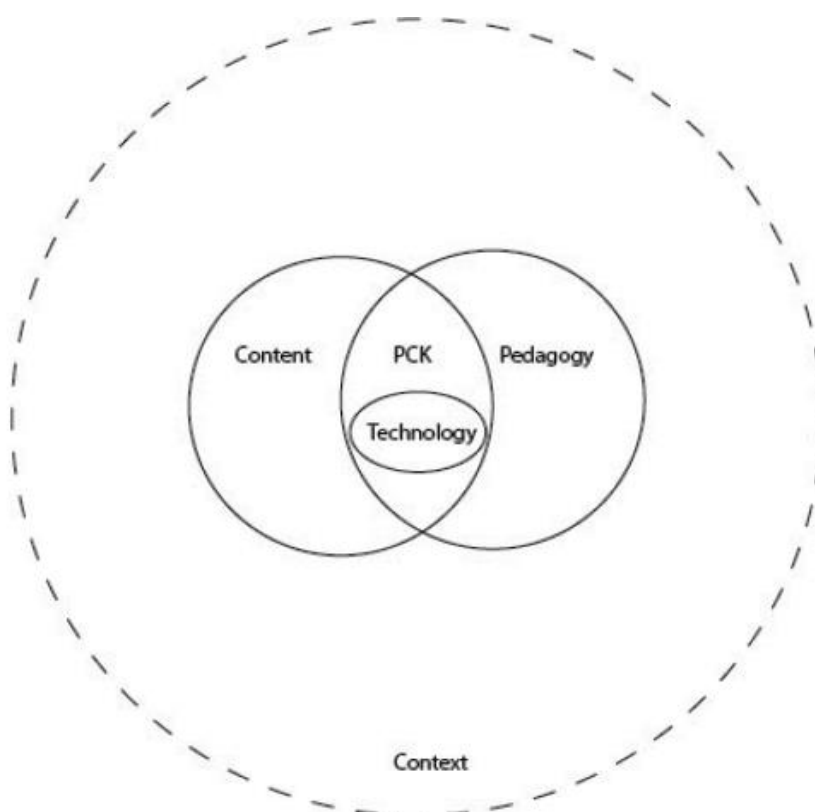


Figure 2.11 Conception of the relationship between technological and pedagogical content knowledge based on Shulman's original PCK framework (Brantley-Dias and Ertmer 2013)

Brantley-Dias and Ertmer (2013) further contend that this reconceptualization of technology as a concentric circle within PCK removes the focus from the technology and places it back within the domain of teaching and learning. Although this conceptualisation shifts the focus away from the technology to consider the way that teachers' knowledge can support learning, Brantley-Dias and Ertmer (2013) argue that it is important to understand what this knowledge looks like in other disciplines. Within this present study, the researcher is interested in how technology knowledge may (or not) support innovative practices within an H.E. context. The concepts relating to technology knowledge and learning discussed here, help in the understanding of how the breakdown of the constituents within the TPACK model contribute to the analysis of knowledge. It remains to be determined in the research as to whether the TPACK model in Figure 2.10 is a useful framework to assist in understanding technology knowledge from a mentor and mentee perspective. Price et al. (2014) argue that the TPACK framework limits their descriptions to classroom practices and does not consider core differences related to learning and teaching practices, making its application somewhat limited in scope. This research is considering a context beyond classroom learning and teaching practices. Consequently, I believe that the TPACK framework may have the potential interpretive characteristics to be able to understand aspects of technology uptake within a wider research context.

In summary for this section, the discussion highlights a need to understand the links between teacher knowledge, pedagogic knowledge and technological knowledge to ensure good final outcomes are reached. The TPACK model and its derivatives offer a framework in which to contextualise and evaluate knowledge. This model may offer a useful framework in which to evaluate mentor/mentee relationships as part of a technological change process.

2.6 Chapter summary

This chapter has highlighted the complexities influencing technology innovation from both the institutional and the person perspectives. From my reading, it is evident that H.E. organisations are constantly dealing with change that is imposed by government initiatives, especially in this modern world where technology is prominent and its usage in education is fundamental. Through the current research I propose that education practice is more systemic, and its presence is not just manifest in mainstream teaching and learning contexts. As such, technology innovation practices and its support to enhance normal working practices, must be considered for all staff, and not just for those at the frontline of classroom pedagogy. In this research, I want to examine the challenges to achieve sustained e-learning innovation practices using a mentoring approach within an e-learning initiative. The aim would be to inform wider judgement about how to influence e-learning development across an institution. The intention is to encompass the whole structure in which all cultural practices in education are located, with an attempt to study the links between aspects of institutional, pedagogic, and personal approaches to technology that foster a sustained approach to adoption.

In Section 2.1, I highlighted in the literature that policy issues regarding technology implementation in teaching and learning contexts were complex, e.g. Kirkwood and Price (2016). Moreover, the review revealed that institutional factors that promote or inhibit technology uptake presented some individual barriers to technology adoption at staff level (e.g. see Reid 2017). In Section 2.2.1, the review concerned models that promoted technology adoption. I argued that the models do not allow for the interrogation of specific aspects of the personal traits displayed by people during the innovation process of interest to this research. These characteristics include the social dynamics and the perception of agency within them, that occur during the innovation process. I want the research to elucidate the attitude and motivational drivers of people engaged in technological innovation, and to capture this through a mentoring process.

In order to contribute to our understanding of the complexities of the change processes described, I propose to implement a case study based within the higher education context, where there are necessities of technology development. The proposed context is an academic School of an H.E institution where the researcher is located. The aim will be to find a group of people willing to develop their expertise with technologies and, with the support of mentors, seek to enhance their practice. In this case, the inclusion of a group of volunteers will be from a School that includes administrative, technical and academic staff with varying confidence with technologies. They will be paired with mentors and they will participate from their own volition as part of a CPD exercise. It is envisaged that the context will attract volunteers (and mentors) with different knowledge of technologies. The difficulties presented here include whether and how far the ideal goal of attempting to change working practices of very busy people is a feasible strategy. It also seeks to understand the impact that volunteer mentors and their influence on supporting the development of e-learning practices. Will people be motivated to take part over a lengthy period of time? Furthermore, will there be resistance to the idea from the School management or the staff themselves? If so, how could these issues be dealt with? To address the concerns identified above and examine the challenges contributing to the issues, this research aims to seek answers to the following research questions:

RQ 1: How do change agents influence technological innovation processes?

RQ 2: How can the influences revealed by technological innovation processes be articulated for application to other technology innovation contexts?

RQ 3: How can the technological change process be evaluated within a voluntary CPD intervention?

Research question 1 (RQ 1.) concerns the mentoring practices of the change agents and will be addressed through the exploration of the mentors, and their interpretation of these actions during the technological innovation process. RQ 2. aims to form an understanding of how the change process is experienced within the context. This is examined through interrogation of the developed relationships between the participants

and mentors during the process of working on the individual technology development objectives. RQ 3. evaluates the process revealed in RQ 2. and attempts to identify methods that contribute to understanding how the change process can be operationalised. For instance, the features (e.g. knowledge, motivation, and personal aims) explored in RQ 1 and RQ 2, are further scrutinised through selected case study projects. These will be chosen to identify any useful attributes that support sustained innovation within the selected projects. These traits will be scrutinised through analysing the unique relationships developed by the mentors and participants concerned. The research questions set the context for the study and established the framework and boundaries for the generation of the data and its subsequent analysis.

Through the answering of the research questions above, the research aims to fulfil the following objectives:

Research objective 1:

To explore the actions of mentors as change agents within an innovation change process to better understand the issues associated with achieving sustainable technology uptake in HEIs.

Research objective 2:

To develop a set of criteria that captures how mentors contribute to technology innovation processes in order to better inform policy makers of the issues to consider when implementing new technologies across HEIs.

A proposal for the implementation of a case study has been made, one which raises many questions about the feasibility of an intervention design and the motivation of participants for being included. The case study proposed is one that seeks the inclusion of a wider range of agents/stakeholders than is normally acknowledged in case study research. The research therefore needs to utilise an analytic model/framework with the ability to interrogate observations reflecting the complexities of individual factors reviewed in Sections 2.3. The model/framework will need to be able to interrogate the

potential tensions between the mentor/mentee pairings as well as address the differences in knowledge that they present themselves through the case study.

Through my reading to determine a suitable framework to act as an analytical tool, I considered solutions such as Tim May's *Situating Social Theory* (May 2008). This publication was useful in providing an overview of options that help to conceptualise frameworks and help in understanding human actions. May (2008) also helped with theorising the differences between individual and collective levels of social interactions. I also considered the use of modern theoretical models that include ethnomethodology and activity theory. These are two frameworks that have been used to measure the interactions between human and computers as reviewed by Rogers (2012). Both models offer more flexibility as analytical frameworks. Ethnomethodology is a social methodology based on making sense of how people produce orderly conduct in normal work settings, and originates from Garfinkel (1967; 1984). In this methodology the focus is on the person and their use of technologies. Activity Theory, on the other hand, is a theoretical framework with a focus on understanding human behaviour in the context of practical activity in a real-world context. Activity Theory as a theoretical framework would appear to be appropriate for the context of the research study outlined. For its potential flexibility of approach and its versatility as a conceptual framework, it is prudent to review activity theory in more detail and consider its historical beginnings and use within educational contexts. Activity theory is reviewed in Chapter 3.

3 – Activity theory as the study theoretical framework

In this chapter I discuss a potential theoretical analytical framework for utilisation in this research study. The proposal for the research investigation to be structured within a case study has been made in Chapter 2. There is much research into the adoption of technologies in H.E. contexts from different standpoints, but I have chosen to use Activity Theory as the overarching framework for several reasons: a) Activity theory is used in work contexts to find solutions to problems and is associated with change in socio-cultural terms; b) It is developmental and therefore able to capture emerging patterns of human activity for the purpose of achieving goals; c) The components within the activity system are able to identify areas of tension through the process of people engaging in the activity. These tensions result in change. The chapter begins with a section outlining the historical background to Activity theory through Cultural Historical Activity Theory (CHAT). This is followed by a discussion about how CHAT concepts were adapted by Engeström through the development of activity system analysis. The chapter concludes with a discussion that justifies the choice of Activity Theory within the research and determines the research questions that will be addressed using activity system analysis.

3.1 Introduction

Activity system analysis is a method of analysing human interactions and contradictions in real world complex environments, which may lead to the development and change of the processes observed. Its origins are based on Cultural Historical Activity Theory (CHAT) and it is an analytical method 'designed to enhance understanding of human activity situated in a collective context (Engeström 1987; Kaptelinin and Nardi 2006). It is a useful tool in qualitative research for understanding practical issues in complex learning environments. It is also useful for its ability to enable the breakdown of complex real-world data into meaningful and manageable parts. Contradictions within Activity

system analysis is the main area of focus for the research context. According to Yamagata-Lynch (2010), activity system analysis provides a framework to build a reliable evaluation of data. Moreover, activity system analysis provides opportunities for investigators to:

- a) Work with manageable units of analysis;
- b) Find systemic implications;
- c) Understand systemic contradictions and tensions; and
- d) Communicate findings from the analysis. (Yamagata-Lynch 2010: 5)

The utilisation of activity system analysis in this research will enable me to understand interactions between the participants during the process of their changing practice of using technologies to enhance working contexts. Once the unit of analysis has been identified within the study, it will be possible to scrutinise relationships between the participants' activities and draw out any systemic implications of learning that occur within the change process. If it is possible to identify the sources of influence in the activity setting, i.e. an area of pressure within the activity, it may be possible to pinpoint a systemic contradiction. The contradictions within the research setting may be the drivers of transformation in subsequent activities, i.e. positive or negative changes of e-learning practice with technologies. The use of activity system analysis is therefore a useful tool with which to report the analysis of data generated. The different components of the activity system are useful to highlight and interrogate any changes found. The flexibility of activity system analysis, as outlined above, convinced me that it offers the ideal analytical framework for scrutinising the activities of the participants during the process of technology innovation and learning within the research context outlined. It is important to learn about the origins of activity system analysis to understand the theory behind its development. The discussion in Section 3.2 will focus on those historical principles of Cultural Historical Activity Theory (CHAT) in general that have strengthened

the reasons for selecting activity system analysis in particular, as the analytical framework for this study.

3.2 Historical principles of Activity Theory

Cultural Historical Activity Theory (CHAT) is a theoretical framework rooted in psychology that originated from the work of Lev Vygotsky in collaboration with A.N. Leont'ev and A.R. Luria in the 1920s to 1930s. The branch of psychology in this work examines the relationship between the organism and the environment in human development (Yamagata-Lynch 2010). CHAT researchers scrutinise human activity as the unit of analysis rather than using a reductionist approach. 'They examine the interactions shared among human consciousness, observable behaviour, and cultural setting through mediated action' (Yamagata-Lynch 2010: 140). Both Sociocultural theory and Activity theory are branches of CHAT. Daniels (2004) explains that they both focus on developing an understanding of learning and development as mediated processes. Sociocultural theory emphasises semiotic mediation because culture and history are embedded within speech e.g. see Wertsch (1985). Activity theory on the other hand, focuses on the activity itself, e.g. see Engeström (2000). Both approaches theorise and aim to provide methodological tools to explore social, cultural and historical factors that characterise how humans operate. This research will concentrate on activity theory, as the focus will be on the activities of the actors and their learning within the activity system.

Vygotsky advocates that learning is not simply a sub-conscious process taking place in the mind; instead human learning is a conscious activity brought about through "psychological tools" or "signs" (Kaptelinin and Nardi 2006: 42). His work focused on understanding the human mind in terms of the processes from which this understanding emerges. The notion of mediation as developed from Vygotsky (1978) also provides the link between mental processes and those of social and historical means. In Yamagata-Lynch (2010) the glossary definition of mediated action is "... a process where individuals

interact with artefacts, tools, and social others in their environment and find new meanings about their world.” (pg. 141). A focus on socio-cultural aspects of people interacting with technologies is developed through the relationships between the different components of their activities. Mediated action through a CHAT perspective supports the exploration of the interactions between the mentor, mentee and the technologies as these interactions develop. It is the relationships between the three that I particularly want to single out for scrutiny.

For Vygotsky, mediated action is represented as a process linking the relationships between *subjects* as the individual(s) engaged in the activity, and the *mediating artefacts/tools* that may consist of actual artefacts, social others, and prior knowledge that contributes to the subject’s mediated action experiences within the activity (see Figure 3.1). In much of the literature the term “tool” is used. However, Cole (1998: 108) suggests that tool is subordinate to the term artefact, which he utilises in his analogies. Cole explains that the notion of “tool” mediation used by Luria in the early work of cultural historical psychology considered tools to incorporate language as a “tool of tools”, as well as functional artefacts such as hoes or plates. Thus, the notion of mediating tools entails putting a function between the action and task. The *object* is the goal of the activity.

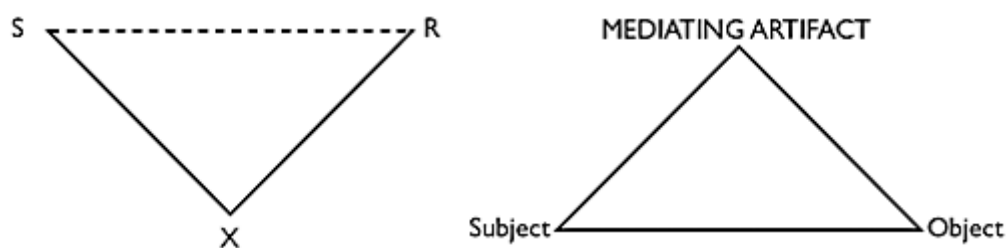


Figure 3.1 Mediating Triangle and its common reformulation. Source: (Engeström 2001)

Various contemporary researchers have developed the mediating triangle e.g. focussing on semiotic means of mediation (Wertsch (1991) or focussing on the activity itself (Engeström (1993).

From a CHAT perspective ZPD is mediation by others. It is a conceptual tool used to understand the complexities involved in human activity while individuals engage in meaning making processes and interact with the environment.

Through acting on things in the world they engage with the meanings that those things assumed within social activity. Humans shape those meanings and are shaped by them. This process takes place within the ZPD. (Daniels 2001: 56)

The zone of proximal development (ZPD) was a concept proposed by Vygotsky to understand the gap between an individual's performance in a task as compared to their performance if they get help from a peer or more knowledgeable other person. Daniels (2001) emphasises that in this context Vygotsky wanted to develop a rationalization for humans to be seen to be '*making themselves from the outside*'. The task of understanding the complex relationships between mentors and mentees and their experiences during the process of innovation, could be loosely applied through ZPD analysis if learning and the development of learning was the principle focus.

The importance of personal motivation from the conception of this research idea was discussed in Section 2.3.1. In the context of ZPD and motivation, Levykh (2008) expanded the work of Vygotsky by suggesting that from the outset the creation of an emotional and positive collaboration was necessary between teachers and students if the establishment and maintenance of ZPD was to be effective. Moreover, Vygotsky used the term "obucheniye" to define the reciprocal relationship between learning and teaching with emotion as a fundamental component for both students' learning and for action within the processes of teaching. Teacher motivation in relation to sharing knowledge demonstrates the nurturing function towards students' developments as learners. Vygotsky maintained that the nurturing process promoted trust towards the teacher and promoted an appreciation of the subject.

A safe and emotionally positive collaboration between teachers and students creates a more complex and a more complete ZPD and motivates the child's further intellectual and emotional development towards its highest level. (Levykh 2008: 92)

This aspect of nurturing and trust in relation to educational development is an important factor in a mentoring context. The process of establishing and maintaining the ZPD is dynamic and encompasses the development of the individual personality. 'Education always denotes a change. If nothing changes, then nothing has been taught' (Levykh 2008, pg 92). Here the ZPD acts as a facilitator and indicator of change and development within the subject. Vygotsky formed links between emotion, motivation and educational development and these traits are facilitated by the relationships developed within a teaching and learning context.

3.3 Construct of Second and Third Generation Activity Theory

Engeström (1987) extended the development of analytical methods within activity theory through the introduction of activity system analysis. This is a further development of Vygotsky's idea of mediation to focus on shared activities. Engeström did this so that there could be analysis of the wider community instead of focussing only on individuals operating with tools. Engeström's model embedded Leont'ev's original subject-object relationship, attributing this addition to second generation activity theory, and changed the analytical components into *subject*, *tool* and *community*. The model was then developed to suggest that the three interactions could be mediated and so proposed the use of three types of mediators i.e. *tools*, *rules* and *division of labour*. This model concept is typically illustrated in Figure 3.2 and described below.

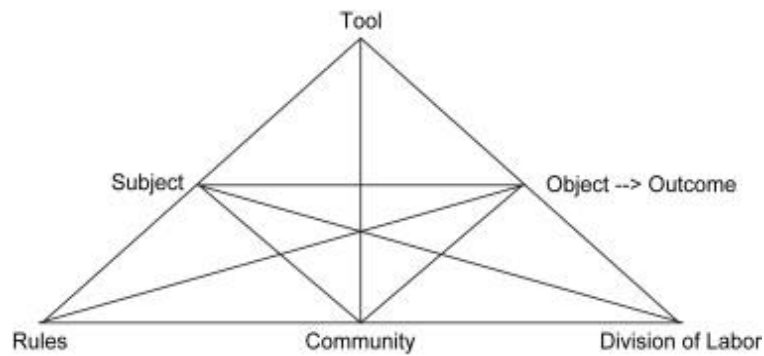


Figure 3.2 The Activity System (Engeström 1987)

Subject, object and outcome

The *subject* of the activity system is the individual or group to be scrutinised and is dependent on the other components of the activity system. The *object* refers to the goals or motives emanating from the subjects' aims to achieve in an activity system, and which achievements are then transformed into outcomes mediated by the physical and symbolic, external and internal tools. Engeström (1999) points out the importance of examining interactions between multiple activities and their boundaries in order to identify potential development and changes in human activity and shared systems.

Tools/mediating artefacts

Tools or structures make activity and action possible. They may be external (such as computers, scissors), or internal (such as concepts or problem solving by trial and error), and they mediate the object of activity. Tools participate in the transformation of the object into a desired or unexpected outcome, and they can also enable or constrain activity.

Community, Rules/Norms; Division of Labour/Roles

The *community* refers to the participants of the activity system that share the same object. The *rules* regulate actions and interactions within the activity system. They may

be formal, written or explicit or less formal, unwritten or implicit. The *division of labour* involves the division of tasks and roles.

The significance of second generation activity theory was its ability to emphasise the link between subjects with their community (Daniels 2001). The impact of contradictions within activity systems for change and development was emphasised by Engeström driven by the work of Il'enkov (see Daniels (2001:89). Il'enkov conceptualised the idea of internal contradictions as the driving force for change and development in activity systems to later guide empirical research at that time (Engeström 2001). The proposal for a third generation of AT came out of the need to "develop conceptual tools to understand dialogue, multiple perspectives, and networks of interactive activity systems" (Engeström 2001: 135). For example, Gutiérrez et.al. (1999) argued that the use of multiple, diverse and conflicting mediational tools creates a 'third space' in which to understand the complexity of learning environments and the potential for these environments to understand transformation taking place within them.

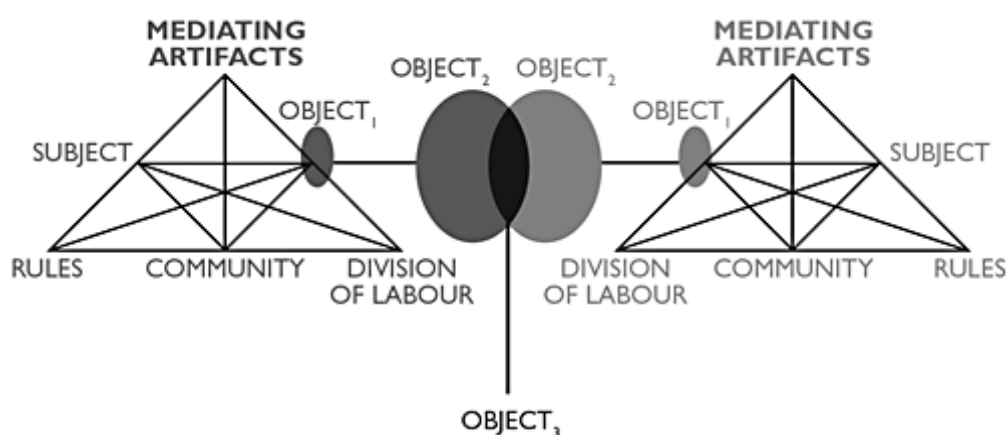


Figure 3.3 Two interacting activity systems as minimal model for the third generation of activity theory (Engeström 2001: 136)

Figure 3.3 reproduced from Engeström (2001: 136), illustrates the model of third-generation AT where there is a minimum of two interacting systems as the focus of analysis. The system consists of the development of a network (minimum two),

interactive tools conceptually designed to understand dialogues, and multiple perspectives on activity systems. This model expands analysis in different directions:

Third generation activity theory expands the analysis both up and down outward and inward. Moving up and outward, it tackles multiple interconnected activity systems with their partially shared and often fragmented objects. Moving downward and inwards, it tackles issues of subjectivity, experiencing, personal sense, emotion, embodiment, identity, and moral commitment. (Engeström 2014: xv).

Engeström (2014) argues that the dual directional approach requires serious research activity to bridge the gap in differences of studying activity systems. Nevertheless, drawing on the work of Daniels and Engeström, I concluded that the third generation activity system resonated more with the present research focus. Third generation activity system analysis provides the opportunity for this research to investigate the multiple perspectives operating within the study. Moreover, the activity model provides the opportunity to drill down and scrutinise the individual relationships as they developed within the context.

An important feature of the present research design is ability to interpret and understand what is happening in terms of the learning activities between the participants during the process of innovation. According to Engeström's model of third generation activity theory (2001: 136), interventions result in contradictions and struggles leading to the analysis of power and control within two activity systems. The model uses the contradictions that exist in system as the focus for the analytical process. These are noted as five key principles:

1. The first principle and the main unit of analysis in activity theory is the **activity system**
2. The **multi-voicedness** of activity systems is the second principle and refers to the community of people with different opinions, interests and perspectives. The different histories of people mean that people will interpret the division of labour in various ways. The different perspectives may result in "a source of trouble and a source of innovation, demanding actions of translation and negotiation (Engeström 2001: 136).

3. The third principle is the **historicity of activity**. Activity systems change and transform over time. It is important to understand these past changes before they can be evaluated against the current context and any suggestions applied.
4. **Contradictions** are the fourth principle and the driving force of change and development in the activity system. Contradictions are not the same as problems or conflicts. Contradictions are historically accumulating structural tensions within and between activity systems.
5. Transformation is possible in activity systems which is the fifth principle of activity. As tensions arise within the activity system, participants question the established norms which lead to possible changes. "**An expansive transformation** is accomplished when the object and motive of the activity are reconceptualised to embrace a radically wider horizon of possibilities than in the previous mode of the activity" (Engeström 2001: 137).

How the five principles are applied in the present research is discussed in Chapter 6. The next section discusses the usefulness of AT as an analytical tool for the study.

3.4 Usefulness of Activity Theory

The process of examining obstacles to technology innovation within an H.E. context, may present challenges during the implementation of institutional change policies on the part of the end-users. Through the identification of such challenges it is also important to reveal any contradictions that may occur. Identifying systemic contradictions and tensions within activity systems helps researchers to exemplify and discuss changes in activities. This in turn 'can drive the transformation in future activities and portray how human activities are tied to several complex phenomena in a natural setting rather than predicting a causal relationship between observed behaviour and isolated variables' (Yamagata-Lynch 2010: 8). Murphy and Rodríguez-Manzanares (2008) offer a further insight into how AT and its principle of contradictions guide research in educational technology. They argue that:

One of the strengths or advantages of AT is how it offers a broad lens of inquiry that encompasses various aspects of the educational setting such as students' and teachers' backgrounds and perspectives, the whole institutional setting, and the evolution of the activity system over time. (Murphy and Rodríguez-Manzanares 2008:453)

This is a very important assertion in the context of the proposed study, in that AT offers a framework that is flexible enough to consider the different aspects of activity within the School setting where the research is situated. Indeed, Yamagata-Lynch (2010) promotes the use of activity theory as an analytical framework for its ability to help researchers to:

- a) Work with a manageable unit of analysis,
- b) Find systemic implications,
- c) Understand systemic contradictions and tensions, and
- d) Communicate findings from the analyses. (Yamagata-Lynch 2010: 5)

AT provides the opportunity to build up reliable interpretations of data through the analysis of human activity, i.e. the unit of analysis within the identified human context. This reliability is based upon the identification of a trustworthy unit of analysis. (The trustworthiness of the research is discussed further in Section 4.3). Thereafter, researchers can determine relevant multiple activity systems and identify relationships between the activities to find systemic implications. AT is selected for its utility and flexibility to manage units of analysis, and its ability to investigate multiple perspectives within the context. Moreover, AT has the capability to act as a framework in which to understand tensions and contradictions within an activity system. As the research is centred on gaining knowledge through mentorship and the relationships formed during the process of technological innovation, the analysis of contradictions within the activity system will be of utmost importance for the analysis of the data. This approach will then enable the communication of findings in a systematic manner.

3.5 Chapter summary

This chapter has discussed the choice of activity theory as the main theoretical framework for the analysis of data in this thesis. The proposed research takes place within an institution considering actions to mitigate barriers to technological change while considering mechanisms that support the implementation process of innovative practices using a mentoring approach. At the time of establishing the parameters for this study, there was little research that examined factors relating to problems associated

with the promotion of sustained technological innovation using a mentoring approach during that innovation process. A substantial amount of research focused on the technology itself or the institutional context from which the e-learning policies originated. This review of literature has identified a gap in knowledge that concerns the innovation process from the wider institutional context that includes administrators who play a significant role in the student experience. The social dynamics and the perception of agency within them, that occur during the innovation process will be examined. I want the research to elucidate the attitude and motivational drivers of people engaged in technological innovation, and to capture this through a mentoring process. The research aims to be able to offer an alternative approach to technology innovation development practices using mentoring, that bridge the gap between top-down innovation policy administration, and work-related factors that contribute to poor adoption of innovative practices in the education workplace. In Chapter 4, I discuss the design and methodology that underpins this research.

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4 - Research design and methodology

*In this chapter I outline the methodological foundations and the design to be utilised within the study. The chapter presents the development of the research methods that serve the research questions and the aims and objectives developed in Chapter 2. It comprises four main parts. Section 4.1 reviews the setting for research, comprising Section 4.1.1 which describes **the project** (thereafter known as the **ePioneers project**), which is the overarching setting for **the research study** in this thesis. Section 4.1.3 outlines a number of distinct initiatives within the project (hereafter called the "**Project cases**"). Section 4.1.4 profiles the project mentors, and Section 4.1.5 profiles the ePioneers. The research ecology concludes with Section 4.1.6 which outlines the investigation of the research study and contextualises the problem identified from the research questions in relation to the cases within the project. Next, Section 4.2 considers the research strategy which includes a discussion of the fundamental features of the socio-constructivist methodology that underpins the theoretical approaches taken within the research. This section proposes a qualitative methodology and case study approach to interrogate the cases within the research study. Sections 4.3 positions the role of the researcher within the study, Section 4.4 evaluates the study design and Section 4.5 presents the ethical issues that needed consideration.*

4.1 The research ecology

In this section I provide the reader with an understanding of the setting and participants that provided the context for the research study. The section outlines the background to setting up the project and its strategy. This is followed by detailing the project cases, the mentors that supported the cases, and the ePioneers themselves. Finally, the section outlines the study itself.

4.1.1 The ePioneers Project

I start this chapter by providing a scaffolding for the research reported in this thesis through an account of the overarching project in which the present research is set. The study in this thesis is based upon a 2-year project in the School of Education at the Institution called the 'ePioneers project'. Table 4.1 lists the types of participant and the roles they play within the project. The participants are all volunteer staff members from the School. The **eStrategy group** set up and ran the project; the **mentors** consist of the five eStrategy group members together with two volunteer staff members recruited for their expertise in several of the ePioneer projects. The **ePioneers** are staff members from the School who responded to a call for volunteers wishing to enhance their use of e-learning technology for their individual work contexts. The next paragraphs outline the aims and structure of this ePioneers project.

Table 4.1 Membership of the ePioneers project

Project member(s)	Role in the ePioneers project
eStrategy group members	• A group of five e-learning early adopters with different job roles in the School • Set up and manage the ePioneers project • Act as mentors to the ePioneers and support the development of the projects
Mentors	• Five eStrategy group members together with three other volunteer staff members with suitable expertise to support the ePioneers
ePioneers	• Volunteers recruited from the School who want to develop their practice with e-learning for continuing professional development (CPD)

The driving force behind the ePioneers project was the School e-Strategy group of which I was an active member. This group consisted of five e-learning early adopters with different roles within the School, each with the common desire to improve the use of e-learning by the staff across all areas in the School. The e-Strategy group recognised that within the School there were pockets of good e-learning practice, however, they wanted

to engineer a situation where innovative practices became routine across all areas of the School. The ePioneers project aimed to investigate the conditions leading for sustained innovative practices using a mentoring approach.

4.1.2 The ePioneers project strategic plan

The e-Strategy group submitted a policy document to the School Executive Team that aimed to strategically include e-learning as part of the School Plan for 2006-2009. The document in Appendix 9.1 **School of Education e-learning policy**, is the policy document that was submitted as part of the School plan for 2005-2009. The policy comprised of a vision whereby the School staff would be integral to the School's e-learning development goals. The policy advocated the need for the School to shift from a culture of e-learning where staff supported each other in small pockets of e-learning development, to a situation where e-learning innovation was a standard procedure across the school. The main terms of reference for the vision were as follows:

1. Include as many people in the School as possible (academic, technical and administrative staff) to allow the utilisation of a range of developmental tools.
2. Recruit "ePioneers" and a small number of mentors who would be split between the ePioneers, to work with technologies new to them.
3. Identify 4-5 e-learning development themes
4. Invite two ePioneers to join each theme.
5. Disseminate successes to the wider University and share good practice.
6. E-pioneer projects should yield impressive results and enhance learning and teaching for a minimum of staff time.

The ePioneers would be identified as working with (or wanting to work with) e-learning technologies, but *not* be recognised as technology experts already engaged with e-learning in some way. The policy was approved by the School Executive Team and written into the School plan for 2005-2009. Following this approval, this vision was converted into a University Learning and Teaching bid for funding which included all the points in the list above. The e-Strategy group successfully won funding for two years

from the University Learning and Teaching Fund to operationalise the e-learning strategy through the bid as 'the ePioneers project'.

Having outlined the context and background to setting up the ePioneers project, the next task is to explain how the potential participants and their unique e-learning project initiatives (the "**project cases**") were selected for inclusion within the ePioneers project. This is covered in section 4.1.3 below.

4.1.3 The Cases within the project

In this section I describe how the unique e-learning initiatives, hereafter known as the "project cases", were selected for inclusion within the ePioneers project. The section also explains the background to how the mentors were assigned to each project case. The details of the cases themselves will be explained in Section 4.1.5.

The e-Strategy group launched 'The ePioneers project' in July 2006 through a series of awareness-raising activities: e.g., the School staff meeting (Appendix 9.7), an invitation posted on the School intranet, via email, research newsletters and posters. In addition, each member of staff was personally invited to take part through individual flyers posted in their personal mail pigeonholes (Appendix 9.8 Invitation to ePioneers project

). The flyers outlined the aims of the project and invited members of staff to become ePioneers to trial 'quick-gain' e-learning applications relevant to their own work context. Each ePioneer would be paired with a volunteer mentor from the School who would offer support, ideas, and provide technical assistance. Interested staff members were invited to an informal lunchtime launch meeting where the three main aims of the project were explained. The interested attendees were informed that the project aimed to:

- Promote practical outcomes (e.g. administration/teaching & learning material efficiencies, – quick gains by putting together pairs/clusters of people to find solutions using technology now available.
- Generate examples of such ideas - gather all members of staff together so all feel confident to move forward with these new initiatives.
- Outline the conditions for the funding and transferability of the outcomes - the funding required that the projects were to be turned into guides/guidance for other departments across the University. Their initial internal commitment would become a University commitment.

All the interested parties were required to complete an initial project Proforma (Appendix 9.10) that outlined the aims of their project case, the 'quick gain' to be achieved, the contribution to the School, any resourcing requests, and their project evaluation criteria. The completed proformas enabled the e-Strategy group to consider the individual ideas submitted. Of the 22 project proformas received, 7 potential projects withdrew for various reasons before the launch. The remaining 15 projects were approved, and these would form the "Project Cases" that the research study is based upon. Table 4.2 (A & B) show a list of the project and an outline of the aims.

Table 4.2 The ePioneer projects A

ePioneer number	ePioneer project case name	Project case aims
1.	Window to the World	Development of 'fast track' training sessions for new Video Conferencing users
2.	Using Interactive White Boards (IWB) in PGCE Maths Sessions	Create PGCE Maths Sessions Using The IWB
3.	Enhancing distance doctoral supervision	Enhance distance doctoral supervision via synchronous interactive collaborative technologies such as SKYPE

4.	Video Podcasting of CDRG seminars	Production of video podcasts
5.	Podcasting: TESL Talk	Production of 15 podcast conversations/interviews recorded, described, transcribed, uploaded to <i>SharePoint</i> , linked to articles, available for play/mp3 download
6.	REVISE Teaching practice	Video recording of 20 MA English Language Teaching (Distance learning) (ELTD) students to produce microteaching clips for self-reflection. Student feedback posted online in <i>Pebble Pad</i> web folios
7.	Development of Support Material for BA Fine Art	To set up module packages, using WebCT (online virtual learning environment) to enable current students to access academic material and additional information and discussion opportunities between taught sessions

Table 4.3 The ePioneer projects B

ePioneer number	ePioneer project case name	Project case aims
8.	Certificate in Art History – e-learning/distance learning	Art History Certificate distance learning pilot using WebCT
9.	Encouraging learning from a website	To stimulate MA TESOL students to make use of a website providing academic writing support by embedding it in course provision.
10.	'Managing WebCT'	Focus group feedback about e-learning materials in the Flexible PGCE course, (facilitated by ePioneer funding), has led to the setting up of a new Initial Teacher Education (ITE) committee working group, 'Quality Assurance in E-Learning' (QAEL).
11.	Autonomy in Language Teaching and Learning	Develop on-line resources for autonomous learning at postgraduate level.
12.	Local History Portal Group	Students use portal to post local history resources
13.	Email Newsletter	Produce an email newsletter to maintain awareness of courses in the minds of enquirers i.e. potential students, and encourage enrolments
14.	Research Education Students Peer Online Network Support Environment (RESPONSE) *	To establish an on-line network collaboration between overseas part-time students to support their research
15.	Electronic Submission/ Tracking of Coursework	This project aims to improve the tracking of submitted coursework and is currently re-mapping procedures following the introduction of numeric marking within the School.

It is interesting to note here that the expectation of Item 3 of the vision '*to identify 4-5 e-learning development themes*' (see Section 4.1.1), was subject to the e-Strategy group strategically identifying e-learning themes that would be beneficial to the School's efficiency. However, the group concluded that the participants themselves were in the best position to understand the aspects of their work that they wanted to enhance with technology, even though they may not know how or what e-learning tools to utilise.

4.1.4 The ePioneer project mentors

The review of mentoring and coaching literature in Chapter 2, sections 2.4.22.4.2, highlighted the value of fostering a mentoring or coaching approach to support technological innovation based on the mentors' knowledge and expertise. The project cases identified in Section 4.1.3 were split between the 5 e-Strategy group members (including myself). Each eStrategy group member was assigned to act as a mentor for one or more of the projects. A further three mentor volunteers were recruited from within the School to support the remaining cases. Their selection was based on their interest and knowledge in those particular areas of e-learning required. None of the mentors (including the eStrategy group mentors) were necessarily professional specialists in IT, nor were they especially recruited to be so. Moreover, the project mentors were not specifically trained for their roles in supporting the ePioneers. Nevertheless, they all possessed enough knowledge and confidence as e-learning early adopters to be able to support the ePioneers with meeting their project objectives.

The ePioneers project mentors were invited to their own briefing session after the project launch. At this session, the mentors were provided with their own briefing guide (Appendix 9.2 **Briefing for the mentors document**). The document provided a guide to mentoring a colleague new to e-learning, the challenges and the practicalities of the role. The mentors discussed the document, which allowed them to exchange ideas and form strategies about their approaches to supporting their mentees after they commenced working with their ePioneer cases. Furthermore, the mentors agreed that their roles in the project should be reviewed regularly and that they should each reflect on their roles within the process. This would be achieved through regular posts on their progress using the reporting blog agreed at the meeting launch.

During the project briefing session, the mentors had the opportunity to meet with their ePioneers and have an initial discussion. It is through the research that the different approaches to mentoring, and the knowledge and expertise gained during the

development process will be evaluated through activity system analysis. Each aspect of the division of labour and rules and regulations determined by the participants within the new e-learning community will be scrutinised. In addition, any tensions that develop will be scrutinised.

All the mentors were staff from the School and so did not need to adjust to an unfamiliar working environment, which might be the case if the mentors were drawn from sources outside the School/institution. In order to provide an idea of the regular job role and e-learning expertise offered by the mentors, Table 4.4 shows the mentors and their normal job positions within the School, together with the expertise they offered in support of the ePioneers' projects.

Table 4.4 Mentor e-learning credentials

Project Mentor (PM)	Job family	Job role	e-learning expertise
PM1	TS	A newly appointed academic	Background in computer science research
PM2	TS	A University IT technician servicing the campus	General technical support
PM3	RT	A senior academic	Leader of Learning and teaching
PM4	RT	A senior academic e-learning researcher	Expert in digital and mobile technologies
PM5	RT	A senior academic e-learning researcher	Expert in intranet portal systems
PM6	APM	An academic-related undergraduate IT courses coordinator (the researcher)	IT trainer
PM7	APM	An administrative team leader	General IT expertise to manage administration teams
PM8	APM	An administrative team leader	General IT expertise to manage administration teams

The mentors, as shown in Table 4.4, were experts in their own contexts and some had published in the general field of educational technologies (e.g. PM1, PM4, PM5, and PM6). Some were experts in the specific technology for the projects they were mentoring. PM4 was an expert in digital technologies and PM5 was an expert in intranet portal technologies. The remaining mentors (PM2, PM6, PM7, and PM8) were knowledgeable in e-learning to be able to act as critical friends and provide comprehensive mentoring support.

In this section of the chapter, the aim has been to provide the reader with an understanding of the setting and participants that provided the context for the research study. Sections 4.1.1 outlined the context for the ePioneers project; Section 4.1.3 identified how the cases within the project were selected; 4.1.4, how the project mentors were identified. Next, Section 4.1.5 situates the ePioneers and their project cases within the study context.

4.1.5 The ePioneers

In Section 4.1.4, I explained the role of the mentors in the ePioneers project. In this section, I provide some information about the ePioneers, their projects, and the job families they belong to in their normal job roles. I want to establish a profile of each of the ePioneers in order to evaluate within the research, whether their normal job roles had an influence on how they interacted with their mentors during the development of their project cases. This is a very important step, as it allows for the identification of any tensions that might result in contradictions through activity system analysis. All members of the School were invited to participate in the ePioneers project (see Section 4.1.3, The Cases within the project). The project aimed to be inclusive to all staff so that e-learning technologies could be developed across all areas of the School. The project drew participants from academic, technical and administrative staff. All of the ePioneers project participants volunteered to participate as a CPD initiative.

There are four job families operating within the University, namely, Research & Teaching (RT), Administrative, Professional and Managerial (APM), Technical Services (TS), and Operations & Facilities (O&F). Role holders in the RT job family are mainly engaged in research and teaching to include leadership, management and the administration of these activities; those in the APM family provide services to support staff, students, systems and resources both internal and external to the university; TS employees provide technical expertise and specialist skills. The O&F family was not chosen for this study. Within each job family staff have different levels of freedom to make decisions. The scrutiny of job roles and the related freedom of the participants to act provides the opportunity to measure the management of e-learning processes and their support through the activity system. Table 4.4 shows the credentials of the mentors. Each mentor selected a project(s) to support based on their personal interest and their perceived ability to support mentees. Table 4.5 (A + B) provides a summary of the ePioneers in each case study project. The job family and job role of each ePioneer is shown together with a brief description of the aims of each case study project. In addition, the job family of the mentor that supported each ePioneer is also shown.

Table 4.5 Composition of the ePioneers and their project cases(A)

ePioneer number	ePioneer job family and job role	ePioneer project case name	Project case aims	Project case Mentor (PM)	Project case mentor job family
1.	TS Educational technician	Window to the World	Development of 'fast track' training sessions for new Video Conferencing users	PM1	TS
2.	RT Academic	Using Interactive White Boards (IWB) in PGCE Maths Sessions	Create PGCE Maths Sessions Using The IWB	PM 2	TS
3.	RT Academic	Enhancing distance doctoral supervision	Enhance distance doctoral supervision via synchronous interactive collaborative technologies such as SKYPE	PM 3	RT
4.	RT Academic	Video Podcasting of CDRG seminars	Production of video podcasts	PM 4	RT
5.	RT Academic	Podcasting: TESL Talk	Production of 15 podcast conversations/interviews recorded, described, transcribed, uploaded to <i>SharePoint</i> , linked to articles, available for play/mp3 download	PM 4	RT
6.	RT Academic	REVISE Teaching practice	Video recording of 20 MA English Language Teaching (Distance learning) (ELTD) students to produce microteaching clips for self-reflection. Student feedback posted online in <i>Pebble Pad</i> web folios	PM 4	RT
7.	RT Academic	Development of Support Material for BA Fine Art	To set up module packages, using WebCT (online virtual learning environment) to enable current students to access academic material and additional information and discussion opportunities between taught sessions	PM 5	RT
8.	RT Academic	Certificate in Art History – e-learning/distance learning	Art History Certificate distance learning pilot using WebCT	PM 5	RT

Job family
Research & Teaching (RT)
Administrative, Professional and Managerial (APM)
Technical Services (TS)
This study researcher (APM Researcher)

Table 4.6 Composition of the ePioneers and their project cases (B)

ePioneer number	ePioneer job family and job role	ePioneer project case name	Project case aims	Project case Mentor (PM)	Project case mentor job family
9.	RT Academic	Encouraging learning from a website	To stimulate MA TESOL students to make use of a website providing academic writing support by embedding it in course provision.	PM 5	RT
10.	RT Academic	'Managing WebCT'	Focus group feedback about e-learning materials in the Flexible PGCE course, (facilitated by ePioneer funding), has led to the setting up of a new Initial Teacher Education (ITE) committee working group, 'Quality Assurance in E-Learning' (QAEL).	PM 5	RT
11.	RT Academic	Autonomy in Language Teaching and Learning	Develop on-line resources for autonomous learning at postgraduate level.	PM 6	RT
12.	APM Part-time tutor	Local History Portal Group	Students use portal to post local history resources	PM 7	APM (Researcher)
13.	APM Administrator	Email Newsletter	Produce an email newsletter to maintain awareness of courses in the minds of enquirers i.e. potential students, and encourage enrolments	PM 7	APM (Researcher)
14.	APM Administrator	Research Education Students Peer Online Network Support Environment (RESPONSE) *	To establish an on-line network collaboration between overseas part-time students to support their research	PM 7	APM (Researcher)
15.	APM Administrator	Electronic Submission/ Tracking of Coursework	This project aims to improve the tracking of submitted coursework and is currently re-mapping procedures following the introduction of numeric marking within the School.	PM 8	APM

Job family
Research & Teaching (RT)
Administrative, Professional and Managerial (APM)
Technical Services (TS)
This study researcher (APM Researcher)

Project case 1 ePioneer was an experienced educational technician who provided technical support for the academic team they worked with. They wanted to develop video conferencing technology to support the work of the post-graduate teaching team. Project case 2 ePioneer was a senior lecturer of postgraduate teaching courses. They wanted to develop interactive whiteboard technology for teacher training purposes. The majority of ePioneers (3-11) were academics wanting to develop their teaching courses within the School. Their projects were aimed at developing teaching pedagogy. ePioneer 12 was a contractual part-time tutor who wanted to develop their very limited knowledge of the role of technology in teaching, whilst ePioneers 13 and 15 are administrator team leaders within the School. They wanted to develop the administrative processes within the teams they managed. In Section 4.1.6, I explain how the ePioneers project and the cases within it form the basis for the embedded research study that this thesis is based on.

4.1.6 The research study

In Chapter 1, Section 1.2, I argued that technology mediates a wide range of educational practices and stressed the importance of acknowledging its wider dissemination into mainstream education. As such, I emphasised the need to support technology innovation practices across all areas of HEIs. Moreover, I pointed out the lack of sustained innovative practices in the HEI context where I worked. I therefore proposed the use of mentoring to both encourage more innovation and to acknowledge the need to support innovative practices. The literature review supports the view that technology innovation may be inhibited by a lack of technical support, but also points out that other work-related factors, (e.g. institutional and individual barriers, or pedagogic issues) (see Birch and Burnett 2009), may also play a part. Kirkwood & Price (2016: 6) points out that there are now many factors that determine effective technology adoption. However, they also argue that there is little literature that discusses teachers' beliefs about the processes of teaching and learning, and how those beliefs are actualised within

their teaching practices. However, this research study seeks to broaden the argument about effective technology adoption by focusing on ways to understand and support the beliefs of users during the innovation process.

This study utilises the 15 cases within the ePioneers project to investigate institutional and pedagogic issues to promote sustainable innovative practices using a mentoring approach within an H.E. School context. It is important to note that this research study was undertaken in 2006 at the start of a period during which government-funded bodies were pushing for e-learning innovation in HEIs (see Chapter 1, Section 1.2). At that time, E-learning policies often included the dissemination of new technologies such as virtual learning environments (VLEs), learning management systems (LMS), or regular implementation of new computer software e.g. Microsoft Office™. The launch of such technologies was usually accompanied by some form of technical support but from personal experience this support often fell short of knowledge that supported the pedagogic application of the technology.

The research adds to knowledge by studying a range of practice and practitioners in order to develop a mentoring process that meets their needs with technology innovation. Also, it considers the extent to which the impact of the diversity of technology on teaching and learning can be addressed, by considering how the process of innovation might be supported by staff expert users of these technologies. By developing a mentoring approach, the research might help to understand the socio-cultural processes that occur if innovation is to progress.

To sum up, this section has contextualised the present research study by explaining the context of the ePioneers project in which it was embedded. The ePioneer participants and their mentors were identified. The next section discusses the underlying theoretical approach taken for the present study, and methodology that will underpin the choice of methods suitable to the questions posed.

4.2 *The research strategy*

4.2.1 *Different approaches to research investigation*

In this section, I first discuss the main perspectives on how knowledge can be generated. I then outline my approach to the issues that impact the methodology and methods to be utilised in this research study. One of the reasons for conducting educational research is to improve practice (Atkins and Wallace 2012):

...'We carry out research into education in order to help us – and others – to s better understanding of what constitutes effective teaching and learning'... In the end the purpose of the enquiry – the use to which its discoveries are put – will normally be to improve the effectiveness of our professional practice and the systems within which we operate to support learners in their learning. (Atkins and Wallace 2012: 12)

Researchers adopt different perspectives on the nature of knowledge and how it can be generated and reported. For this reason Pring (2015) argues that "researchers must be eclectic in their search for the truth" (pg. 46). Pring's assertion refers to the fact that researchers disagree about assumptions behind a research method and about the most effective way to proceed with research. Researchers must therefore choose an appropriate research approach based on their own belief system as it relates to investigative purposes. The choices of research methods are based on the researcher's epistemological position (different underlying theories of explanation of truth and verification), and ontological position (different world views). Research approaches may include observation, experiments, surveys, interviews, case studies, and historical inquiry. These research approaches generally separate into distinctive paradigms. Common research traditions include functionalism, interpretive theory, phenomenology, ethnomethodology, ethnography, constructivism, and postmodernism.

Of these paradigms, two of the most debated within the research philosophy literature are positivism and its counterpart interpretivism (Denzin and Lincoln 2011; Lincoln and Guba 1985; Merriam 1998). The positivist view of reality is based on pursuing an objective way of gaining knowledge of people's action through the identification and documentation of facts-about-the-world. Atkins and Wallace (2012) define a positivist

approach as one that objectively investigates facts utilising a scientific approach to reporting generalisations. An interpretivist view on the other hand, believes that to understand people's action requires analysis of the interpretations they give to what they are doing. Interpretivists scrutinise the opinions and shared meaning of people. Interpretive studies typically investigate through fieldwork in natural settings, notes and transcripts of interviews or conversations (Wellington 2015: 27) and focuses on people as individuals and groups, and reports their histories, personal accounts and their interactions. Interpretivist researchers do not reject positivist research approaches, but they are particularly interested in the meaning construction of research participants. My research lens is firmly based on understanding how innovation with technologies can be supported through mentoring by capturing the learned experiences of the participants during the innovation process. By gaining an understanding of the feelings and views of the participants as they emerge through the process, I firmly consider that the research takes an interpretivist approach. The philosophical underpinnings that will apply to the selection of the interpretivist approach for this research study will be discussed in the following section.

4.2.2 The ontology and epistemology of the research study

This section outlines my own ontological and epistemological position within this research. By gaining an understanding of these assumptions, the reader will understand the method and data collection techniques that are central to this research study.

The ontological interpretation of social constructivism is that multiple realities are constructed through lived experiences and interactions with others. It is my view that these realities can be constructed through following the experiences of the ePioneers and mentors whilst monitoring their learning experiences at specific time points during the process of them developing their initiatives. I believe that the solicited reflections referring to the ePioneers and mentors' experiences will be important for determining their views of technological innovation. I think that knowledge regarding the ePioneers'

experience of mentoring will emerge from the research findings, through the interpretation of their individual experiences as they build relationships with their mentors. This will take the form of monitoring the developing of mentor-ePioneer relationships, whilst the ePioneers develop their expertise with their preferred technologies. By taking this approach, the intention of this research is to provide a rich picture of the socio-cultural processes that contribute to fostering an approach to sustainable technology innovation across the HEI context. As this research involves following the interactions of ePioneers and mentors over a prolonged time period, an interpretivist approach is appropriate to be able to analyse the nuances and tensions within the relationships as they develop. This close interaction with the study participants will capture incidences of the human experience, so that the more tangible and unpredictable mentor and ePioneer interactions may be extracted from the data. The trustworthiness of this type of data gathering is managed through the various methods used to gather the data. These are based on a suitable methodology which is discussed below. The methods based on this methodological choice are covered in Chapter 5.

4.2.3 Case study approach

Wellington (2015) defines methodology as 'the activity or business of choosing, reflecting upon, evaluating and justifying the methods you use' (pg. 33). Further, the role of a methodology commitment is to highlight the limitations and to scrutinise and/or evaluate the methods available. The research intends to critically explore the experiences of technology users and, as they are supported by mentors, to understand the issues that contribute to the complexities of technology innovation in the workplace of HEIs. The fieldwork in this research study therefore requires a method of analysis capable of investigating, in detail, a group of volunteer higher educationalist users and their mentors. The scenario consists of administrators, technicians and academics who are not confident with technologies but have taken an active interest in participating in a CPD initiative to enhance their use of technologies within their respective work contexts.

Indeed, each participant submitted a written proposal outlining their aims and objectives for the project (Appendix 9.10).

The Case Study approach provides an appropriate platform in which to explore in detail, and break down the complex issues relating to the formation and maintenance of the relationships that emerge from the project cases as they develop. The case study as a methodological approach is defined by the following researchers according to discipline and purpose:

- A methodological choice (Stake 1995; 2005),
- A specific approach to research, (Yin 1984; 2013)
- The final product or narrative of a qualitative study (Creswell 2013).

There are also differing philosophical orientations between Stake's and Yin's case study approaches (Boblin, et al. 2013). Yin's (2009) post-positivist orientation supports the use of a formal conceptual framework, where propositions are tested when data is collected and analysed. Stake's constructivist approach provides an interpretive platform in which to analyse the interactions and motivations of the participants, whereas Yin's rigid propositions makes it less possible to interpret process as it happens. This research adopts Stake's constructivist orientation for the analysis to facilitate the interpretation of data that may emerge from recording the mentor-ePioneer interactions during the innovation process. This more flexible interpretivist approach will help to guide the interpretation of the developing relationships through the continuing innovation process. It is therefore appropriate that a research study will be based on a longitudinal cross case analysis of multiple project cases. Stake's (1995) collective case study approach is selected because of the flexibility. The approach is described thus:

The collective case study 'is not the study of a collective but an instrumental study extended to several cases. Individual cases in the collection may or may not be known in advance to manifest the common characteristic. They may be similar or dissimilar, redundancy and variety each having voice. They are chosen because it is believed that understanding them will lead to better understanding, perhaps better theorising, about a still larger collection of cases. (Stake 1994: 237).

The choice of Stake's approach is further justified because it can be used to interpret the data from the individual cases and their implication within the entire case study.

Moreover, the multi-method approaches involved in collecting the data would help to ensure that the findings are trustworthy.

To provide a clear perspective on the pathway used to provide knowledge of the issues under scrutiny within this research, Table 4.7 outlines the different research elements to construct knowledge under discussion in this research context.

Table 4.7 The research elements for knowledge construction

Research design element	Definition	My research paradigm
Ontology	What is there to learn in this context?	What are the experiences of learning in the process of technological innovation from the reflections of ePioneers and mentors?
Epistemology	What/how can I learn about it?	Interpretivism. Constructing knowledge from the reflections of the mentor/mentee experiences through their developing relationships during the process.
Methodology	How do I proceed to gain that knowledge?	Interpretivist approach
Method	What specific procedure was utilised?	Collective case study
Data	What specific instruments were used to collect the data?	ePioneer and mentor interviews Observation Show and tell Delphi technique

My pathway to gaining knowledge about the process leading towards sustainable innovation practices with mentoring, through the reflections of the ePioneers and mentors during the innovation process, was guided by a pattern linking ontology (what I wanted to learn within the context), epistemology (how I could learn about it), methodology (the procedure taken to gain that knowledge), and the method (the specific procedures utilised). In this context it was important for me to learn from the

experiences of the participants themselves. Thus, the data collection instruments were selected to facilitate the discovery and interpretation of data directly from the participants. At this point I have outlined my ontological, epistemological position and methodological positions. The next section will cover the other aspects of this research ecology, namely, reflexivity and ethical challenges.

4.3 Reflexivity

In Section 4.1.4 my role in the ePioneers project as both e-Strategy group member and mentor (PM6) was noted. It is clear that my chosen position as a researcher is firmly inside the research context. In this section I contextualise my role as researcher within the research study and set the boundaries of that role within the research.

Within the literature there are many examples of terminology that define a researcher's position as an 'outsider' or 'insider' within a study context. However, in practice, such a clear sense of an insider position is hard to describe as only one role within a specific research context. In the context of education research, the 'insider researcher' is best described as one who undertakes research within his or her own school, university or education department. According to Atkins & Wallace (2012), this position fits the researcher's scale of insiderness/outsiderness when corroborating with the Teaching and Learning Research Programme (TLRP) framework. However, Trowler (2011) points out that 'insiderness' cannot be fixed when conducting research within HEIs because the research may be concerned with previously unknown aspects of an institution that is currently being researched. Further, Thomson and Gunter (2011) argue against the notion of fixed insider/outsider researcher identities during the research process, proposing that the researcher identity is fluid, shifting between insiderness/outsiderness. These arguments in the literature highlight the difficulty of determining a researcher's level of insiderness within HEI contexts such as the present study, where the researcher has multiple roles. Indeed, Wellington (2015) argues that educational research is different from mainstream scientific research such that it should aspire to be 'systematic,

credible, verifiable, justifiable, useful, valuable and trustworthy' (Wellington 2015).

Consequently, the validity and reliability within this study is further discussed in Section 4.4.

4.4 Evaluation of the study

Validity, reliability and the trustworthiness of data is an important discussion point within qualitative research. According to Cohen, Manion and Morrison (2007) the validity description is research context specific, and no research can be judged to be 100 per cent valid. Validity is addressed in qualitative research as follows:

...the depth, richness and scope of the data achieved, the participants approached, the extent of triangulation and the disinterestedness or objectivity of the researcher (Cohen, Manion and Morrison 2007: 105).

However, the authors argue that validity should be considered as a matter of scale and steps taken to maximise its authenticity instead. Validity in qualitative research, according to Creswell (2013), offers numerous perspectives depending on its relative importance. Miles, Huberman and Saldaña (2014) highlight the difficulty of establishing standards specifying quality in qualitative research.

Many interpretivist researchers suggest that it is not really possible to establish standards or to specify criteria for good qualitative work – and that the effort to do so is somehow expert centred and exclusionary, not responsive to the contingent, contextual, or personally interpretive nature of any qualitative study. (Miles, Huberman and Saldaña 2014: 311)

The proposal of 'trustworthiness' as an alternative to validity and reliability is offered by Miles, Huberman and Saldaña (2014) within the critical realist tradition of Lincoln and Guba (1985). They argue that the term validity is contested by researchers and is not valid in qualitative studies. However, it is still used widely because it suggests a more rigorous stance within qualitative research. Bassey (2012) researching within an educational context also prefers to use the notion of trustworthiness of data. This research takes place within an educational context. The trustworthiness of the data is achieved through the various methods employed to gather information from the multiple project cases and the different sources of data from the main case study (see Chapter

5). The trustworthiness of the data can be further validated through the methods of analysis employed.

The trustworthiness of the data is linked to triangulation. Triangulation involves the use of two or more methods of data collection and is a powerful way to demonstrate equivalent validity in qualitative research.

Triangulation may be defined as the use of two or more methods of data collection in the study of some aspect of human behaviour. The use of multiple methods, or the multi-method approach as it is sometimes called, contrasts with the ubiquitous but generally more vulnerable single-method approach that characterises so much of the research in social sciences. (Cohen, Manion and Morrison 2007: 195)

Triangulation is the use of various procedures to minimise misinterpretation, a process that uses multiple perceptions to clarify meaning and verify the repeatability of an observation or interpretation (Stake 1994: 241). It is particularly valuable in case study research as multiple methods are usually employed (Cohen, Manion and Morrison 2007). The importance of triangulation is emphasised by Yin (2009) who argues for its advantages and indeed the necessity for using multiple sources to develop 'converging lines of inquiry' – a process of triangulation and corroboration of data.

Table 4.8 outlines the positions taken by this researcher within the ePioneers project. It identifies three researcher roles and their corresponding researcher identities during the data collection process.

Table 4.8 Insider researcher identities within the ePioneers project

Researcher role	Researcher identities
Member of the e-Strategy group who was responsible for instigating and managing the ePioneers project	• Supporter of School e-strategy initiatives • Legitimater of change in School e-learning strategy
Project mentor	• Confidante • Motivator • Critical friend
Mentor-coordinator	• Motivator • Managing day-to-day running of project • Writer of publications relating to the project dissemination

As a member of the e-Strategy group, the researcher was part of the management team that set up and managed the ePioneers project. As part of the management team, the researcher played no direct role in the research. My job role was subordinate to the other members of the eStrategy group but within the group, everyone's input was valued equally. As project case mentor, I supported three of the ePioneer projects, but I had not worked with any of the ePioneers previously. In this role, I was directly involved in the research through the projects they supported. The project cases coordinator role was not set from the outset. The e-Strategy group members managed the project by informal agreement even though no coordinator was formally identified at the outset. The case mentor-coordinator role emerged when I noticed the need for someone to manage the day to day running of the case projects and to maintain their momentum for the duration of the ePioneers project. At the beginning of the project, the impact of the coordinator role on the research was not known. During the project, the role was seen to be practical and motivational to the participants. Any further impact of the role, both directly and indirectly, will be discussed within the data analysis. It is evident from the descriptions in Table 4.8 that the researcher role was multiple and complex. To establish trustworthiness, I used a variety of data collection methods and data sources to gain a better understanding of my researcher role and identities. I suggest that the researcher roles within this research context are unique and therefore may not be transferable to another context or the same context on a different occasion. Instead, I offer enough

detail within the data to provide the reader with enough information for them to determine the transferability of the information presented. Further, the dependability of the data presented through the complex roles identified above, is further ensured through an audit trail of the regularly minuted discussions between the eStrategy group members.

The complexity of the research position outlined above, requires that the identity of the researcher is clearly distinguished within the research study, so that the analysis of data is credible and reliable. In this context the researcher role is not as clear defined compared to how an outsider researcher might be identified. The boundaries within the unit of analysis of the case study are clearly identified within the activity system. This means that the roles of all the actors within the activity system can be identified and scrutinised within the data. The analysis of the data in Chapter Five will draw on the multiple identities identified in Table 4.8. In Section 4.5, I discuss further the issues relating to insider research by outlining the ethical challenges to consider within the research study.

4.5 Ethical challenges

Section 4.3 discussed the researcher's position as an insider researcher within the ePioneers project, and how this position will be considered within the research study. The section also pointed out the need to ensure the credibility and trustworthiness of the data. Strategies formed to deal with ethical issues, in connection with the data trustworthiness and the researcher's position must protect the institution and the people being researched within its context. As previously indicated, case studies offer the ability to closely interrogate the human interactions of the participants in this study. Moreover, the approach will facilitate the scrutiny of data between and across the multiple project cases to enable me to answer the research questions. The main issues dealing with ethics to be discussed in this section include a) the challenges as an insider researcher

and, b) providing the necessary information and structure to gain consent from the participants.

4.5.1 The challenges of an insider researcher

A case study approach was selected as the most appropriate methodology to use in this context and the reasons for this selection have been discussed in Section 4.2.3. Thomas (2011) further argues that case study research provides a distinctive type of 'exemplary' knowledge that can be analysed and interpreted through the case study. Further, this type of knowledge is legitimised because interpretations are drawn from the lived experience rather than the theory. Moreover, Trowler (2011) asserts that Thomas's argument is noteworthy because the judgements about the robustness of data analysis and conclusions are made on the basis of 'insider' knowledge.

A familiar definition of ethics is: 'norms for conduct that distinguish between acceptable and unacceptable behaviour' (Resnik 2011). Case study research like other research methodologies shares challenges related to ethical concerns. Ethical issues arise in a number of phases during the research process and not just the data collection phase (Creswell (2013); (Costley, Elliott and Gibbs 2010)). The challenges for the insider researcher in the ePioneers project have already been highlighted in Section 4.3. Consequently, careful consideration must be afforded to confidentiality and anonymity in the way that the researcher reports any findings from the study. Floyd and Arthur (2012) propose the concept of external and internal ethical engagement for insider researchers. This is based on the work of Tolich (2004) who describes confidentiality to be like an iceberg; external confidentiality found within ethical codes (ensuring anonymity) above the surface; and internal confidentiality (ensuring participants cannot identify themselves), below the surface (see Figure 4.1). Floyd and Arthur contrast external ethical engagement, (e.g. informed consent and anonymity through the submission of ethical approval applications, etc.); with internal ethical engagement, (deeper ethical and moral dilemmas encountered while in the field), (e.g. personal and

professional relationships with participants, insider knowledge, conflicting professional and research roles, and anonymity) (Floyd and Arthur 2012: 172). Figure 4.1 illustrates the interactions between insider researchers' prior knowledge and its effects on research design and implementation; the knowledge gained from doing the research, and its impact on professional roles and personal relationships. My interpretation of this model in this research study context is explained as follows:

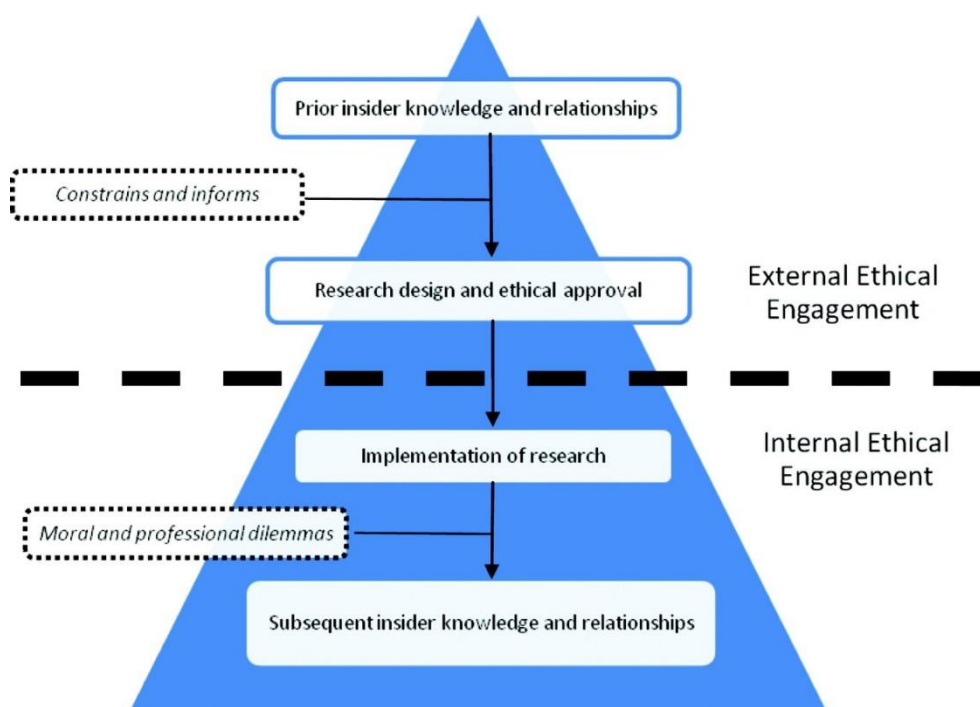


Figure 4.1 External and internal ethical engagement (Floyd and Arthur 2012: 178)

The Institution requires that all staff and students engaged in research must follow the [Code of Research Conduct and Research Ethics](https://www.nottingham.ac.uk/fabs/rgs/documents/code-of-research-conduct-and-research-ethics-(version-4-2013).pdf)¹ and seek approval from the School's Ethics committee. The School adopts the University's code in conjunction with The British Education Research Association (BERA) guidelines, as standard for research. All researchers must complete and submit an Ethics approval form (Appendix 9.3) and

¹ [Code of Research Conduct and Research Ethics](https://www.nottingham.ac.uk/fabs/rgs/documents/code-of-research-conduct-and-research-ethics-(version-4-2013).pdf)
[https://www.nottingham.ac.uk/fabs/rgs/documents/code-of-research-conduct-and-research-ethics-\(version-4-2013\).pdf](https://www.nottingham.ac.uk/fabs/rgs/documents/code-of-research-conduct-and-research-ethics-(version-4-2013).pdf)

approval for any proposed research must meet these guidelines. The ePioneers project was successful and was approved by the School's Ethics committee. This approval process concurs with the criteria for External Ethical Engagement as shown in Figure 4.1.

Internal Ethical Engagement, as identified in Figure 4.1, is something that I consider to be more challenging to achieve, especially when the unpredictability of moral and professional dilemmas must be considered. This might include the challenge of obtaining informed consent from the participants, consent to not only take part in the research, but to also agree to share their experiences within the wider institution. However, informed consent from all of the participants was gained through the participants signing a consent form prior to the start of the project (Appendix 9.5). The details on the consent form ensured that the participants were made aware that the information from the study might be published and they could withdraw permission if they wanted to. This was part of the funding conditions that required the output of the project to be cascaded to the wider institution. Interviews would be audio taped/ videotaped and the outputs archived as electronic copies which would not be accessible to the public but available to the e-Strategy group. The confidentiality and anonymity of any data extracted and cited in the writing of this thesis would be maintained.

The issues relating to internal ethical engagement (below the surface of the Floyd & Arthur iceberg), and the maintenance of professionalism whilst dealing with the conflicts of researcher roles and anonymity in this context, was a more challenging issue to reconcile whilst collecting the data and writing up the results for this thesis. As previously stated, the researcher was familiar to the participants as a member of staff, but I did not work directly with any of them. Therefore, it was relatively easy to maintain an objective approach when data-gathering and writing because the ePioneers and mentors had no preconceptions of expected behaviours that I might exhibit, if I had been familiar to them. It was more important to maintain anonymity in the reporting of data during the analysis. Floyd and Arthur (2012) argue that the preservation of

institutional anonymity is a problem for insider researchers because of the ease of using online searching tools to identify institutions. Rather, it is more important that the researcher seeks to maintain the anonymity of the individuals researched (Trowler 2011: 3). In this research study, participant anonymity was achieved by the omission of names and the removal of any identifying factors. The interview notes were made available to the participants to ensure accuracy and anonymity and to avert any concerns that information was obtained under false pretences. I was careful to ensure that the data was reported objectively whilst protecting the anonymity of the participants. All of the data was discussed within the weekly eStrategy group meetings. This stance follows the proposed solution by Trowler (2011) of conducting research with 'polyocular' where research involves using teams from 'inside' and/or 'outside' cultures. The precautions taken included ensuring that all of the respondents were anonymously coded during the transcriptions of the interview data. Once transcribed, the respondents were given the opportunity to check their interviews for accuracy. They were free to withdraw from the study at any time. Further, confidentiality was ensured by storing all of the audio data on a password-protected computer. All of the data collected from the different sources were then stored in one place on NVivo 10, a computer assisted qualitative analysis software (CAQDAS). Any video data was archived and was stored securely in a central location only accessible with authenticated Windows login credentials.

4.6 Summary

In this chapter, I have outlined the background to the ePioneers project which forms the main source of data for this research. I have highlighted the theoretical underpinnings and case study methodology for the research study and positioned myself as an insider researcher within it. Ethical considerations relating to insider research have been discussed for the research context. The data collection methods used for the research study are detailed in the next chapter.

5 - Research methods

In this chapter I present the research methods and tools used to collect the data and respond to the research questions.

This research study is a longitudinal qualitative case study. The main data are the interactions of the ePioneers and mentors in the ePioneers project. The methods that will be used are based on Stake's constructivist case study approach as discussed in Chapter 4, Section 4.2.3. "Methods are the specific techniques and procedures used to collect and analyse data" according to (Scotland 2012: 9). Stake's approach allows me to interpret the data as it emerges, rather than deploying it for proving or disproving a proposition, as in the case of Yin's positivist case study approach (Yin 1984; 2013). The focus of the analysis is the relationships between the mentors and ePioneers during the process of technological innovation. Thus, as a case study the data collection is specifically targeted to gather information that is reflective of the process and also developmental. These methods will be explained in Sections 5.2 and 5.3.

5.1 Data collection

In this section, I outline the rationale for the data collection in this research. Following Stake's constructivist case study approach (Stake 1994), I used the following data collection tools to collect data from the ePioneers project: in-depth interviews from all of the mentors and ePioneers, a Delphi analysis, notes from observations, notes from show and tell activities, and from group meetings. Details of the timing and approach for each method is discussed in the sections that follow. The main ePioneers project was carried out in the academic years 2006-2008. The data was collected over a 12-month period. Table 5.1 provides a timeline for the data collection.

Table 5.1 Data Collection Time Line

Month	1	2	3	4	5	6	7	8	9	10	11	12
Project Launch												
ePioneers Interview 1												
ePioneers Interview 2												
Researcher Interview												
Delphi												
Mentor Interview 1												
Mentor Interview 2												
Show and Tell												
e-Strategy Group Meetings												

Table 5.2 illustrates the data I wanted to generate from each mode of inquiry:

Table 5.2 Illustrating the data requirements for each method

RESEARCH QUESTION	METHODS	TYPE OF DATA TO BE COLLECTED	TIME
RQ1 How do change agents influence technology innovation processes?	ePioneer interview 1	Information that divulges: - The initial relationship with the mentor - Progress on the project - Any barriers to relationship building and innovation	Months 3-4
	Mentor interview 1	Information that expresses: - The initial relationship with the ePioneer - Progress on the project - Any barriers to relationship building and innovation - Strategies used to support the projects and any barriers encountered	Months 3-4
	Meetings	To gather data about the learning process through the observation of interactions between the mentors and ePioneers	Ongoing

	Show and tell	To observe the project outcomes and the mentors and mentees interacting as a community whilst showcasing their outputs	Months 7-8
RQ2 How can the influences revealed by technological innovation processed be articulated for application to other technology innovation contexts?	Delphi	To gain information from the mentors and ePioneers in months 4-6 about the challenges of the innovation processes and learning experiences encountered so far within the intervention	Months 4-6
	ePioneer interview 2 Mentor interview 2	To gather information about the outcomes of the intervention and contribution factor of what/whom added to the success.	Months 9-12

The ePioneer and mentor interviews 1, the meetings, and the Show and Tell observation activities contributed information regarding the initial interactions of the mentors and mentees through the early stages of developing their projects in order to answer RQ. 1. The Delphi analysis and interviews 2 focussed on gathering data about the successes and challenges to the innovation process: this contributed to answering RQ 2. A detailed description of these processes follows in Section 5.2 to 5.3.

5.2 *The ePioneer project interviews*

For case studies, like any other research interview situation, Yin (2013) asserts that study interviews require the interviewer to operate at two different levels simultaneously: namely, a) to satisfy the needs for the study by following the appropriate line of enquiry based on pre-determined research aims, and b) to ask conversational questions in a non-threatening and friendly manner that also meet the needs of the case study. For the purpose of generating rich case study data from the ePioneers project, this research utilised face-to-face interviews of up to an hour in length. The interviews followed a shorter semi-structured format using case study interviewing techniques after Merriam (1998). The focus of these interviews was to

gather specific information on the mentor and mentee relationships. The interview questions were pre-determined; however, I changed the order of the questions depending on what I perceived to be appropriate at that time of the project progress.

5.2.1 Phase 1 interviews

Phase 1 of the interviews was carried out in months 3-4; every mentor and ePioneer was included. The Phase 1 interview questions are shown in Table 5.3. A timetable was drawn up of all the participants and each person was interviewed at a mutually convenient time during the working day to fit in with work schedules. Each interview was scheduled to last between 15-45 minutes at each stage (the average interview lasted for 30 minutes). The interview structure followed the process outlined below:

1. The purpose and the nature of the study was restated to the interviewees.
2. Assurances were given to the respondents that they could remain anonymous and that their responses would be treated as confidential.
3. The interviewer asked permission for the interview to be recorded.
4. Finally, the interviewee was asked to sign the informed consent form (see Appendix 9.5)

Table 5.3 Case study interview questions (months 3-4)

PHASE 1 PARTICIPANT QUESTIONS	
Mentors	ePioneers
1. Can you reflect on what you consider the role of a mentor to be? 2. Can you reflect on your role in the process of the development of the project(s) you are mentoring? 3. How do you think you have been of value to: a. The project? b. The ePioneer? 4. Can you reflect on your experiences of posting your progress reports on the ePioneer blog?	1. How do you think your project(s) is/are progressing? 2. Have there been any problems? Can you explain how you overcame them? 3. Can you reflect on what you consider the role of your mentor to be? 4. Can you reflect on the support that your mentor has provided? 5. How do you see this support developing as your project matures? 6. What are your first impressions of using SharePoint to post progress reports on your project?

5. Have there been any barriers to the kind of information that you have posted? 6. Can you reflect on how you have helped your ePioneer with posting blog reports on SharePoint? Is there anything else you could do to support them with this? 7. I would like to encourage all members of the ePioneer project to share their experiences and comment on each other's projects and form more of a 'Community'. How do you think you could contribute to this?	7. Can you reflect on your experiences of posting your progress reports on the ePioneer blog? 8. Have there been any barriers to the kind of information that you have posted? 9. Can you reflect on the next stages of your project? Are you able to plot a time line for development at this stage? If not, when do you think you will be in a position to do this? 10. I would like to encourage all members of the ePioneer project to share their experiences and comment on each other's projects and form more of a 'Community'. How do you think you could contribute to this?
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5.2.2 Phase 2 interviews

The Phase 2 interviews followed the same format as Phase 1 but using the set of interview questions in Table 5.4. The questions shown in Table 5.4 are aimed to be less structured and conversational, as I wanted to gather more reflective data about the process of innovation the ePioneers and mentors had experienced.

Table 5.4 Case study interview questions (months 9-12)

PHASE 2 QUESTIONS FOR EPIONEERS AND MENTORS
1. What is the current state of your project? 2. What do you need to do to in the immediate future to move forward with your project? 3. How do you plan to do this? By when? 4. What new opportunities for your e-learning development have arisen since starting your project? 5. Who/what has contributed to its success/progress? OR 6. What will contribute to its success/progress? 7. What are the significant things that have acted as a catalyst for success/progress so far? OR 8. What will act as a catalyst to aid the progress of the project in the future? 9. What role is your mentor now playing in your project? 10. How has it changed since you first started? 11. Would you describe the role of the mentor as different to the beginning of the project?

5.2.3 Delphi analysis

The Delphi technique is a qualitative forecasting technique that has been applied to a variety of research contexts and domains (Gupta and Clarke 1996; Hasson, Keeney and McKenna 2000; Cohen, Manion and Morrison 2011). In this research context it was used in months 4-6 to gather data from the mentors and ePioneers that reflected on their perceptions of the progress of development of their projects, and the roles each was playing in that development. In activity system terms, the Delphi technique was used to gather data about how the rules and division of labour were acted out within the case project community.

The Delphi technique involves a three-stage process (Cohen, Manion and Morrison 2011). Stage one requires the leader (the researcher in this instance), to ask the ePioneers/mentors to respond to a series of questions and statements in writing. In stage two, the leader collects the responses and collates them into clusters or issues and responses. These responses are returned to the group as a clustered group response and the group are asked to react to this collective response by return email. This procedure allows the individual to agree or disagree with the collective responses. In stage three, stage two may be repeated until the leader decides on the most appropriate point to stop. In this research context, the endpoint would occur through discussion with the whole group in a face-to-face meeting, scheduled an hour after the group reacted to the collective response. Table 5.5 lists the questions for the mentors and ePioneers used in the Delphi technique.

Table 5.5 Delphi ePioneer/mentor questions

<u>Mentor questions</u>
1. What do you see as being the 3 main benefits of being a mentor in the ePioneers project?
2. What do you see as being the 3 main problems of being a mentor?
3. What are the 3 main things you have learned as a result of doing the ePioneers project?
<u>ePioneer questions</u>
1. What do you see as the 3 main successes to your ePioneer project?
2. What do you see as the 3 main challenges to your ePioneer project?
3. What do you see as the 3 main things you have learned as a result of doing the ePioneer project?

The questions in Table 5.5 were based on the Appreciative Inquiry approach.

(Cooperrider and Whitney 2001). Appreciative Inquiry (AI) is defined as follows:

Appreciative Inquiry is about the co-evolutionary search for the best in people, their organizations, and the relevant world around them... AI involves, in a central way, the art and practice of asking questions that strengthen a system's capacity to apprehend, anticipate, and heighten positive potential. It centrally involves the mobilization of inquiry through the crafting of the "unconditional positive question" often-involving hundreds or sometimes thousands of people. (Cooperrider and Whitney 2001: 3)

The AI question format is designed to generate answers to questions that are reflective on the process of innovation at that timepoint. Further, I wanted to focus on the positive aspects and successes of the project rather than dwelling on what was not achieved.

This would help in the understanding of the attributes that might constitute a sustained approach to technology development and implementation.

There were two Delphi cycles performed on the morning of the pre-arranged group meeting of mentors and ePioneers together. In the first cycle, the ePioneers and mentors were asked to respond by return email. In this cycle, the aim was to obtain data that would contribute to answering RQ 1 and RQ 2., in relation to the challenges experienced by the participants during the project development process. Moreover, this cycle aimed to gather data about the learning being experienced of the mentors and ePioneers. The results of this run was collated in this second cycle and the responses were emailed to the respondents for their comments and reactions (Appendix 9.11). The responses from

this cycle were summarised and they formed the agenda and discussion items for the lunchtime meeting.

5.3 Communication techniques within the project

Regular communication was a fundamental part of the ePioneers project, in order to maintain the interest of the participants and encourage them to reach their project objectives. The communication techniques employed included, for example, informal oral prompts in the corridors, formal and informal emails asking the participants to complete tasks by deadlines set by the e-Strategy group. At monthly intervals I sent out email alerts to the participants for the following purposes, to:

- a) prepare for ePioneer/mentor group meetings;
- b) remind participants of the deadlines to report on their progress;
- c) maintain the momentum of the project;
- d) encourage the development of the emerging e-learning community through regular communication.

Table 5.6 illustrates the types of communication tools and events utilised for the collection of data within the project.

Table 5.6 Meeting events and attendance

Meeting event	Number of meetings	Attendance
1.ePioneers and mentors (joint meetings)	3	All
2.Mentors and e-Strategy Group members	2	All
3.e-Strategy Group	Weekly	all
4.Show and Tell events	2	All mentors & ePioneer

5.3.1 Group Meetings

Structured conversations within group meetings were another data collection tool. The meetings provided observational data about the mentor-ePioneer interactions as a community. They formed part of the various communication techniques that were employed during the ePioneers project. There were three joint meetings with the ePioneers and mentors:

- Meeting 1 – project launch
- Meeting 2 – lunchtime community-building 1
- Meeting 3 – lunchtime community-building 2

The three joint informal ePioneer and mentor meetings lasted up to an hour only. The first meeting launched the ePioneers project. The aim of this first meeting was for initial community-building where the ePioneers could exchange stories about their projects and offer each other mutual support. The agendas for the second and third meeting were constructed from the results of the Delphi analysis questions (see Section 5.2.3). The ePioneers and mentors were asked to respond to questions two hours before the meeting time. These responses formed the agenda and were the basis for discussion during the meetings. All of the meeting minutes were recorded, approved by the e-Strategy group before they were approved, and a summary circulated to the ePioneer and mentors and finally archived to the project secure server. This data provided case study information about the mentor role at different levels of involvement during the project.

5.3.2 Show and Tell events

There were two Show and Tell events that were organised as opportunities for the ePioneers and mentors to collaborate and to showcase the outputs of their project case to a wider audience within the School and university. The first event was a showcase to the School, and the second to the wider institution. The events provided the researcher with observational data of the developing relationships between the ePioneers and mentors within the new working community. The observational data gathered also provided an opportunity to gauge the level of acceptance of this type of approach to supported technological innovation within the School. Both of the events were video-recorded, and the tape archived.

Event 1 was organised as a lunch-time showcase after six months of project development. Each ePioneer and mentor pairing were provided with an electronic template upon which to outline their project aims and the quick gains they wanted to achieve. The completed template was converted into a poster for each of a set of stands allotted to the case projects. Demonstrations were also prepared for the projects, if appropriate. The School staff were invited to view the outputs and ask questions. The ePioneers/mentors used the feedback from this showcase to further develop their projects.

Event 2 to the wider university, took place in months 10-11. This was a much larger event and scheduled to last for 2.5 hours (with lunch included). It was open to the School and targeted strategically to particular sections of the wider university. Invitations were sent to Information Services, the Staff Development Unit and other sections in the institution that could offer collaboration opportunities to further enhance the outputs of the project cases, and this initiative. The proceedings were video recorded, and the tapes archived. The data generated through this collaboration and observation provided information for follow-up in the final interview sessions with the participants.

5.3.3 ePioneer cases reports

Each ePioneer produced a short-written report that outlined the successes with gaining the outputs set at the beginning of their projects. The reports were completed after the final interviews had been conducted.

5.3.4 Discarded asynchronous reporting tool - SharePoint

A condition of the funding bid for the project was the requirement for regular reporting of progress, so that the results of any good practice could be cascaded to the rest of the Institution. This information would form the basis of a report at the end of the 2-year project. The e-Strategy group decided that this would be completed electronically in lieu of compiling a lengthy report at the end of the project in the form of a blog.

'Blogging' is essentially keeping an open diary or journal of your thoughts, ideas and experiences on a website (Clarke 2008: 174).

The advice provided about how to use the blogging format included the following points:

- What is the ePioneers shared blog?
- Where can I find the ePioneers shared blog?
- Why use the ePioneers shared blog?
- What should appear in the shared blog?
- How frequently should I contribute to the blog?
- How long should a blog entry be? (Appendix 9.9)

In addition, the use of an online reporting tool aimed to also help nurture the participants to develop as a community within the School: one that would exploit e-learning more widely. Microsoft SharePoint™ software is a tool that allows you to store and share documents in one place and work on them collaboratively with colleagues. SharePoint was used within the institution for other purposes, so it was selected by the e-Strategy team as the reporting software of choice. The reporting system was introduced at the launch of the ePioneers project (Appendix 9.9).

The participants were provided with a rationale and instructions on how to access the system. The rationale set out the intention to develop a community of e-learning practitioners within the School with the common interest of exploiting e-learning more

fully. It also provided the users with an outline of the content to include and the frequency of the postings to be provided.

The reporting format was to be a narrative of the project process shared with the other participants and available for viewing outside of the university. The blog was to be updated at the beginning, middle and end of the project. Moreover, the blog was located in a shared space where all participants could view each other's posts.

Although this was a useful tool which would have served the purpose for the task, the e-Strategy group had not thought through the following:

1. The setting-up and ease of use of the tool (especially for novice e-learners).
2. The participants' experience with the concept of blogs/blogging.
3. The willingness of the participants to use a public forum to record success/failure/inactivity within their projects.

Within the first few weeks of the ePioneers project it was evident that few participants were using the online reporting facility, SharePoint, for their monthly progress reports required to collect data for the project. Therefore, the ambition of an online diary was not fulfilled. Yet it was vital to be able to collect the thoughts of the participants throughout the intervention process. The reporting tool for online blog progress reporting using SharePoint was not used systematically by the participants, although regular email alert reminders were sent out by the mentor-coordinator. To expedite the data collection and to capture essential data within the first few months of the project, the researcher considered that face-to-face interviews would be the most appropriate data collection tool to replace the use of SharePoint, in month three of the project. However, the reasons for not utilising the tool would be explored through these face-to-face interviews. A major flaw in the project that I realised at the project launch was the fact that the SharePoint reporting tool was imposed upon a newly formed group that was meeting for the first time. However, it was the perceived simplicity of reporting progress (and not the tool to be used) in lieu of completing a final written report, which was the driving force that allowed the idea of utilising SharePoint to proceed. Although it was

judged by the e-Strategy group to be an appropriate tool for the purpose, the basic practicalities affecting the users of the tool and their abilities or knowledge were not taken into consideration. The participants were expected to use an additional e-learning tool that they were not familiar with. Moreover, there was confusion in the expected formality required for reporting their progress. However, this discarded tool provided a substantial amount of data about the barriers to using a piece of technology, albeit a matter incidental to the purpose for its use. The data therefore warrants further scrutiny (see Section 6.3.2 for a full analysis).

5.4 Summary

In this chapter I have provided a detailed account of the methods of data generation for the research. The analysis of the data is presented in Chapter 6.

6 – Data analysis

In this chapter I present the process for the analysis of the data and detail the findings from the ePioneers case study to address the research questions: How do change agents influence technological innovation processes? How are these influences articulated for application to other technology innovation contexts? The chapter begins by mapping out the steps used for the data analysis and how themes are derived from the activity system for further scrutiny using the project cases. I then discuss a discarded method of data collection and its relevance for inclusion within the analysis. The key themes identified are analysed through the main activity system unit of analysis. The final section provides an in-depth exploration of knowledge and relationship-building of four selected case study projects to answer the research questions.

As articulated in Chapter 3, Activity system analysis was selected as the framework for the presentation and analysis of the data, with a focus on the actions of the mentors and ePioneers during technology innovation processes and any contradictions that emerged during the interactions. Although the data is presented in a narrative format, it is the narration that reveals any tensions that may lead the reader to make any judgements on their significance for application to their own contexts.

6.1 Analytical framework for the data analysis

In this section, I provide the details of the main analytical framework and the units of analysis within the activity system framework. As outlined in Section 4.2.3, this research consists of a collective case study with project cases for interrogation to answer the research questions. The data within each of the individual project case studies will be analysed and then cross case analysis will be applied across the entire project. Miles, Huberman & Saldña (2014) argue that conducting a cross-case analysis enhances, firstly, generalisability and transferability to other contexts and, secondly, enhances deeper understanding and explanation. They add that:

Multiple cases not only pin down the specific conditions under which findings occur but also help us form the more general categories of how those conditions may be related (Miles, Huberman and Saldaña 2014: 101).

In this case, the cross-case analysis is utilised to understand the mentor role across all the project cases and between the mentor/ePioneer dyads of the individual project cases. This type of analysis corresponds with the strategy of a 'case-oriented approach' described in Miles, Huberman & Saldaña (2014): one that scrutinises the entire collective case study for patterns, associations, causes and effects. It then identifies similarities and differences across the project cases to identify any generalisations. The unit of analysis is restricted to the fifteen project case studies under scrutiny, which are within the single School context. These form the boundaries of the case that is recognised as an important factor, especially in real-world complex human activity (Yamagata-Lynch 2010). Further details of how activity system analysis is utilised for the data analysis is discussed next.

The minimum unit of analysis using the activity system framework is two interacting activity systems as shown in Figure 6.1. The constituent parts of the framework are divided into Activity System (A) and Activity System (B). Activity system (B) consists of the mentor and ePioneer interactions within the individual project cases coded as individual activity systems. In Activity System (A) the activities from the individual project cases are cross coded against each other to identify common themes within the main activity system. In Activity system (A), the **Subject** consists of all of the project participants within the individual cases, while in Activity system (B) the subjects are the collective case study projects. Both activity systems are linked by the collective objective to produce artefacts i.e. quick-gain project outcomes and the sharing of practice. The **Tools** in each activity system are the mentor's knowledge and communication skills. The **Community** is the ePioneers community and the e-Pioneers and mentors interaction within it. The **Rules** refer to the cultural/institutional norms of working within an H.E. community and the **Division of Labour** is how the mentors and ePioneers share the responsibility of their project development. Through the analysis of the data within all of

the components of the two interacting activity systems the attributes of the mentors as change agents in the process will be scrutinised in order to answer the research questions.

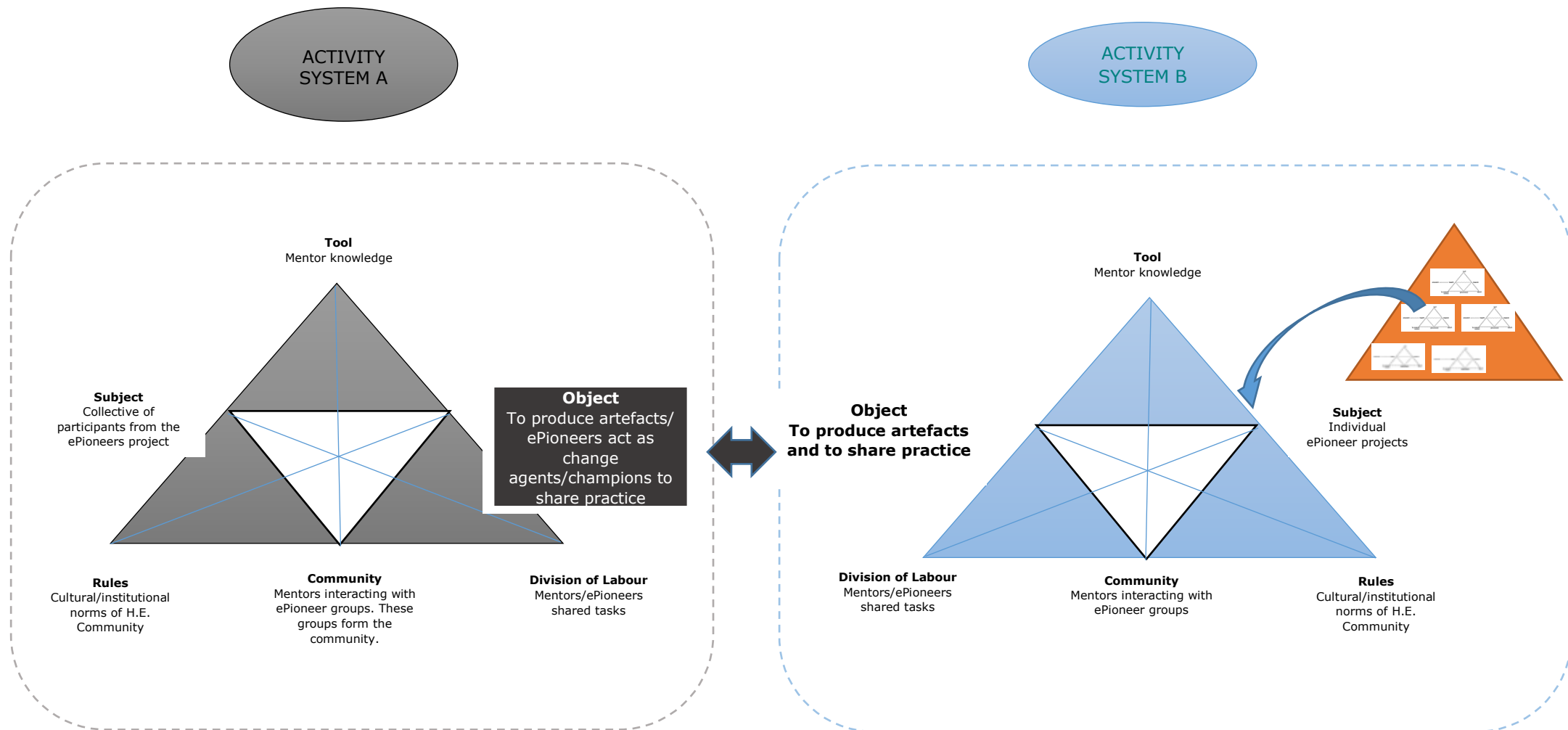


Figure 6.1 Main case study Activity system unit of analysis

6.2 The sequence for the data analysis

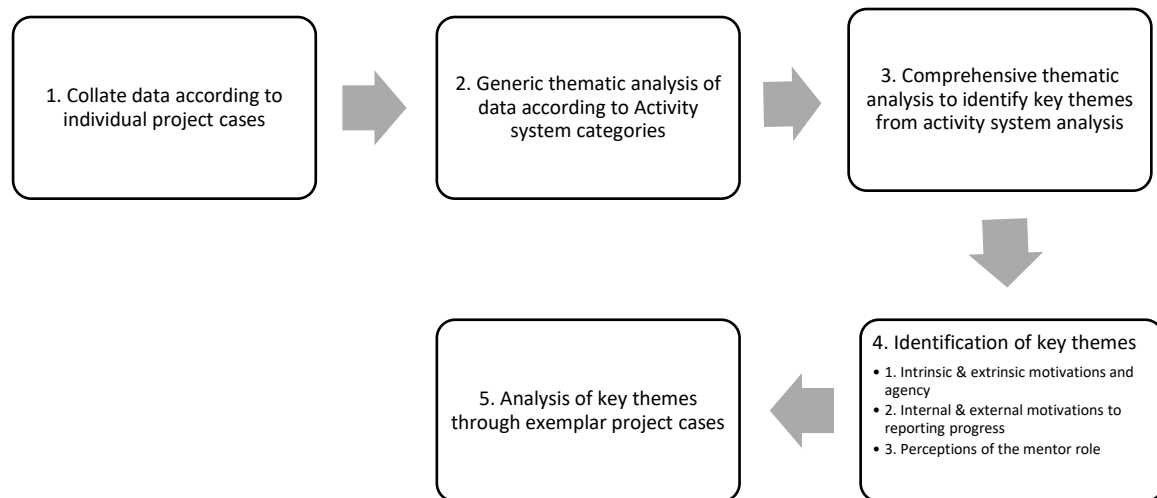
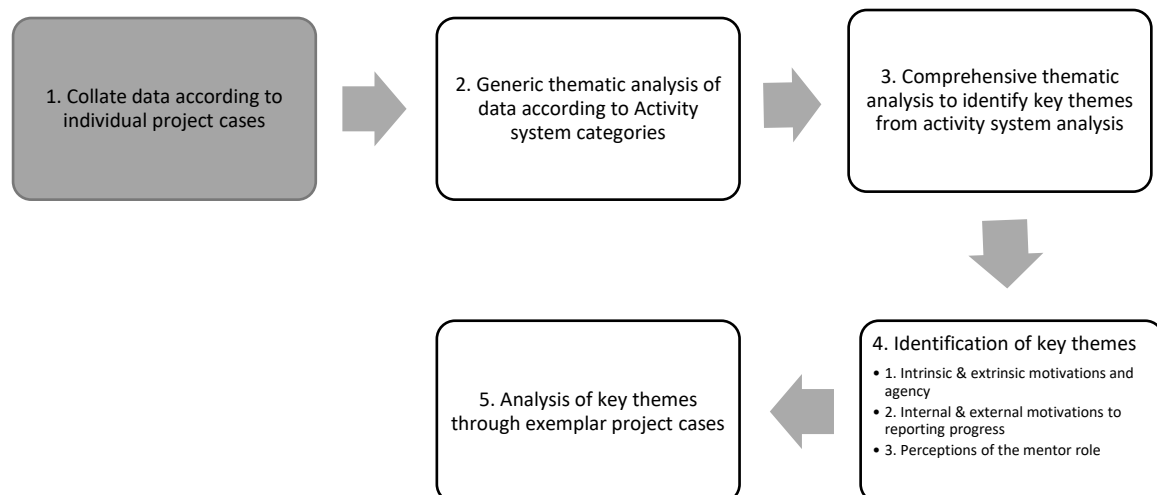


Figure 6.2 Data Analysis Plan

Figure 6.2 provides a diagrammatic representation of how the data will be used to generate general themes and then scrutinised further to identify key themes to answer the research questions. The steps in the process are as follows:

6.2.1 Collating of mentor/mentee data according to individual project cases



Computer-assisted qualitative data analysis software NVivo (2002) was used to store the transcribed data and to facilitate the data analysis. This software ensured that all the data was stored centrally and therefore was easily accessible for manipulation. The type of data stored within NVivo included the following:

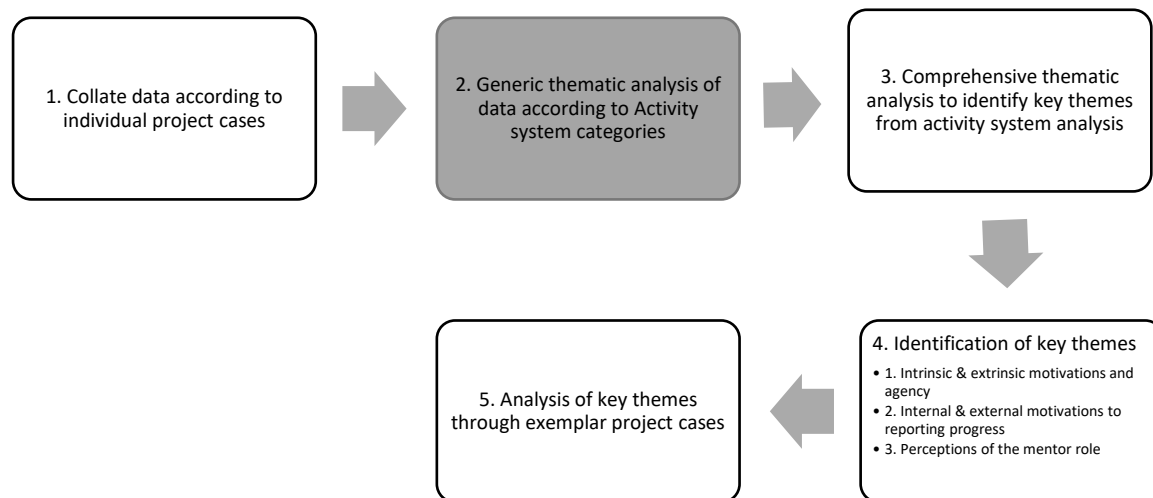
- i. The transcribed mentor and ePioneer interviews from Phase 1 & Phase 2 of the ePioneer projects
- ii. Summaries from the Delphi analysis
- iii. Notes from meeting minutes
- iv. Observation notes from show-and-tell events

The process of collating the data in preparation for its analysis involved several steps.

The data was transcribed verbatim and then the analysis process was divided into two main stages:

- (1) Initial and substantive categorical interpretation through coding of the data using a thematic approach (Braun and Clarke 2006). The approach to the coding in this case was approached as 'splitting' or 'lumping' the data (Bazeley and Jackson 2013). The former is to maximise the differences between text passages and look for finely-detailed themes, whereas the latter is to minimise differences and focus on more general themes. (See Section 6.2.2)
- (2) Comprehensive data treatment (Silverman 2013) was then applied to explore the data in more detail to code instances of the interviews that related to the ePioneer and mentor interaction and relationship-building. This was conducted for the activity systems of all the projects in Activity System B. (See Section 6.2.3)

6.2.2 Generic thematic analysis of data according to Activity system categories



The analysis follows a sequence that involves scrutinising the mapped-out data from Activity System A (Section 4.2.3). The first part of the analysis entails mapping out the themes and contradictions that emerge from the general thematic analysis. The general thematic coding of the data was done in six stages utilising Braun and Clarke's thematic approach (Braun and Clarke 2006). This approach facilitated active engagement with the data from each of the case study projects to form an initial view of managing the analysis. The process of generating codes and themes involved six phases of thematic analysis: familiarisation of the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and reporting. Table 6.1 outlines how the data was manipulated within each step.

Table 6.1 Phases of thematic analysis (adapted from Braun and Clarke 2006: 87)

Phase	Description of the process	What I did
1. Familiarising yourself with your data:	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas	Verbatim transcriptions loaded into NVivo and grouped by mentor/ePioneers for each project
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.	Divide interviews into mentor/ePioneer; beginning/end project
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme	Theme according to mentor/ePioneer interactions
4. Reviewing themes:	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis.	Map themes on to the activity system B (Figure 6.1)
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme, and the overall story the analysis tells, generating clear definitions and names for each theme.	Refine themes based on component of activity system
6. Producing the report:	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research	

Phase 1 involved loading the transcriptions into NVivo and grouping them by ePioneer and mentor for each project. Next, the data was divided into two main sections, i.e. interviews at the beginning and interviews at the end of the project. At Phase 3 (Searching for themes), the data was coded using the categories in the Activity system (Figure 6.3). This involved the data from each interview being coded on the activity system components.

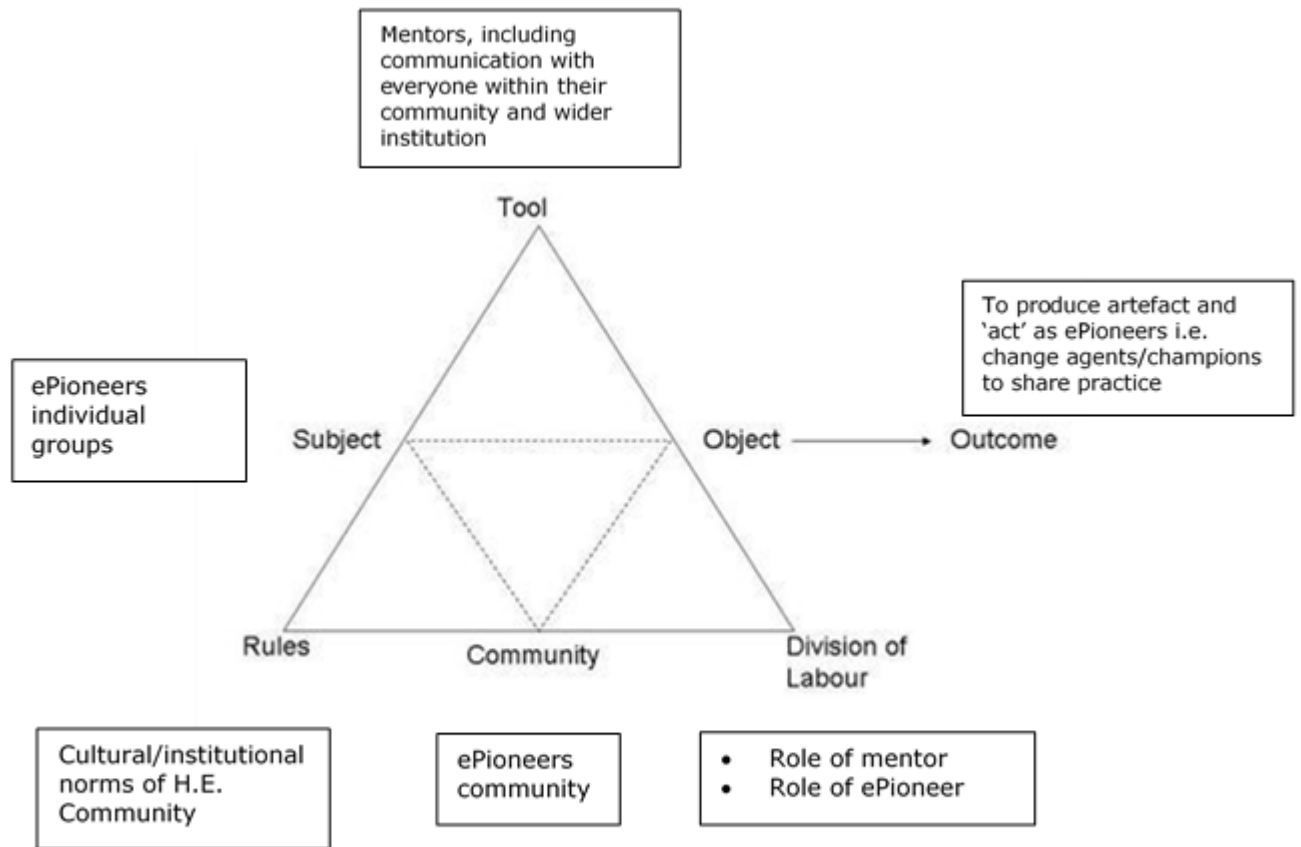
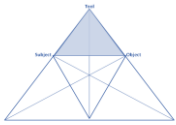
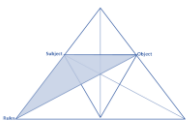
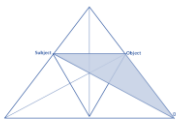
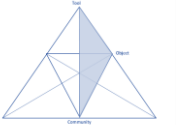


Figure 6.3 The activity system of the ePioneers project, adapted from Engeström (2001)

Figure 6.3 illustrates how the activity system worked for the ePioneers project. Table 6.2 provides an explanation of the components in activity system terminology. The subject-activity focus is explained within the project context. By gaining an understanding of this breakdown of activities within the system, it is easier to apply an inductive approach to code the data to the appropriate categories within the activity system. It is also easier to apply Phase 4 of Braun and Clarke's thematic approach (Braun and Clarke 2006). In Phase 4, the data in each of the activity system components are reviewed for further refinement into the appropriate activity system categories. In phases 5 and 6 the data are scrutinised further to identify more themes to be analysed more comprehensively. The process of comprehensive data analysis is covered in the next section.

Table 6.2 The Use of the activity system components for mapping data

Subject-Activity Triangle Focus	Explanations within study context
Subject-Tool-Object 	Engeström (1999) defines the subject of the activity system as the individual or group to be scrutinised. The tools (or structures) make the activity possible. They are social others and artefacts that can act as a resource for the activity (1999). The object is the goal or motive of the activity that are transformed into outcomes mediated by the tools. In this context the communication with the mentors (tools) are the main resource because they are the enablers of the activity of the (subject) ePioneers individual groups. The tools facilitate the production of artefacts (technology innovations) as a resource to help the ePioneers reach their outcomes. Successful outcomes empower the ePioneers as change agents/champions to share their practice.
Subject-Rules-Object 	The rules are the formal/informal regulations that affect how the activity takes place. The rules in this context are related to the H.E. context of the institution, the School and within the ePioneers project.
Subject-Division of labour-Object 	The Division of Labour decides how the tasks are shared among the community. In the project context the division of labour was shared between the mentors and ePioneers. The actions of the mentors and ePioneers within this community will be scrutinised.
Community-Tool-Object 	The community refers to the ePioneers community of practice i.e. the community in which the projects are operating to reach their objectives.

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FILE HOME CREATE DATA ANALYZE QUERY EXPLORE LAYOUT VIEW

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Nodes

- Nodes
 - Activity Theory
 - ePioneer video interviews
 - ePioneer Video Transcript
 - Themes
 - Website interviews
 - Cases
 - ePioneer Project Case No
 - ePioneer Phase 2 Interview
 - Nursing interviews
 - Respondents
 - Themes
 - Relationships
 - Node Matrices

Look for Search In Activity Theor

Activity Theory

Name	Sources	Ref
1.Subject		1
2.Tools		1
3.Object		1
4.Community		20
5.Rules		12
Institutional advantages		2
Institutional barriers		9
School of Education Barriers		1
6.Division of labour		19
Becoming autonomous		10
ePioneers becoming autonomous		2
Implementation advisor		8
Mentors becoming autonomous		2
Motivator		5
No responsibility by ePioneer		1
No structure defined		3
Pedagogic advisor		6

Sources Nodes

Figure 6.4 Data organised within activity system components

6.2.3 Comprehensive thematic analysis

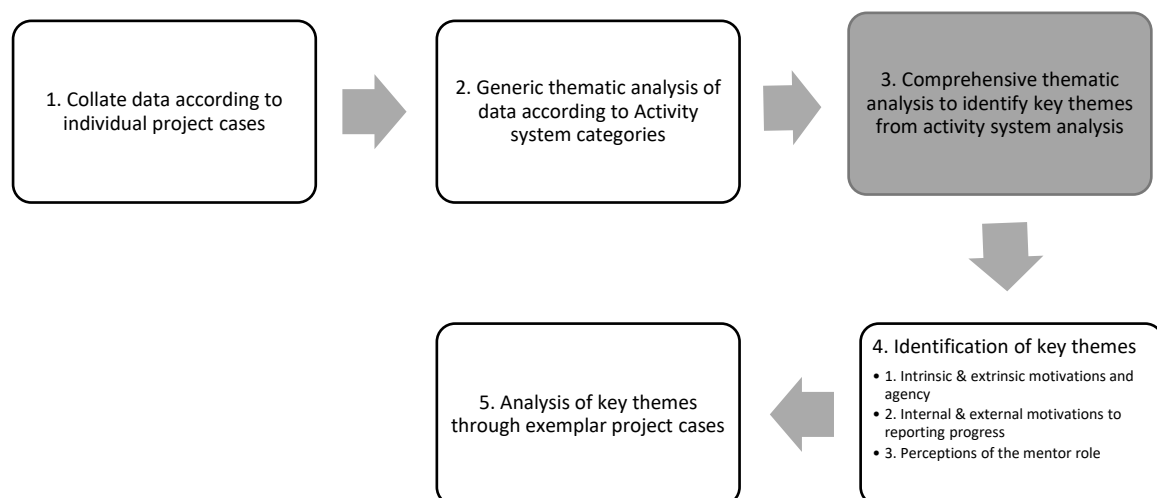


Figure 6.4 is a screenshot taken within NVivo which shows the distribution of the coded data after the generic theme analysis. After the general coding the results indicated that the most clustered coded references were lumped within the community, rules and division of labour components, as shown by the number of coding episodes, indicated by the arrows in Figure 6.4. The clustering of data would be further analysed to ascertain the presence of any emerging tensions.

According to Engeström's application of the third-generation activity system, interventions result in contradictions and struggles that in turn can be analysed as power and control within two activity systems (Engeström 2001). The purpose of the comprehensive data analysis within this case study unit of analysis is to drill down into the data, especially in relation to the community, rules and division of labour sections, identifying any contradictions that occur during the innovation process. To be able to fully scrutinise this data, the researcher employed the diagnostic tool Activity-Oriented Design Method (AODM) (Mwanza 2002; Mwanza-Simwami 2011) in order to problematise the data further. The AODM was originally designed to support HCI research and design processes by Mwanza (2002), to gather and analyse data from organisational work practices. However, the iterative nature of the approach with AODM could be applied to further scrutinise the data in the community, rules and the division of labour sections of the activity system. Further, the AODM could be used to identify tensions and contradictions if present in the data.

The AODM Toolkit consists of four methodological diagnostic tools to identify elements of human activity and for examining inter-relationships within the activity system. The following paragraphs adapted from Mwanza (2001; Mwanza-Simwami 2011) outline the use of each step of the model in turn, and how its principles were applied to the research data. The four diagnostic tools are as follows:

1. The AODM Eight-step model
2. Activity notation (to reduce complexity in activity analysis)
3. Technique for generating research questions

4. Technique for mapping operational processes

6.2.3.1 The AODM Eight-step model stages

Step 1 – interpreting the situation under examination using Activity Theory

The first tool consists of an Eight-Step-Model (ESM). It interprets the elements of the components of the activity triangle by transforming them into open questions that identify the activity under investigation. Table 6.3 illustrates the model and how it is applied to the ePioneers case study unit of analysis. It shows how to interpret the various components of the activity system through a system of open questions. This interpretation provides basic knowledge of the research context necessary for mapping to the activity system components.

Table 6.3 AODM Eight-Step-Model for e-learning change practices. Adapted from Mwanza (2002)

Component	Question to ask:	Interpretation of Activity System elements
Step 1: Activity of interest	What sort of activity am I interested in?	Change e-learning practices within a voluntary CPD context
Step 2: Objective	Why is the activity taking place?	To produce artefacts and 'act' as ePioneers: i.e. change agents/champions to share practice
Step 3: Subjects	Who is involved in carrying out the activity?	ePioneers
Step 4: Tools	By what means are the subjects performing the activity?	Mentors knowledge to communicate with everyone within their community and wider community
Step 5: Rules and regulations	Are there any cultural norms, rules or regulations governing the performance of the activity?	Cultural/institutional norms within a H.E. community
Step 6: Division of labour	Who is responsible for what, when carrying out activity and how are those roles organised?	Mentors/ePioneers shared tasks
Step 7: Community	What is the environment in which the activity is carried out?	ePioneer community within the School context
Step 8: Outcomes	What is the desired outcome from carrying out this activity?	Produce e-learning change agents/champions to share practice in order to promote sustained innovation

Step 2 - Activity notation (to reduce complexity in activity analysis)

The activity of interest in Step 1 may be complex when mapped onto the activity system because it comprises the various sub-activities that constitute the activity system to be analysed. In this case it is the data in steps 5, 6 and 7, as indicated in Figure 6.4, that were the components of most interest and that required further breakdown for analysis. The activity notation is used to simplify the complex activity system into smaller constituent parts for the analysis of data (Figure 6.5).

The Activity Notation				
Actors (Doers)	~	Mediator	~	Object-ive (Purpose)
Subjects	~	Tools	~	Object
Subjects	~	Rules	~	Object
Subjects	~	Division of Labour	~	Object
Community	~	Tools	~	Object
Community	~	Rules	~	Object
Community	~	Division of Labour	~	Object

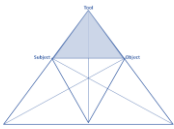
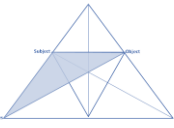
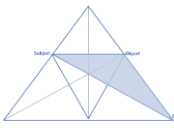
Figure 6.5 AODM Activity Notation (Mwanza 2001: 152)

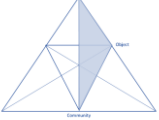
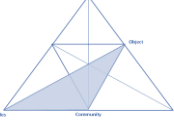
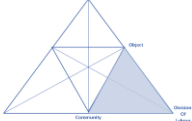
The rules for using the notation is that it consists of the following components:

- 1) An 'Actor' represented by the Subject or Community component of the triangle model.
- 2) A 'Mediator' represented by the Tools, Rules or Division of Labour component of the triangle.
- 3) The 'Object' on which activity is focused.

Each combination within the activity notation represents a complete sub-activity triangle from the main activity system (Figure 6.5). In the context of the ePioneers project each sub-triangle is highlighted as shown in Table 6.4. As Activity System (B) is only extended by the individual projects, the mapping process is limited to activity system (A).

Table 6.4 AODM mapping of ePioneer processes of Activity System (A)

Subject-Activity Triangle Focus	Application of the activity notation within study context	Potential areas of tension for further scrutiny and research interest questions
1. Subject-tool-object 	Engeström (1999) defines the subject of the activity system as the individual or group to be scrutinised. The tools (or structures) make the activity possible. They are social others and artefacts that can act as a resource for the activity (1999). The object is the goal or motive of the activity that are transformed into outcomes mediated by the tools. In this context the communication with the mentors (tools) are the main resource because they are the enablers of the activity of the (subject) ePioneers individual groups. The tools facilitate the production of artefacts (technology innovations) as a resource to help the ePioneers reach their outcomes. Successful outcomes empower the ePioneers as change agents/champions to share their practice.	The ePioneers (subject), are working together with mentors (tools) within a new unfamiliar context that differs from their normal working environments. The object is to produce artefacts or design changes through communication with the tools to reach the objective. POTENTIAL CONTRADICTION 1: CAUSED BY UNFAMILIAR WORKING CONTEXT FOR SUBJECTS & TOOLS
2. Subject-rules-object 	The rules are the formal/informal regulations that affect how the activity takes place. The rules in this context are related to the H.E. context of the institution, the School and within the ePioneers project.	The cultural norms and rules and regulations that the participants (subjects & tools) are used to operating within, conflict with the new project context. The participants are colleagues with differing roles and responsibilities within the School. They are now collaborating in a completely new voluntary context. Therefore, the absence of explicit rules within the project context, causes tension with how the subjects and tools (ePioneers groups & mentors) should make decisions on how to progress with the innovations to reach their objective. POTENTIAL CONTRADICTION 2: CAUSED BY TENSIONS BETWEEN IMPLICIT/EXPLICIT INSTITUTIONAL RULES & DECISION-MAKING WITHIN NEW CONTEXT TO ENABLE THE INNOVATION PROCESS.
3. Subject-division of labour-object 	The Division of Labour decides how the tasks are shared among the community. In the project context the division of labour was shared between the mentors and ePioneers. The actions of the mentors and ePioneers within this community will be scrutinised.	The hierarchical structure of the School means that the project participants have different levels of agency in which to make decisions in their work contexts. The explicit nature of the participants' job roles in the School might be in conflict with determining the division of labour in this new project context. The nature of the ePioneer-mentor pairing implicitly assumes that the mentors have more (technological) knowledge to better support the ePioneer. However, unknown issues of agency may affect decision-making within the activity system. POTENTIAL CONTRADICTION 3: CAUSED BY TYPES OF KNOWLEDGE AND AGENCY HELD OR PERCEIVED TO BE HELD BY EPIONEERS & MENTORS

Subject-Activity Triangle Focus	Application of the activity notation within study context	Potential areas of tension for further scrutiny and research interest questions
4. Community-tool-object 	The community refers to the ePioneers community of practice i.e. the community in which the projects are operating to reach their objectives.	The ePioneers community is new for the participants, so relationship-building is difficult because of conflicting job roles and related freedom to act. POTENTIAL CONTRADICTION 4: CAUSED BY THE UNESTABLISHED RULES OF AGENCY WITHIN THE NEWLY FORMED COMMUNITY
5. Community-rules-object 		The formation of the new ePioneers community requires the establishment of new rules between the ePioneers and mentors. Implicit understanding of project content knowledge, causes tension with establishing relationships within the community and may affect progress towards the object. POTENTIAL CONTRADICTION 4: CAUSED BY THE UNESTABLISHED RULES OF AGENCY WITHIN THE NEWLY FORMED COMMUNITY
6. Community-division of labour-object 		The division of labour is dependent on ePioneer and mentor knowledge and the needs of the ePioneers within the community. CONTRADICTION CAUSED BY TYPES OF KNOWLEDGE HELD OR PERCEIVED TO BE HELD BY EPIONEERS & MENTORS CONTRADICTION CAUSED BY THE UNESTABLISHED RULES OF AGENCY WITHIN THE NEWLY FORMED COMMUNITY

The questions from the ESM were applied to each of the subject-activity components in the activity system numbered 1-6 in Table 6.4. For example, sub-triangle 1 consisted of (Subject-Tool-Object). In terms of the project, the mentors (tools) were the main enabling resource for the activity of the (subjects) in activity systems A & B. The mentors were knowledgeable about the technology and/or context for the innovation, and so were able to provide contextualised input that encouraged the ePioneers to produce artefacts or design changes relevant to their project context. The potential area of tension within this sub-triangle is the unfamiliar context that the mentors and mentees were working in, both in the pairing (they had never worked together in this type of context), and potential job role tensions (they had differing degrees of agency in decision-making). By problematizing the study context in activity system terms for each sub-triangle using the activity notation, the analysis identified potential areas of tension that may result in contradictions that could be further exploited within the data.

Step 3 - Technique for generating themes

The ADOM provides the means to generate themes from the constituent parts of the case study and to create questions that will identify contradictions that, in turn, will provide a deeper context in which to answer the research questions. Figure 6.6 illustrates the technique for generating further questions within the activity system framework.

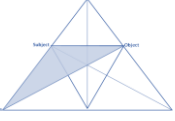
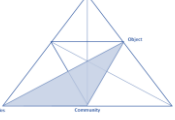
Technique of Generating Research Questions
1. What Tools do the Subjects use to achieve their Objective and how? 2. What Rules affect the way the Subjects achieve the Objective and how? 3. How does the Division of Labour influence the way the subjects satisfy their Objective? 4. How do the Tools in use affect the way the Community achieves the Objective? 5. What Rules affect the way the Community satisfies their Objective and how? 6. How does the Division of Labour affect the way the Community achieves the Objective?

Figure 6.6 AODM's Technique of Generating General Research questions (Adapted from Mwanza 2001: 5)

tep 4 - Technique for mapping operational processes

Table 6.5 identifies contradictions generated from utilising the questioning within the AODM framework in the context of this study. For each sub-activity system, the context was problematized within the system to enable the identification of any potential contradictions in relation to perceptions of the mentor role that might be evident. Each component of the activity system was questioned using the stages of the AODM toolkit to identify potential contradictions.

Table 6.5 AODM mapping of mentor role contradictions.
Adapted from Mwanza (2002)

Subject-Activity Triangle Focus	Potential areas of contradiction for further scrutiny
1. subject-tool-object 	The ePioneers (subject), are working together with mentors (tools) within a new unfamiliar context that differs from their normal working environments. The object is to produce artefacts or design changes through communication with the tools to reach the objective. CONTRADICTION = UNFAMILIAR WORKING CONTEXT FOR SUBJECTS & TOOLS TO FORM WORKING RELATIONSHIPS
2. subject-rules-object 	The cultural norms and rules and regulations that the participants (subjects & tools) are used to operating within, conflict with the new project context. The participants are colleagues with differing roles and responsibilities within the School. They are now collaborating in a completely new voluntary context. Therefore, the absence of explicit rules within the project context, causes tension with how the subjects and tools (ePioneers groups & mentors) should make decisions on how to progress with the innovations to reach their objective. CONTRADICTION = TENSIONS BETWEEN IMPLICIT/EXPLICIT INSTITUTIONAL RULES & AGENCY BETWEEN SUBJECT & TOOL AFFECTS DECISION-MAKING WITHIN NEW CONTEXT
3. subject-division of labour-object 	The hierarchical structure of the School means that the project participants have different levels of agency in which to make decisions in their work contexts. The explicit nature of the participants' job roles in the School might conflict with determining the division of labour in this new project context. The nature of the ePioneer-mentor pairing implicitly assumes that the mentors have more (technological) knowledge to better support the ePioneer. However, unknown issues of agency may affect decision-making within the activity system. CONTRADICTION = EXPLICIT/IMPLICIT KNOWLEDGE EXPECTATIONS
4. community-tool-object 	The ePioneers community is new for the participants, so relationship-building may be difficult because of conflicting job roles its related freedom to act. CONTRADICTION = CAUSED BY THE UNESTABLISHED RULES OF AGENCY WITHIN THE NEWLY FORMED COMMUNITY
5. community-rules-object 	The formation of the new ePioneers community requires the establishment of new rules between the ePioneers and mentors. Implicit understanding of project content knowledge, causes tension with establishing relationships within the community and may affect progress towards the object. CONTRADICTION = UNESTABLISHED RULES OF AGENCY WITHIN THE NEWLY FORMED COMMUNITY
6. community-division of labour-object 	The division of labour is dependent on ePioneer and mentor knowledge and the needs of the ePioneers within the community. CONTRADICTION = IMPLICIT COMMUNITY RULES UNKNOWN

This stage enables the identification of patterns and relationships between the components, as well as showcasing areas of contention. This is the final step to the

AODM toolkit. This technique was used to interrogate the data and to identify the main themes for further analysis in terms of the research questions.

Table 6.6 provides an overview of the contradictions highlighted in Table 6.5 and generated questions relating to perceptions of the mentor role identified through AODM mapping in the areas of interest within the activity system where they may apply. The table also highlights the key themes in relation to the activity system that apply to the contradictions. These themes form the basis of the analysis in relation to the research questions in the remainder of the chapter.

Table 6.6 Overview of tensions relating to perceptions of the mentor role

Contradiction 1:	Contradiction 2:	Contradiction 3:	Contradiction 4:
CAUSED BY UNFAMILIAR WORKING CONTEXT FOR SUBJECTS & TOOLS	CAUSED BY IMPLICIT/EXPLICIT INSTITUTIONAL RULES & HOW SUBJECTS AND TOOLS SHOULD ACT WITHIN NEW CONTEXT	CAUSED BY TYPES OF KNOWLEDGE HELD OR PERCEIVED TO BE HELD BY EPIONEERS & MENTORS	CAUSED BY THE UNESTABLISHED RULES OF AGENCY WITHIN THE NEWLY FORMED COMMUNITY
Area of activity system			
Subject-tool-object	Subject-rules-object	Subject-division of labour-object	Community
1. How do the mentors' actions at the different levels of the activity influence tensions between the unspoken implicit and explicit rules identified within the developing project community? 2. What contradictions (if any) can be identified from (1)?	3. How do the ePioneers and mentors manage decision-making in their new context, whilst reconciling their implicit job-related rules and freedom to act, in order to determine the division of labour for their project case contexts?	4. How do the different levels of knowledge and agency afforded by implicit job roles, affect the ability of the ePioneers to form relationships with their mentor?	5. What are the roles and actions of the mentors that support community development?
KEY THEME 3	KEY THEME 1 & 2	KEY THEME 3	ALL THEMES??

Contradiction 1 is focused upon Vygotsky's basic mediated **subject-tool-object** action triangle (Cole and Engeström 1993), and applies to the unfamiliar context in which the mentors are working with the ePioneers in order to meet the objectives. Contradiction 2 relates to the undecided rules of collaboration and division of labour between the participants in this newly formed community at the start of the project. Contradiction 3

points to the different knowledge of the ePioneers and mentors about technology and the project context, and their perception of freedom to make decisions based on their job roles. Contradiction 4 refers to the unknown rules and context of the newly formed e-learning community in which the participants are working. The key themes that emerge from the initial analysis are then analysed in greater detail in the rest of the chapter in order to answer the research questions.

6.3 Analysis of the key themes

The themes identified from the AODM analysis were grouped into three key areas. These themes are shown in Figure 6.7 and will form the main part of the analysis that seeks answers to the research questions.

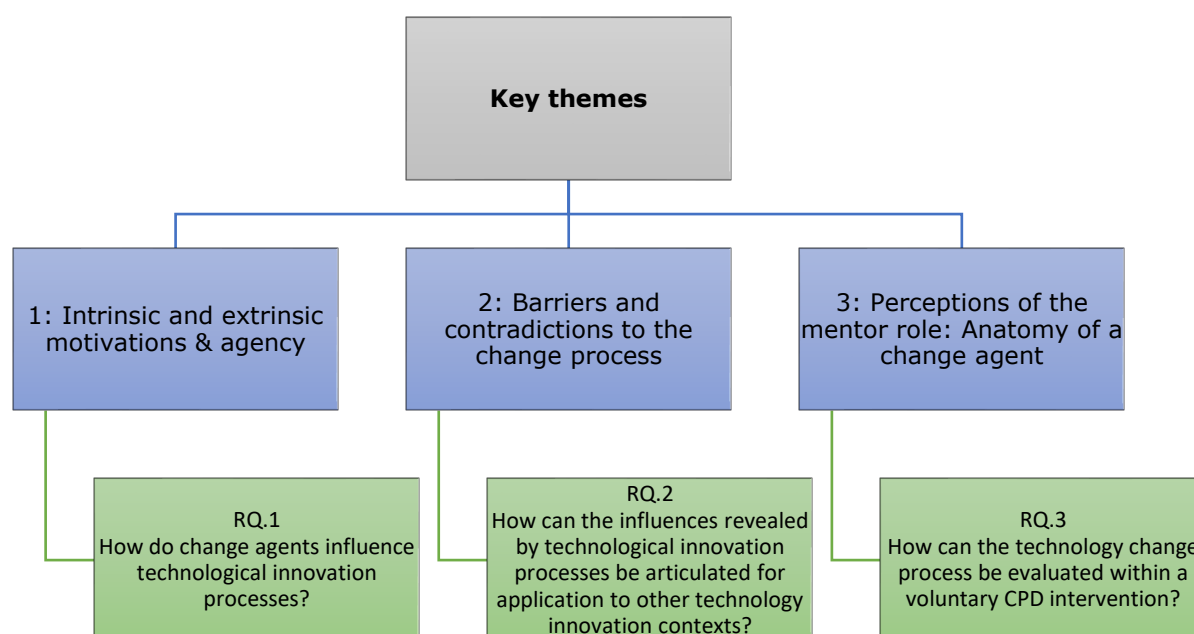


Figure 6.7 Key themes identified for analysis

Key theme 1 is an examination of the motivations of the mentors as change agents: considering what drives their practice in the promotion of development of e-learning practices. The focus is on an examination of the mentors' specific knowledge in relation to the implementation of technological change and the intrinsic and extrinsic motivations that is recruited to promote change. The aim is to form an understanding of the motivations and attributes that the mentors/change agents possess which contribute to the support of promotion of sustained technological innovation.

Key theme 2 analyses the personal barriers and contradictions to reporting personal experiences during the project developmental process. The theme emerges from the reluctance of some participants to publicly report progress on their developing projects.

Due to the volume of data generated from their comments on reasons for reluctance to utilise SharePoint as the reporting system, I wanted to understand this resistance more closely. This data might shed some light on this as an issue relating to barriers that prevent sustained technological developments.

Key theme 3 is an exploration of the different perceptions of the mentor role. This theme was derived from descriptions of the role from the mentors and the ePioneers. The aim was to gain an understanding of the mentors' perception of their role in the context of the project(s) they were mentoring, compared to reports in the mentoring/coaching literature. A further aim was to evaluate their perception of the role as the mentor-mentee relationships evolved. This is part of understanding the motivation of the mentors as change agents within the process. This analysis of the perceived mentor roles seeks to answer RQ 3 and evaluates the process in order to ascertain the transferability of change agent roles to the wider H.E. context.

6.3.1 Key Theme 1

6.3.1.1 Intrinsic and extrinsic mentor motivations and agency

The analysis for Key theme 1 addresses RQ 1 and is focused on understanding the motivations and related qualities of the mentors as change agents and their potential influence on the technological innovation processes within the project context. Figure 6.8 shows the subject-rule-object area of the activity system under scrutiny, and the cause of the contradiction and the questions generated, based on AODM mapping.

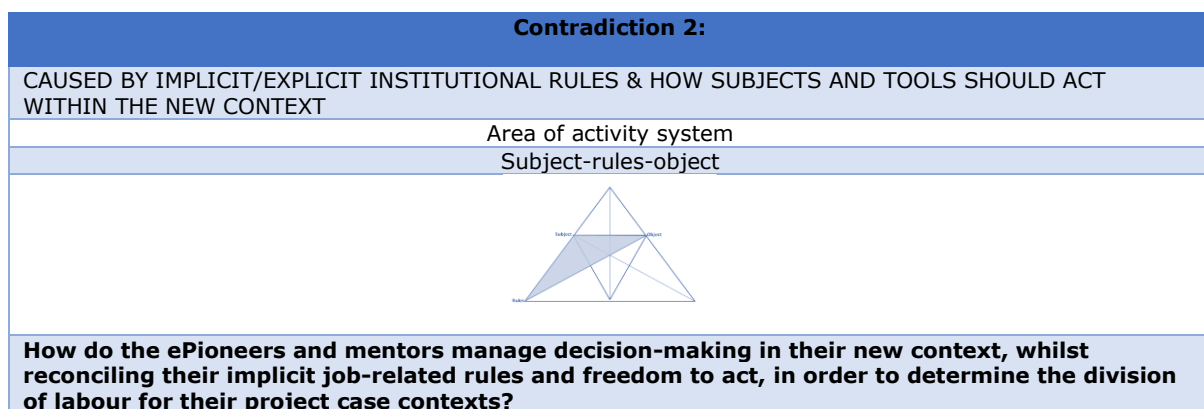


Figure 6.8 Potential contradictions for Key Theme 1

The contradiction identified in this theme occurs because the new working context consisted of academics, administrators and technical staff working within a new community. This context raised uncertainty about decision-making where the ePioneers (Subject) and mentors (Tool) were unsure in their decision-making. This is because they were aware of a conflict in the power and limitations resulting from the hierarchical status related to their individual job roles. AODM mapping (6.2.3) identified how the cultural norms and rules and regulations that the subjects and tools are used to working within (see Activity system B, Section 6.1) were in conflict with the new context of the project. Within this new context there is an absence of explicitly set out rules, therefore causing tensions around how the ePioneers and mentors should work together in order to reach their objective(s). Who should make decisions as the expert in the context? What impact does this contradiction have on the change agents and their influence on

promoting the innovation process? The analysis starts with a consideration of the types of motivation elicited by the mentors broken down into examples of intrinsic and extrinsic motivational traits. Then follows a deeper analysis of these motivational traits from the perspective of the e-Strategy group mentors and the particular role of the mentor-coordinator.

6.3.1.2 Motivation and the mentors

The types of motivation presented by the ePioneers and mentors provide a background for understanding the unique support provided within each project. To be motivated, according to Ryan and Deci (2000) in the context of learning and assimilation, 'means to be moved to do something' (pg, 54). Moreover, people differ in the types and amount of motivation they display; i.e., the level of that motivation and the orientation of it. The orientation of motivations relates to the underlying attitudes and goals behind actions; i.e., the 'why' of the actions (Ryan and Deci 2000). The ePioneers project took place in a work context, so it is important to differentiate the types of motivation that occurred from the participants' perspective. This is especially important given the voluntary nature of the project from the outset. Moreover, this research is particularly concerned with understanding the motivation of the mentors, so that a picture of the attributes of the mentor as a change agent can be constructed.

As discussed in Chapter 2 section 2.3.1, motivation in the workplace, according to Birkinshaw (2012), is personal and prompted by behavioural triggers that are either from external factors (extrinsic motivation) or triggers internal to the person (intrinsic motivation). In terms of an interpretation within the activity system, intrinsic motivation was expressed through the ePioneers (subject) having a high regard for the mentor (object). There is also internal extrinsic motivation, i.e. external rewards that are internally valued. This type of motivation is based upon a sliding scale of internalised motivators from intrinsic to extrinsic within two endpoints. Workplace motivation is a concept that is totally applicable to this study context: the research focuses heavily on the motivations of the participants and the relationships that developed over the course

of the project. Within the research context there was strong evidence from the data of intrinsic motivational factors impacting the mentor roles within the project. These became more evident as the project cases developed. The evidence is discussed later within this section.

Examples of motivation within the project was revealed through a deeper analysis of types of intrinsic motivations using self-determination theory (SDT). SDT is based upon human needs of autonomy, competence and relatedness (see Section 2.3.1). Here, I firstly consider motivations in relation to the e-Strategy group and the mentor-coordinator in particular. For instance, my role as an e-Strategy group member in the project evolved into one of the management and coordination of the day-to-day running of individual projects. This role was both extrinsically and intrinsically motivated for various reasons. The extrinsic factors related to the institutional demand to develop the use of learning and teaching technologies, and the responsibility of the people with specific technology-related job roles to ensure those goals were achieved. The entire e-Strategy group is involved extrinsically in this case. Here I invoked the new freedom to act with powers assigned to me within the study context despite working with more senior colleagues. This was demonstrated in my actions through an intrinsic motivation to ensure that the object of the project was satisfactorily reached.

Within the e-Strategy group for instance, the membership consisted of the Director of Teaching and Learning (aka Project mentor 3 in this context), a professor, an associate professor, a senior lecturer, a learning technologist and an academic-related member of staff - myself. In terms of hierarchy, the learning technologist and I belonged to the Administrative, Professional and Managerial (APM) family, whereas the other members belonged to the Research & Teaching (RT) family. Hierarchy was explicitly evident within the group composition but was strategically overlooked. This group of people were already actively embracing e-learning technologies and supporting users as part of mainstream learning and teaching practices. In terms of the activity system, the e-Strategy group utilised their own intrinsic motivation and acted as tools to ensure that

the project focussed on developing e-learning skills within the School. Similarly, the ePioneers as subjects, were supported by the tools (mentors' knowledge and communication skills) to develop their innovative skills and change their practices. The strict hierarchical nature of the institution in terms of management and job role present conflicting actions within the new community. The e-Strategy group proceeded from an informal, collegiate attitude, where no leadership role was intentionally identified, although leadership was implicit for the aims of the group. This assertion is confirmed in comments from the Learning & Teaching coordinator (Project 3 mentor).

The E-Learning Strategy Group in the School of Education was really formed as part of the Learning and Teaching Committee, and its brief was really to look at how e-learning, and learning and teaching in general, what was the relationship between them. Because there was a concern from some of us that it seemed that, as long as you had the two separated out, and it seemed that a lot of the strategies and policies always seemed to be badging e-learning as being something completely different from the learning and teaching agenda, then it seemed to us that there was a gap there that didn't quite feel right. (Project 3 mentor)

Project 3 mentor was acutely aware of the intrinsic motivation that was driving the e-Strategy group to manage the e-learning project in a manner that was inclusive to all staff and strived towards embedding e-learning into the normal working practices for all. Another e-Strategy group member noted the non-hierarchical structure within the group although they were acutely aware of the different levels of responsibility of its members.

We represented different perspectives, and different levels of responsibility, and different areas of responsibility within the school, and yet we were able to pool those in a way where nobody was in charge. It was a democratic group, equal voice and all of that, [...] well placed to, sort of, touch the structure and processes of the school at a number of levels. (Senior lecturer e-Strategy group member)

It tried to capture the different roles of people within the school, and it was a voluntary group, and it consisted of people from both the academic staff and the administrative staff, and the technologists as well, so really, it was bringing together three elements of work within the school. (Project 3 mentor)

Project 3 mentor noted the combination of the three job families within the group, which were Technical, APM and RT. The group coordinated the project and divided the tasks between them based upon their particular skills, interests and e-learning expertise.

A strong example of internal extrinsic motivation working against cultural rules is demonstrated in interview data from the e-Strategy group early in the project. Although there was an active staff development policy within the School, there was no allocated time for staff development within this project, unless time was bought out for the purpose. During the instigation of the project, this time allocation was not considered. I recognised from the early meetings that workloads were impacting on the project planning progress and the execution of tasks. I recognised that the group members were a collection of busy academics and administrators with heavy workloads far greater than my own. They therefore needed someone to lead on the day-to-day running of the project. In activity system terms, a contradiction in the division of labour against the rules and regulations of the normal working practices of the e-Strategy group resulted in a transformation of roles, whereby I took a proactive approach: taking the lead to ensure that project objectives were operational. This constraint and identification of my new role was soon recognised by Project 3 mentor:

Well, Elaine took on the bulk of the co-ordination, and I think we were very lucky that she did do that so vigorously, actually, because I think that was important in keeping the project both moving forward and together as a project, because otherwise it could, very easily, have become just the subprojects. (Project 3 mentor)

Project 3 mentor commented on the importance of this leadership role to keep the main project aims and objectives intact, otherwise to risk the projects fragmenting into individual School projects. This observation recognised the demonstration of overwhelming regard and also intrinsic motivation to support subjects in reaching the project objectives - despite the working time constraints acting on the participants.

With the benefit of hindsight, the most efficient way of operating a 'mentoring project' would have been to have a project coordinator. However, this possibility of a person with a suitably allocated workload was not considered in the planning stages. Nevertheless, the mentor-coordinator role was important, and it emerged by default from a personal standpoint: experienced internally as a mentor and as a member of the e-Strategy team directing the project.

Project 3 mentor remarked that the mentor-coordinator triggered a realisation of the top-down perspective that was acting on behalf of the e-Strategy group that the ePioneers responded to, in order to move their projects forward.

It [the project] involved a certain amount of sensitivity because if people really felt that it was the top-down, "You must do..." then that would have changed the ethos of the group. On the other hand, without somebody gently reminding us that a report needs to be done, we're halfway through, how about meeting, and don't forget to check, and all those kind of reminders then, that's where it came from, and it was crucial. (Project 3 mentor)

Project 3 mentor was acutely aware of the importance of the mentor-coordinator and their effect on the responses from the project participants. This demonstrates an awareness of how the cultural rules conflict with the rules being established within this new community and leads to an understanding of how these rules are reconciled within the group. It was clear that the intervention of the mentor-coordinator leading the day-to-day running of the project was achieved not from the hierarchical perspective of an academic and this evoked positive responses from the participants. Project 3 mentor quite rightly identified that the role evoked bottom-up responses from the realisation of the top-down perspective that was acting on behalf of the eStrategy group. This is evidenced through the freedom to act embodied within eStrategy group management role but in conflict with the hierarchical status and freedom to act within my normal job role. As the project researcher, I also recognised quite early on that my role as mentor-coordinator was having a very influential effect during the process.

I've seen me acting as a sort of trigger in different areas of the project anyway [Researcher]. And you have, and the great thing about that, and it's something that we have to be careful about is that deep down I think it's alright because Elaine will do that. But, what that means is that on this kind of initiative actually you do need somebody who feels (for whatever reason) – for you I'm guessing that it's partly a personal motivation because it's research that you're doing this. It's more than that. [...] but it's part of it as a kind of professional wanting to. (Project 3 mentor)

[...] then I've been triggered into action because of this (interview) [...] So perhaps there is something about a supremo i.e. yourself acting as a kind of I don't know – trigger to mentors without you feeling you're going in front of your Head of School to explain some tricky business. I mean I see it rather in

that way. To me that's very helpful, but for other people they might not need it at all. (Project 3 mentor)

Project 3 mentor recognised intrinsic motivations on two levels: namely, the motivations of the researcher and the motivation as mentor-coordinator in being physically part of the project. Further, evidence that the mentor-coordinator played a key transformational role was found in their personal desire for the project to succeed through their own intrinsically motivated stance.

It needed somebody to keep the momentum going. And I emerged with that role, so I was the one that was talking to people. People saw me in the corridor, and they'd say, "Ah, ePioneers project. I must be doing something on there." (Mentor-coordinator)

This intrinsic motivation evoked a response from the ePioneers and mentors, motivating them to persevere with their personal CPD through their projects without the formal power relationship that would have existed if a senior academic or administrator had taken on this role. A number of ePioneers remarked on the influence of the mentor-coordinator in relation to their project progress. The mentor-coordinator utilised email reminders to trigger actions. But, in addition, the presence of the mentor-coordinator attending to their own daily work around the School served as prompts to motivate the project participants into taking action. This influence is observed by several of the ePioneers below:

There were deadlines that she set, or which were "Have you posted to the blog site?" "You've got to report on your progress." "We're having a, sort of, a show and tell." "We're having a conference", so that these would come out fairly regularly, these emails. And that was useful as well, so it - I think that would help us think about how we're evaluating the project. (Project 4 ePioneer)

You essentially. (Laughter) And I'm not entirely sure whether I mean that in a positive one way. No, I'm joking! It is a matter of one of those, yeah, you know, the email comes around, the first one, I ignore. The second one, I do something about. And...yeah. I assume other people are doing somewhat better than us in terms of reacting more quickly. (Project 15 ePioneer)

I must admit there were a kind of probably two or three occasions where I thought, you know, I just haven't got the time, it was all trying to put it in, you know? Shall I just kind of drop it, but you know the support you've given me and the kind of gentle cajoling has made it really that I will stick with it and we will see it through. (Project 13 ePioneer)

I was probably one of the people who had to be shepherded quite a few times, in terms of sending in reports, and giving updates. I think Elaine's role, in terms of being supportive, but then, at the same time saying, "You've got these deadlines coming. Please remember to do this," was very important, because it also forced me then to think, "Okay, what - how can I handle these difficulties?" and "do I want to handle these difficulties, or do I need to shift?" Which, in the end, I chose to do. (Project 6 ePioneer)

These responses from the ePioneers are in relation to interview questions targeted to understand if there were any change agent actions or responses that contributed to the success of the project (see Section 5.2.2). Project 6 and Project 13 ePioneers reflected on the usefulness of the email triggers that kept them informed and motivated to continue with their projects. Project 15 and Project 16 ePioneers remarked on the effect of the physical presence of the mentor-coordinator around the School for motivation and, moreover, to create guilt triggers if they were not continuing to develop their projects. Project 13 ePioneer reacted to the extrinsic motivation from the support provided by the mentor-coordinator to continue with their project. All these triggers acted as extrinsic motivators to promote action by the ePioneers to take ownership of their projects and adhere to deadlines, even though they were constrained through lack of time and heavy workloads. The external trigger resulted in the ePioneers reacting to the rules within the new community, resulting in positive internal responses to enable them to reach their project objectives. This is exemplified with project 4, 5 and 12 ePioneers.

And the other thing is, of course, is, you know, having you [mentor-coordinator] kind of chipping along and say, (Laughter) [...] knowing you're a part of a structure (the project) and that you've got the right kind of deadlines, that's really useful. (Project 4 and 5 ePioneers)

You're the little devil on my shoulder saying, "You will get this done." (Project 12 ePioneer)

The comments by ePioneers 4, 5 and 12 above, provide examples that demonstrate the effectiveness of the mentor-coordinator as an extrinsic motivator. This also adds to the external intrinsic feeling of worth that exemplifies the mentor-coordinator role.

So far, the analysis in this theme has been linked to the motivations of the mentor-coordinators as tools acting within the activity system and then their influence on the

project outcomes. However, it is also important to acknowledge the extrinsic motivational factors that influenced the mentors in relation to the project. Within the ePioneers project moderate financial support was allocated to individual projects, this provided an extrinsic motivation for taking part in the ePioneers initiative. Such funding allowed the ePioneers the freedom to develop their projects in any way they wished. Internalized extrinsic motivation was evident in the mentors reflecting on their perceived value to the project outcomes. For example:

So, it's almost as though you start off with a very strict project structure, and then what you're really doing is creating a culture whereby people are more anxious to learn in general, and you start getting approached from all sorts of directions. And that's, I suppose, quite gratifying, in that your expertise is valued. It can also be quite overwhelming, in that you feel that people are asking you far more things than they used to do, and how does that impact on your time and on your own role? So there's a, sort of, positive and negative aspect to that. (Project 1 mentor)

Project 1 mentor genuinely valued the positive perception given to the role of a mentor, but they also struggled with the extra recognition that the role demanded in terms of available time: this caused a conflict between their job role and the project. In this case the contradiction was probably because this mentor was new to the university and had not yet established their own job role. However, this mentor also recognised the value of their role as a mentor despite initial tensions relating to decision-making and freedom to act within this project context.

6.3.1.3 Summary of findings: Key theme 1

This research has considered dyadic relationships of a mentor change agent within a group of ePioneers. It follows from the assertion by Haggard (2011) to distinguish mentoring from other kinds of work-related relationships and it contributes to an understanding of the core attributes guiding mentoring in work-related contexts. Namely, that they should be: reciprocity, CPD and interaction over time. Moreover, it adds to knowledge in the field that Haggard (2011) laments is lacking. This theme has demonstrated how intrinsic and extrinsic motivational factors of the mentors as change agents has played an influential role within the innovation change process. The emergent

mentor-coordinator role led to individuals demonstrating their positive motivational stance. That prompted a very positive object-orientation that encouraged the participants to value the achievement of their project objectives through their developmental actions. It would be useful to unpick this role and its achievements in further research.

Motivation was further demonstrated through the mentor-coordinator's efforts to maintain the project momentum and to motivate other mentors and, ultimately, to have them act as tools within the activity system. The positive object-oriented responses from the mentors and ePioneers were internally integrated, regulated responses linked to the instrumental value of completing the projects, i.e., an extrinsic trait. There were no apparent tensions between the mentor-coordinators and the project participants. These traits concur with Haggard et.al's (2011) notion of core work-related mentoring attributes, in that the reciprocal relationship involves two-way social exchange. The resulting developmental benefits, according to Haggard, are linked usually to the mentee's career progression; regular/consistent interaction between the mentor and mentee signals commitment, intensity and duration.

In terms of answering RQ 1, the analysis has identified change agent traits with positive object-orientations that influence the technological innovation process. These are intrinsic motivational traits that demonstrate positive object orientations, and extrinsic motivational traits that maintain momentum and steer the ePioneers to fulfilment of their project objectives.

6.3.2 *Key Theme 2*

6.3.2.1 *Barriers and contradictions affecting the innovation process*

This theme examines contradictions and barriers to reporting personal experiences during the project development and maturation process. The aim is to answer RQ 2, which asks how the change agents' influence on the respective projects is articulated and disseminated within the immediate and wider technology innovation contexts. Hence, it aims to exemplify some of the experiential barriers encountered during the process of people adopting institutionally led technology change policies. It focuses on the personal challenges of the mentors and ePioneers in reporting progress with their projects utilizing a shared online reporting system, and then the effect of intervention by the mentor-coordinator within this process. The aim is to explore contradictions relating to the willingness of the participants to disclose fully their personal development journeys, to the ePioneers community, and to the wider e-learning community internal and external to the university. Moreover, this theme explores the presence of contradictions of agency within the new community, in order to understand whether the participants' normal job roles affect decision-making related to the development process they are experiencing.

In terms of AODM analysis, the data suggests that the rules/regulations within the activity system are coercing certain types of participant behaviour in relation to the reporting of progress. The reporting convention within the project community was not set but the explicit rules of the project stated that all participants must report their project case progress on a regular basis. The utilisation of the activity system within the analysis will add to the understanding of these behaviours as they are analysed in this theme. These problems were highlighted mainly by the non-use of the reporting system and confirmed thorough discussion during the preliminary interviews. However, it is not the practicalities of using SharePoint that I am interested in, it is the narrative behind this non-use and the associated stories and contradictions relating to agency and motivations of the participants. These matters are the ones that warrant further scrutiny.

The analysis first considers external contradictions whereby agency in relation to freedom within job roles conflicts with agency within the new community; i.e., can the participants report freely in the new community without negatively affecting the feelings of the other participants? Next, the analysis considers contradictions in the division of labour which impact on how the mentors report on progress within the community.

6.3.2.2 Internal and external contradictions in reporting the change process

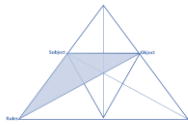
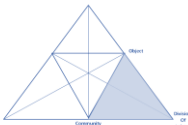
Contradiction 2:	Contradiction 4:
CAUSED BY IMPLICIT/EXPLICIT INSTITUTIONAL RULES & HOW SUBJECTS AND TOOLS SHOULD ACT WITHIN NEW CONTEXT	CAUSED BY THE UNESTABLISHED RULES OF AGENCY WITHIN THE NEWLY FORMED COMMUNITY
Subject-rules-object	Community
	
How do the ePioneers and mentors manage decision-making in their new context, whilst reconciling their implicit job-related rules and freedom to act, in order to determine the division of labour for their project case contexts?	What are the roles and actions of the mentors that support community development?

Figure 6.9 Contradictions related to Key theme 2

Figure 6.9 highlights the contradictions identified through AODM analysis in relation to Key theme 2. Contradiction 2 questions the decision-making capacity and agency of the mentor/mentee in their normal working contexts, that conflicts with how they make decisions within the new community. Contradiction 4 problematises the uncertainty of the division of labour between the participants and how this impacts on decision-making and reporting within the community. In this theme the focus is on examining the contradictions in the rules/regulations quadrant that impact on the relationships within the community. The tensions connected to this contradiction occurred through the process of reporting progress within the projects.

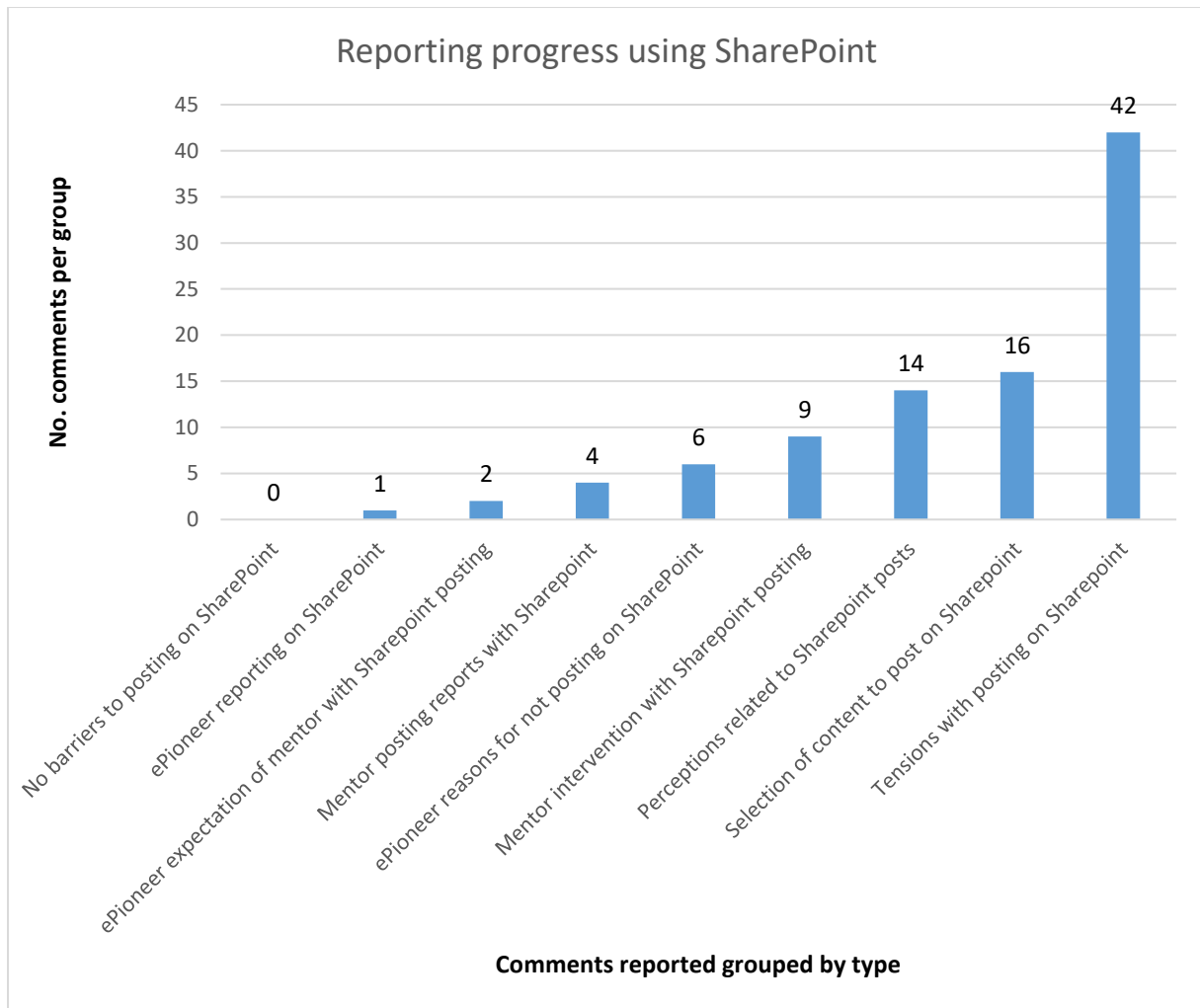


Figure 6.10 Project Participants Reporting with SharePoint

Figure 6.10 shows the themes generated from questions relating to using SharePoint to record project progress and the number of comments in relation to each theme. The comments were extracted from all of the participants, as each was asked the same questions in relation to the reporting procedure (see Chapter 5, Section 5.2.2). Some participants provided more than one reason for not utilising the tool. The main comments were concerned with personal perceptions relating to the posting of blogs, of which there were 42 comments. There were concerns about how the participants felt about reporting their progress and how the readers felt about receiving them. Moreover, there were issues about the selection of content to post, and the apprehensions about not posting reports. The results showed that the category labelled 'Tensions with posting SharePoint' reports was by far the greatest concern of the participants. Here, there were

42 references (all data referring to the category) from 18 sources (interview data). This was closely followed by the category 'Selection of content to post on SharePoint', with 16 comments from 7 sources. Further analysis of the themes showed that this major contradiction was linked to the transparency of the posts and whether the posted responses were viewable to the ePioneers community, the wider university or that public domain wherein blogs are usually posted. In terms of the activity system, the analysis indicates contradictions between the subject and object in relation to decisions to post to the blog. In addition, there were also contradictions in relation to agency and the external-facing nature of SharePoint and the willingness of some participants to post progress internally and externally to the project community. These potential barriers to reporting suggest a direct negative effect on the innovation process. Appendix 9.6 provides a breakdown of the comments regarding the barriers to reporting. The barriers were broken down into sharing negative experiences, shared consensus in reporting and perception of reporting styles.

6.3.2.3 The public face of sharing negative experiences

This section analyses academic job status conflicting with perceptions regarding agency to reporting progress. The traditional view of an 'academic' is one based on collegiality and the exercise of academic freedom, at least according to Clegg (2008: 342). Moreover, the role of the academic has changed, such that academic identity is related to a person's experience and what they value in their own projects as 'intellectuals and persons with strong value orientations' (Clegg 2008: 342). Using McNay's (1995) generic structure of organisational types, this Institution is categorised as a 'collegial', research-led organisation and described as follows.

The university's foundations lie in [...], a constituent college of the University of London set up in 1881, which was then granted its own Royal Charter in 1948. It was the first British university to establish a campus in Malaysia, in 2000, and the first foreign university to open a campus in China, in 2004.

Across the three countries it has more than 8,000 staff, 32,500 undergraduates and 9,600 postgraduates. At its main Nottingham campuses, 27% of students are from overseas, as are a third of academic staff. (Russell Group 2016)

The quote above, taken from the Russell Group of Universities website (Russell Group 2016), exemplifies the international relations the university has developed, including partnership universities in China and Malaysia and, therefore, represents an enhanced opportunity for cross-cultural research. The University is managed by two main bodies, the University Council and the Senate. The Council is the governing body responsible for the approval of strategic plans, finances, buildings and staff. The Senate is responsible for the direction of and regulation of teaching and examinations. The day-to-day management of the University is managed by the University Executive Board. This Board is responsible for steering and supporting the strategic direction of the University:

The UEB exists to:

- **discuss a broad range of opportunities and challenges**, covering all areas of strategic interest
- **engage with the external environment affecting the institution** and higher education - both nationally and internationally - to inform decision making
- **work closely with senior academic and professional service leaders** to understand activity across the University in order to ensure strategy is in line with requirements
- **direct the affairs of the University** on behalf of Council and Senate

(Institutional Management and Governance 2016)

This description of the management and governance of the University indicates a strong hierarchical structure. Its organisation points to the clear divisions between academic structures and support roles, and decision-making exercised through complex committee structures. The hierarchical distinction is exemplified in McNay's (1995) classification of organisations (Conole and Oliver 2007, see Figure 5.1, pg. 70). McNay distinguishes idealised generic categories of sector-specific institutions, namely, collegial, bureaucratic, enterprise and corporate organisations. The author argues that forming an understanding of which cultural type an organisation closely fits into, will help in the formulation of strategies for successful e-learning implementation. According to hierarchical distinction, academic status is more valuable than support functions in research-led institutions (Conole, et al. 2007). This view of academic status affected the

rules/regulations internal and external to the project community; this was exemplified by the comments of academic participants and was found to influence their thoughts and actions within the reporting process. Academic status also played a role in how the APM mentors viewed their status when reporting progress openly; they were concerned with how others viewed their professionalism:

There is a concern that you've got to put a professional front on what you do and if we are out there in the wide world with a large number of ePioneers saying this is crap this is difficult this doesn't work. (Project 5 ePioneer)

Although if that's if we're talking about sharing it just amongst the ePioneers group. I don't know that that necessarily want to bear all if it was open to anyone reading it. I just feel that I would come across as ineffectual which I know I am. My public persona matters to me but I'm quite happy to share the reality and the difficulties with colleagues. (Project 7 ePioneer)

These ePioneers were concerned with the fact that, as academics, their identity needed to be portrayed in a certain manner in public. The explicit rules and regulations of the institution could thereby influence the opinions of participants within this study context. In the case of ePioneers 5 and 7, they wanted to maintain the traditional view of 'the academic', as well as keeping their values and experiences intact. To be portrayed externally to the ePioneers community as weak would indeed cast doubt on their intrinsic academic identity. On the other hand, they were happy to share the development process within the ePioneers community, thus maintaining their status and credibility.

Another mentor considered the positive aspects of sharing their experiences through writing blog reports but was uneasy as to how the content would be perceived in the wider university. Their actions were internally extrinsically motivated (Birkinshaw 2012) through the therapeutic nature in which they considered reporting to the blogs for the benefit of the e-learning community. In other words, they were pleased that their efforts were making an impact, but also wary of negativity that might be caused for any future negotiations they might have with other university services. Project 3 mentor was therefore reticent about reporting barriers to their project progress, as the constraints were directly related to conflicts involving the university Information Services (IS):

[...] I was aware of writing it in the blog – I've got to have another go at IS (Information Systems) and just because that's the way I felt, that's how it is. Then I thought I can't put that on the blog because they (IS) might see it and it's negative. Erm and yet, at the time it is negative because I can't really get anywhere with it. It's just finding the right form of words. And then, I thought I can't do that. (Project 3 mentor)

Project 3 mentor was clearly struggling with the contradiction of trying to report their progress with their project, while the outward-facing nature of the blog required that they chose a form of words that was appropriate and yet not creating another barrier to their project progress. However, a contradiction around academic status and the necessity for reporting within the context of the e-learning community, highlighted the problem with agency for this mentor. The tension with reporting was also more important because, as Director of Teaching and Learning and a member of executive university committees, negative comments about an institution-wide service might not be perceived as developmental but might be seen as a contradiction within their professional relationships across the institution. The observations of Project 3 mentor's reporting experience provide a credible example of a barrier to the institutional implementation of technology that staff must grapple with.

The APM ePioneers and mentors were also concerned with how their reporting would be perceived within the university and the wider internet community. However, their concerns were more focussed on the practicalities of a lack of progress and how that might be perceived, and not so concerned with status issues. Here, consideration must be given to the fact that APM staff do not command the same level of agency as their academic counterparts. Therefore, their willingness to document any project progress is based on a contradiction around their status within a job role and not having the confidence to use a form of words in their reporting that they perceive to be at an appropriate level for blogging.

I go to the meetings, but I haven't been back to look up the other people had done. Actually, it will be nice to have another one of this meeting is because I've found that rather interesting to see what other people are doing. But no I haven't been back on (SharePoint), partly because it's who complain they're sort of embarrassment who have not having really got on with the project. (Project 14 ePioneer)

I think that there might be certain barriers [...] possibly the barriers that I can probably see is two things one is people's inexperience I've never used it and possibly how real, your blog as it were being conceived by somebody else's opinion 'cos I'm sort of I like quite friendly so I just wondered if people would frown upon that because probably my blogs would be quite chirpy and I suppose from support (APM) to academic that might be the only other one I could see perhaps. I suppose because it's non-facing so it's totally up on the web and you're not sitting face-to-face it's slightly different. (Project 14 mentor)

These participants were also concerned with perceptions of identity but within the ePioneers community. They did not want to appear as ineffectual as mentors in reporting their progress. Project 14 mentor was also concerned about not reporting progress in an academic writing genre. Their sense of identity seemed to be threatened within an e-learning community consisting of academics. It was clear that neither project 14 mentor nor Project 14 ePioneer were familiar with the use of blogs therefore creating an immediate tension around reporting their project progress. Their unease and lack of confidence with the reporting system was also creating a barrier to reporting of the innovation process.

6.3.2.4 *Reporting with shared consensus*

Project 4 & 5 mentor advocated that a consensus be reached with the ePioneers prior to reporting anything critical about the project. This mentor was also wary of the possibility of taking credit for the successful work done by the ePioneers on their project with the mentor's support. This mentor was concerned with multiple tensions to reporting progress.

I think that I would want to discuss it through with the project and come up with a consensus form of words I wouldn't want to use it for sounding off about critical negative aspects not that I have been particularly critical negative aspects for this one, but I wouldn't want to do that if there were. And also I wouldn't want to claim responsibility myself for what the project team had done and that's another reason for not contributing, but I feel I wouldn't want to claim their credit if I was putting something on about their success it would feel like me claiming credit for what they've done. (Project 4 & 5 mentor)

This mentor was concerned about reporting the progress of their projects and not being too critical about negative aspects of the process. Moreover, they wanted to ensure that it was the ePioneers who took ownership of the project and thereby claimed praise for their own achievements. In this case, the mentor is assuming a more coaching role, as

suggested by Clutterbuck (2003), where they are encouraging and supporting the ePioneers to take control of the reporting process. This is also an example of extrinsic-intrinsic motivation on the part of mentor taking pride in promoting ownership of the project by the ePioneer. The mentor was clear that the rules within this community would ensure that the mentee would claim ownership of their achievements.

Projects 5-7 mentor strategically chose not to post any blog reports. They proceeded to take a subsidiary approach to supporting the ePioneers and enabled them to construct their own progress reports. This approach allowed the mentor to gain the trust of the ePioneers and to help them to become more comfortable with their projects in that way, rather than posting a blog. Here, the mentor controlled outputs within this project community through extrinsically motivated intrinsic traits.

I think it's a matter of being sensitive about that was saying up there because it's public. Everyone out there can be looking at what we are saying about our role and may be thinking, actually I don't I quite agree with that. So in a way I'm waiting until I've met all of my groups before I put anything up. Because I want to feel that everyone is comfortable with what they're doing and they'll put a blog up and then I think I'll put something up about my role. [...] I'm too sensitive about making sure that I'm not saying anything out of turn with them. I'm trying to build a relationship with these people and I'm not quite sure how they see me and I think if then I'm posting a lot up, then it's almost as if I'm yet again the expert, and I'm trying not to be. Although I can't help but being put in those positions. (Projects 5-7 mentor)

This mentor was more sensitive to the perception of being seen as an expert, because this 'expert' role was a perception founded from the original school audit completed prior to commencing the ePioneers initiative. Accordingly, they adopted a developmental role to mentoring (Brockbank and McGill 2012). The contradictions apparent within this project context were multiple. The mentor did not want the same label of 'expert' to apply within the new community, which might impede the move to complete autonomy of the ePioneers within their projects. They were also cautious in the wider context of the other project mentors' knowledge; being reluctant to set a precedent of expertise and knowledge within the new community that would undermine the knowledge demonstrated by the other mentors.

6.3.2.5 *Value of reporting through blogs*

A final group of mentors and ePioneers were not convinced about the value of the blogs for reporting, thus creating their own barriers within their own project developmental process. These participants were not interested or convinced by the value of using blogs for reporting purposes. They were also reluctant to share their thoughts with external readers. Project 3 ePioneer for example, was a very busy senior academic used to writing long educational reports for different academic publications.

First of all, I'm not a very bloggy person. I haven't quite got into blogs yet, I'm not interested in blocks [sic] yet. And secondly, I just haven't got the time to do it so I haven't. I wouldn't know what it was, I would know how to use it, I don't know what it's for, I don't know. So that to me would be a secondary issue that the needs to be a project in order to use something. (Project 3 ePioneer)

They were not interested in exploring this type of writing genre, albeit understood as a time-saver. That is not to say that they were not motivated to share their experiences with others. However, they were aware of the obligation to report their progress as a condition of the Proforma application they signed. In this case, the explicit project rules conflicted with the experiences of this ePioneer around writing blogs. This expectation and oversight has already been discussed in the introduction to this theme as a major contradiction and flaw in the project planning process.

Project 11 ePioneer was also sceptical about the open nature of using a public reporting system.

I'm still not convinced. I don't like the idea of sharing thoughts about a project that all and sundry can read. Yeah. That's not the way I do things. (Project 11 ePioneer)

Their comment of "that's not the way I do things" is in conflict with the explicit rules of the project. Once again, the rules of the project were clear about reporting, and it may be the system that required rethinking. In a similar approach to the Project 3 ePioneer, this participant did not understand and/or want to utilise the reporting system. They were definitely motivated to share the end-point of the project but not their journey through the process.

6.3.2.6 *Summary of findings: Key theme 2*

This theme examined the perceptions of agency within the developing ePioneers community, focussing on the contradictions to reporting progress linked to the unresolved rules and division of labour. It is clear that there are contradictions in reporting in relation to intrinsic and extrinsic motivational factors within the community. This is related to the participants' perceptions of how their projects were progressing and the lack of pre-determined rules of how to report this progress. The reluctance to engage in the process also highlighted a contradiction directly related to the job role identity and the individual's perceptions of this identity within the ePioneers community and beyond. The notion of agency was an important factor during the reporting process raising issues of conflict caused by job roles. The notion of transformative agency focusing on joint enterprise and its pursuit of collective change possibilities (Haapasaari, Engeström and Kerosuo 2014) indicates how the process of reporting change processes might occur within an e-learning transformation context.

In the next theme, the notion of the mentor role is examined by taking a closer look at the relationships between the mentors and ePioneers as these relationships form and develop.

6.3.3 Key Theme 3

6.3.3.1 *Perceptions of the mentor role*

Key theme 1 focussed on understanding the motivations and related characteristics of the mentors that drive their practice to promote change within a particular e-learning context and thereby to address RQ 1. Key theme 2 addressed RQ 2. It examined contradictions and barriers to reporting personal experiences during the process of technological change through the implementation of technology change policies. Key theme 3 analyses the perceptions of the mentor role in context, in order to evaluate its effectiveness within the context of change agency. It focuses on an analysis of the subject/object quadrants of the activity system, scrutinising the different perceptions of mentor role definitions and functions in context. This theme seeks to answer RQ 3 of how the technological change process can be evaluated. The analysis focuses on the mentor roles in order to generalise how these roles may be evaluated.

In this theme I firstly analyse the different perceived mentor roles identified by the mentor-mentee dyads. The results are then scrutinised against types of knowledge (pedagogic, content and technological), using the TPACK framework and categorised by mentor role. The types of knowledge identified are then evaluated against mentor roles identified in the literature to ascertain the contributing factors to the change process that the mentors offer through the relationships they build with the ePioneers in the research context. The aim is to develop an understanding of how this relationship-building contributes to reaching the project objectives. In addition, the analysis may provide an indication about how the mentor role contributes to knowledge about bringing mentoring and its support of innovative processes to the forefront of technological innovation in the H.E. context.

6.3.3.2 *Categories of mentor roles*

This section analyses the data in order to understand the perceived mentor roles from the point of view of the mentors and ePioneers themselves. Mentoring and coaching

definitions in context were discussed in Chapter 2 (section 2.4.2). This discussion highlighted the many possibilities for mentor role definitions as found in the literature. In this research I wanted to understand the different interpretations of the mentor from a job family perspective, to enable a better understanding of the potential for mentors to act as change agents across the wider institution. Haggard et.al. (2011) argue that researchers often provide definitions of mentoring, if no definition is provided, in order to limit the possibility of participants relying on their own schema of mentor description, such that different arrangements and relationships might be included within a study. In this research context, I provided a base description of mentoring within an e-learning context for generalisation purposes within this study (see Section 2.4.2). In addition, in this research, the mentor role definitions originate from the participants themselves. I take this as an opportunity to agree with the concerns of Haggard et.al. (2011), who argue that researchers substitute participant perceptions of mentors with their own perceptions of the role. However, in the case of this research, the aim is to analyse the different types of mentoring/coaching across the project from the participants' point of view of the role, as compared to the baseline definition of mentoring and coaching with technologies cited in the literature review. In addition, I want to analyse the mentor roles in context to gather examples of how job roles may affect how mentors conceive their roles should be played. Higgins and Kram (2001) acknowledge that the many different definitions of mentoring point to an indecision about what mentoring is or is not, but 'it might be the case instead that we are simply studying different types of mentoring' (pg, 266). This research provides further examples for the literature of mentoring approaches that are specifically appropriate for dealing with process of technology innovation contexts. However, the knowledge and learning between the mentor and mentee is the more important issue that will be explored within this theme.

The literature review of frameworks towards understanding the integration of technology into subject-specific instruction identified TPACK as a suitable framework for analyses (see Chapter 2, Section 2.5). It is utilised in this study to interpret mentor knowledge

within several mentor categories, with approaches to mentoring identified by the mentors and ePioneers. TPACK has been utilised to identify types of knowledge in teaching-related contexts which included ePioneer projects 1-9. However, there was a difference between teacher-led understanding of technology integration within the TPACK framework, compared to the understanding of technology integration by project cases led by administrator ePioneers and mentors. In projects 10-12, the administrators were integrating technologies into administrative processes where PCK was not a consideration for their roles as mentors. The administrator mentors have specific knowledge about institutional administrative operations and procedures that have no particular connection to the PCK attributed to the academic mentors. The administrator mentors possess declarative, procedural and conditional knowledge of administrative procedures (DPCAK). Declarative and procedural and conditional knowledge (as defined by Alexander et al. (1991) states that any form of knowledge conceptually consists of declarative, procedural and conditional forms:

That is to say, when we know something (be it content, linguistic or otherwise), we can know not only the factual information about it (declarative knowledge) but also how to use such knowledge in certain processes or routines (procedural knowledge). We can also understand when and where this knowledge would be applicable (conditional knowledge). (pg. 323)

Project 14-15 mentor exemplifies DPCAK through their actions in supporting projects that may have an impact on administrative processes across the institution, thus:

[...] They are very interesting projects from my point of view for administration and also things I've been battling with the institute for quite some time for administration purposes for admitting students tracking PhD students when you've got three schools to be involved with obviously it can get quite difficult so I think it's also going to be a learning process for me. (Project 14-15 mentor)

The point is that administrator knowledge can be differentiated from academic knowledge. This mentor clearly demonstrates knowledge of administrative procedures that advocated change within their particular contexts. DPCAK is more wide-reaching than the knowledge for teaching proposed by Shulman (1986), who argues that the key to distinguishing the knowledge base of teaching is at the intersection of pedagogy and content. This is where it is the ability of the teacher to transform the content knowledge

they possess into an accessible form for their students and to thereby affect learning. This research goes far beyond the confines of teacher and classroom contexts, in that the knowledge base is centred on a Higher Education Institution which will have a greater impact than a primary or secondary classroom context. The present researcher therefore proposes to adapt the TPACK model which sees PK replaced by declarative/procedural/conditional administrative knowledge (DPCA) as shown in Figure 6.11.

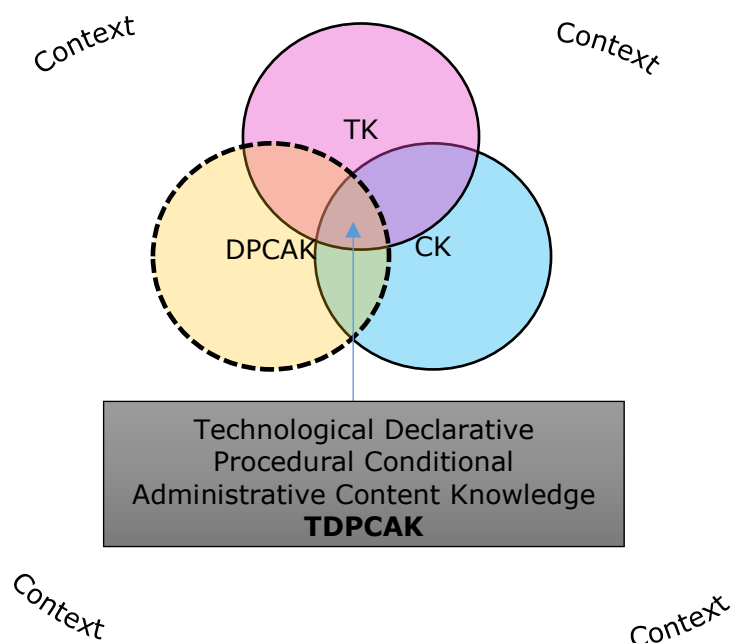


Figure 6.11 TPDPCACK Technological Pedagogical, Procedural Administrative Knowledge. Adapted from TPACK <http://tpack.org>

Figure 6.11 illustrates the adaptation of the TPACK model to incorporate administrator knowledge. The core roles are identified as categories of mentors with technological knowledge (TK), content knowledge (CK) and declarative procedural conditional administrative knowledge (DPCA). It is the intersection of DPCA and TK that presents itself within the study context for the administrator-led projects 10-12. Further, it is the knowledge of the mentors with DPCA, that has a unique ability to transform their

content knowledge of technologies into a form that can influence change in technology application of administrative processes. The intersection of the core components (TDPCACK) is the emergent form of technological, content and declarative, procedural and conditional knowledge that is lacking in Shulman's conceptualisation of knowledge. I argue that this combined knowledge indicates a strong understanding of the implementation of technological changes and how to execute those changes at the organisational level across the institution. This is a fundamental step that adds further evidence to the importance of supporting technological knowledge and its development outside of the classroom context. Furthermore, it is feasible to surmise that, to some extent, all of the mentors possessed TDPCACK.

So far, this section has declared that the mentor roles exhibit particular types of knowledge attributes as analysed through their job roles. The analysis also shows perceived mentor roles categorised by their technological knowledge and other roles attributed to the mentoring process. The descriptions add credence to the generic mentor description identified in the literature review:

A mentor is a person who helps to grow an individual personally and professionally while adopting a flexible coaching approach based on individual need. (Lord, Atkinson and Mitchell 2008: iii)

Figure 6.12 provides a summary of perceived mentor categories and descriptions of the mentor roles within them, as derived from the coded data of the mentor and ePioneer interviews.

Mentor categories	Mentor role	Examples from mentor and ePioneer interviews
Mentors with technological knowledge (TK)	Technology advisor (TA)	Somebody who, perhaps, understood some of the implementation issues, both from a technical angle, but also from an institutional or organisational angle. (Project 1 mentor) To meet with the project team leaders and to provide support guidance and particularly from any kind of technical expertise or specific knowledge Determine if assistance is required and to provide that assistance in as unobtrusive a way as possible. (Project 2 mentor)
Mentors with pedagogic knowledge (PK)	Pedagogic advisor (PA)	[...] genuinely getting involved in what I would call pedagogic conversations around what might happen and what could happen. 'Let's try this'. 'Let's experiment with that'. And underneath all of this, what we were trying aim in terms – where we were trying to go, in terms of theoretical underpinning for what we want to achieve. (Projects 3 mentor) A mentor in terms of teacher education I think it's someone who knows more about something and you do so that's one more tool. (Project 3 ePioneer)
Mentors with procedural administrative knowledge (DPCA)	Network facilitator (NF)	It's quite an exciting one so hopefully hope to shape it guide and point in the right direction if she needs any help that way and hopefully just be more involved because they're very interesting projects from my point of view for administration and also things I've been battling with the institute for quite some time for administration purposes for admitting students and tracking PhD students. When you've got three schools to be involved with obviously it can get quite difficult so I think it's also going to be a learning process for me it's the first time I've done some sort of official mentoring so I think it will be a challenge as well. (Project 14,15 mentor)
	Administrator monitor (AM)	For example, with Project 4 there's been a problem about some of the student engagement with it there are some students who seems to be very engaged and there are other ones who weren't. We talked at the last meet about what we could do to try ensure the engagement of all the students rather than just a proportion of the students and how they could survey the students and how they could adapt the system to ensure greater student engagement. So we have looked forwards as well as back. (Project 4-6 mentor) A good listener good at suggesting a number of ways forward, available when I want to talk something through, good at kicking me up the backside when I need to be reminded that my blog time is coming up again because it's easy to get carried away with what you're doing and forget to do some of the documentation that you've agreed to do. (Project 2 ePioneer)
Roles related to the mentoring process	Coach (C)	Someone to coach me through the project. I would consider it to be very, very similar to coaching if not identical to coaching in that to offer friendly advice and maybe a different angle if there's a problem. A bit of a steering. (Project 12 ePioneer) So, every now and again, we would touch base, and I'd contribute to the online blog, of where I was at, what I was doing. But, other than that, my own motivation spurred me along. I think, every now and again, Elaine would prompt me, or just check, was I still doing something? And that might trigger a response, "Ooh yes, I really need to get on with that particular part." (Project 12 ePioneer)
	Motivator (M)	Hands on and proactive to start with and gradually as their – what you call, the other side of a mentor? ... is there such a word as a mentee, gains in confidence, then they should be able to stand back, keep standing back doing less, unless they're asked to (Project 12 ePioneer). The initial phase is to try and help, I think the people involved a better understand themselves; reflect upon that it is there any want to achieve. I think, certainly, (Project 4 mentor) was a motivator and even when I thought, I'm never going to get this going, he was always very supportive there. (Project 4 ePioneer)
	Critical friend (CF)	But actually, as we both become more and more involved in the project and I think we're both drawing on our own strengths within the project, I think it's become a much more balanced relationship. But in the sense that, there are times when the mentor is definitely leading and then, I think there are other times where I am leading and kind of bringing the mentor up-to-date with what's happening. So it's kind...that kind of balance over time rather than kind of, you know, a kind of balanced discussion every time we meet. (Project 1 ePioneer)

Figure 6.12 Categories of Mentor roles described by case study participants

The final column in each category provides conversation extracts from participants to exemplify the roles described. The interpretation of mentor roles corresponds to the perceived mentoring expectations of the ePioneer. It is interesting that the roles described also correspond with some features of mentor roles defined in the literature (Lord, Atkinson and Mitchell 2008: iii) reviewed in Chapter 2, Section 2.4.2. The expectation of mentor roles was not set at the outset. Indeed, one of the aims of this research was to understand the individuality of the mentor role in e-learning training contexts. These features are to be expected but the roles in this context closely correspond with the working relationships that are formed and developed in the context of technological development of the respective projects. The mentor categories are divided into sections according to TPACK knowledge groupings and the interpretation of their roles are based upon the needs identified within each project. The roles identified within the categories are technology advisor (TA) and pedagogic advisor (PA) in the first two categories. Mentors as technical advisors (TA) provide support and guidance from a specific technical expertise perspective, whereas the pedagogical advisor roles (PA) were mainly academics with technological expertise within a teaching and learning context. The mentor roles within the third category (DPCAK) relate to knowledge of technological administrative processes useful to facilitate change processes within the organisation; e.g., network facilitation to develop a streamlined system for receiving assignment submissions online. As shown in Figure 6.11, this knowledge is distinct from Shulman's PCK and TPACK categories previously discussed, because it recognises a functional knowledge that influences a real change in e-learning practices across a wider context that is more wide-reaching than teacher roles in a classroom context. This is most evident in the case of the network facilitator role, which has a more far-reaching ability to influence change.

Job family	Indicative Job description
Technical Services (TS)	Jobs at this level require specific technical, IT or practical skills and a well-developed working knowledge of technical or scientific practices and procedures acquired by experience on the job and/or through vocational training. Work will involve the application of skills and knowledge to provide a range of technical support activities. Work activities will typically follow an established working pattern. Supervision is in the form of general guidance on routine work.
Administrative. Professional & Managerial (APM)	Roles at this level will be providing advice and support to schools/departments/work units based upon a combination of practical and theoretical knowledge of a technical, professional or specialised field and/or will be involved in the deployment of resources, including people, for a sub-section of a school/department.
Research & Teaching (RT)	Role holders at this level will have extensive experience within their subject/discipline, normally supported by a PhD and/or H.E. teaching qualification. Role holders will also provide expert guidance and coaching to others and may supervise a team. Role holders will typically make a significant contribution to their academic unit via leadership or administrative management or co-ordination of specific initiatives.

Figure 6.13 Indicative job family roles adapted from Institution (2011)

Figure 6.13 provides a description of the job roles in the target job families and an indication of their freedom to act and the agency afforded within these roles. The job roles also correlate with the descriptions of mentor roles identified in Section 2.4.2. These job role descriptions are a fundamental part of the analysis because there may be a link between freedoms to act and decision-making. Differing job roles linked to agency within the mentor/mentee pairings may have a direct progress with innovative practices, especially if linked to tensions within the pairings. However, it is also important to note that the identified roles in Figure 6.12 were not fixed, different aspects were apparent and changeable over time. These changing roles are significant to the nature of the mentor/mentee relationships and may signify the changes occurring when the mentee takes ownership of their e-learning journeys. This includes the types of knowledge highlighted within the perceived mentor categories. This analysis follows in the next section.

6.3.3.3 *Mentors with technological knowledge*

Technology Advisor (TA)

Koehler and Mishra (2009) use the term technology knowledge (TK) to describe a person with technology that is more than basic computer literacy but has a deeper understanding of mastering technologies for the purpose of problem-solving. In the research context, all of the mentors possessed technological knowledge and specialised in mentoring the projects that complemented their particular expertise and/or interest. Therefore, the mentors relied on their own perceived schema to determine what the role should entail.

The mentors for projects 1 & 2 were from the Technical Services (TS) group and were skilled technology practitioners with TK but not necessarily with pedagogic knowledge for their particular ePioneer projects. They described their role to be negotiated and proactive in determining when technical assistance was required in an unobtrusive way. They also saw their role as managers and monitors of their projects. The ePioneers supported by their mentors in this group perceived that the role of their mentor was to support them in using their chosen technologies and to be on hand when problems arose. The approach taken by the mentor to Projects 4 & 5 was to offer specific technical advice and guidance to support to the project:

To meet with the project team leaders and to provide support guidance and particularly from any kind of technical expertise or specific knowledge. (Project 4 & 5 mentor)

Project 10 mentor saw their role as providing guidance and demonstrating best practice in doing things that had been previously poorly executed with the technologies. Project 10 ePioneer wanted a mentor with technical expertise to offer guidance and support to enable them to become autonomous. This mentor/ePioneer relationship is mirrored in Project 11. The mentor for projects 11, 12 and 13 described their role as providing just-in-time support with using technologies and further support when necessary. This type of mentoring is in alignment with developmental mentoring (Brockbank and McGill 2012).

6.3.3.4 *Mentors with pedagogic knowledge*

Pedagogic Advisor (PA)

Koehler and Mishra (2009) assert that TPACK relates to effective teaching with technologies with an understanding that emerges from interactions among content, pedagogy and technology knowledge. The significance here is that TPACK is different from knowledge of all three concepts separately and that it is an understanding of the representation of concepts using technologies:

Pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students' prior knowledge and theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge to develop new epistemologies or strengthen old ones (p.g. 66.)

This knowledge is congruent with the pedagogic advisor (PA) mentor role that emerged from those mentors possessing TPACK knowledge in their own professional contexts, thereby being equipped to support the ePioneers requiring TPACK development in their own project settings. This role is consistent with Shulman's description of teacher's pedagogic knowledge (PK) and pedagogic content knowledge (PCK) framed within teaching and learning contexts (Shulman 1987). PK is an intuitive knowledge of teaching and learning processes and practices. Moreover, PCK describes a teacher's understanding of educational technologies and how they interact together to produce effective teaching with technology. The definitions relate to teaching a specific subject-matter knowledge or specific content and are therefore very applicable to projects with a strong pedagogic content. For example, Project 3 was directly related to providing support for doctoral students and the mentor and ePioneer were both senior academics from the RT family. The mentor recognised that their particular mentor role was concerned with discussing and sharing issues around teaching settings and using their TPACK knowledge to help the ePioneer resolve those issues.

[...] what happened was, some genuine sharing of what issues were in a learning and teaching scenario, with specific learners, who had specific needs, and they became conversations (between the ePioneer and mentor) (Project 3 mentor)

This approach to the mentoring role for Project 3 mentor aligns well with Brockbank & McGill's developmental approach to mentoring (Brockbank and McGill 2012) which now aligns to their current thinking that respects personal knowledge and experience and the mentee's ability to take ownership of the project. Both mentor and mentee shared knowledge and developed a mutual understanding of the project needs.

The mentor for Projects 6,7,8, and 9 had expertise in virtual learning environments (VLEs) and pedagogic applications; this was an ideal attribute for supporting these particular projects, especially as they were also directly related to teaching and learning contexts. Projects 6,7,8, and 9 mentor had been identified as the 'e-learning expert' in the School's e-learning audit. In order to not appear as the 'expert' and to help the ePioneers to take control of developing their projects, the mentor devised a set of criteria to support the individual projects. The mentor had TPACK and devised a strategy to support the mentees to develop how the VLE could be used for their project and the time and commitment they would need to use and manage the VLE for project purposes. This mentor outlined their approach to supporting the projects as loosely based on several developmental stages. These were adapted to fit the demands of the individual projects and based on the needs of the particular ePioneer. The stages were as follows:

- a) Get the participants to understand themselves and reflect on what they want to achieve.
- b) Ask grounded questions about what they want to do and provide guidance within the project remit to enable achievable goals to be reached.
- c) Provide guidance and act as a bridge with updates on VLE developments across the School and wider university.
- d) Provide monitoring.

The intrinsic motivational traits demonstrated by this mentor assumed their need to present a context of autonomy in the workplace (Birkinshaw 2012) for the ePioneers and to provide direction to encourage them to meet their project objectives. The mentor wanted to provide specific guidance but decided to adopt this particular role in order to empower the ePioneers to take control and become e-learning experts in their own right. This mentor wanted to promote the autonomy and competence of their mentees, which Deci and Ryan (2014) advocate as a facilitator or intrinsic motivation.

6.3.3.5 *Mentors with declarative procedural conditional administrative knowledge (DPCAK)*

Administrator Monitor (AM)

Projects 13-15 consisted of mentors and ePioneers from the APM job family who managed their own administrative teams and liaised with other teams across the institution. The administrator monitor (AM) role was identified, as it was evident that within these roles the mentors' knowledge of administrative procedures reached further than the target School/department. These mentors were able to utilise the knowledge required to fulfil their APM role to enable them to guide their ePioneer projects. The mentors to projects 14 & 15 perceived their role as advisory and included the ability to utilise their contacts and act as a liaison between the ePioneer and the wider university:

Probably advice networking, offer of help when I can, introducing people to the introducing the project people to people that I know that could help them hence the networking side and hopefully some valuable guidance if I can offer some. (Project 14, 15 mentor)

The mentor possessed DPCAK in their own contexts and perceived this to be a useful asset in supporting the ePioneers to develop their own DPCAK for their particular contexts.

The ePioneers from projects 13-15 equated the role of mentor to a project management task; they wanted a mentor with a project management and technical background to be able to offer guidance and support but not to be involved in all aspects of the project.

For example:

Well, I would assume they would have a sort of project management background. You are the laymen and they are the technology expert. It is not necessary that they will know exactly how to do something. (Project 14 ePioneer)

This perception of the mentor role by project 14 ePioneer, suggests that they directly related the mentoring task to supporting their own APM job role of managing tasks and processes. This approach to mentoring is based on a functionalist approach that has been reclassified by Brockbank and McGill (2012) as performance mentoring, where the objective is for an individual to have an imposed objective that aligns with a desire to improve one's own performance. This description fits with the ePioneer's limited experience of mentoring approaches through teaching practice and their desire for direct instruction:

My only knowledge of a way a mentor student thing work through the way your mentor when you went on teaching practice would work. In that case I expect the student to be the driver and the mentor fully to be the director. (Project 14 ePioneer)

It is interesting to note the language used by this ePioneer to describe the role of the mentor as the 'director', which correlates with the process of performance mentoring as a directive process. The assumption is that the mentor has the knowledge to help the ePioneer facilitate the execution of the project they wish to develop.

6.3.3.6 Roles related to the mentoring process

Coach, motivator, critical friend

Coaching is a role which is expressed in Lord, Atkinson and Mitchell's (2008) definition of a person who supports and develops people in jobs. Coaching is determined in the literature review as equivalent to an instructor, teacher, trainer or the giver of instructions. A further definition of the motivator role, according to Clutterbuck et.al. (2003), is categorised as part of coaching where the mentor helps the mentee to develop their own self-discipline and acts as a "goad" where necessary. Further, the coach and motivator roles identified by the ePioneers are roles applicable to all of the mentors depending on the project stages or context, but the true meaning of these terms is dependent on the perceived notion of what the roles mean to the person

experiencing the support in a particular working context. Brockbank and McGill (2012) argue that the literature relating to mentoring and coaching is still confusing and surmise that the terms are linked but utilised according to the situation required. Brockbank and McGill (2012) now appraise mentoring and coaching through a new situational model framework. In Project 12 the ePioneer wanted a coach to provide support, encouragement, and guidance and one who had patience; they explicitly utilised the mentor to meet the project deadlines whilst managing their workload:

To have an awful lot of patience... and their support and keep controlling and persuading me and sending the dates for the diary and meetings. (Project 12 ePioneer)

This coaching role perceived by project 12 ePioneer does not relate to the coaching definitions in the literature but is more applicable to the mentoring literature. The ePioneer was referring to performance mentoring defined by Brockbank and McGill (2012) as:

An activity between mentor and client with a prescribed purpose which may or may not be assented to by the client, using a directive process, and the learning outcome is improvement (pg. 56).

Project 2 ePioneer wanted an accessible mentor to answer queries but also someone to act as an advisor and motivator. The mentor expectations for the ePioneers in Projects 4 & 5 was for the ePioneers to kick start the project and then the mentor to provide the motivation and support for it to develop. Project 3-5 mentor sums up their advisory and motivational role as a cyclical process:

So we were all pretty motivated, so it was just a matter of building up our expertise, mutually encouraging each other, having some good discussions, and then seeing how those discussions were actually translated into practice, and then coming back and critiquing it. So it was a cycle of coming up with ideas, seeing possibilities, trying them out, critiquing them, and then going onto the next stage. (Project 3-5 mentor)

The motivator role is again in accordance with Brockbank and McGill's developmental mentoring approach (Brockbank and McGill 2012), providing the opportunity for the mentor and mentee to mutually acknowledge their respective knowledges and expertise.

6.3.3.7 Mentor roles perceptions within the development process

In the previous paragraphs the data was used to map out the different mentor categories and roles. In this section, I attempt to taxonomize how the participants perceived that the mentor role changed during the innovation process. These categories and roles were then scrutinised more closely to analyse the perception of mentor roles identified at various stages of the development process. These roles are shown in Table 6.7 which aims to seek greater clarity to answering RQ 3 through understanding the attributes of the mentor role and how the mentor actions contribute to influencing the change process. The perceived mentor role descriptions identified in Figure 6.12 were used in the analysis of ePioneer responses to identify the perceived roles the mentors played in the innovation process. The ePioneer responses were grouped into mentor-perceived roles at the start, mid-point and end of the project innovation journeys.

Table 6.7 Mentor roles categorised

Projects	Mentor role	ePioneer project start	ePioneer project middle	ePioneer project end
1	TA	PA	TA	CF
2	TA M	TA M	AM	AM
3	PA	PA M	-	-
4	TA AM	M	AM	AM
5		AM	AM	AM
6		PA M	TA M	TA
7		TA	TA	TA
8		TA AM	AM	AM
9		TA M	TA AM	AM
10	TA PA	TA AM	TA AM	TA AM
11	TA AM	TA AM	AM	AM
12		C	AM	AM
13		TA AM	TA M	AM
14	NF	TA	TA M	AM
15		TA	NF	TA AM

Key:

TA	Technological Advisor
PA	Pedagogic advisor
AM	Administrator monitor
NF	Network facilitator
C	Coach
M	Motivator
C	Critical friend

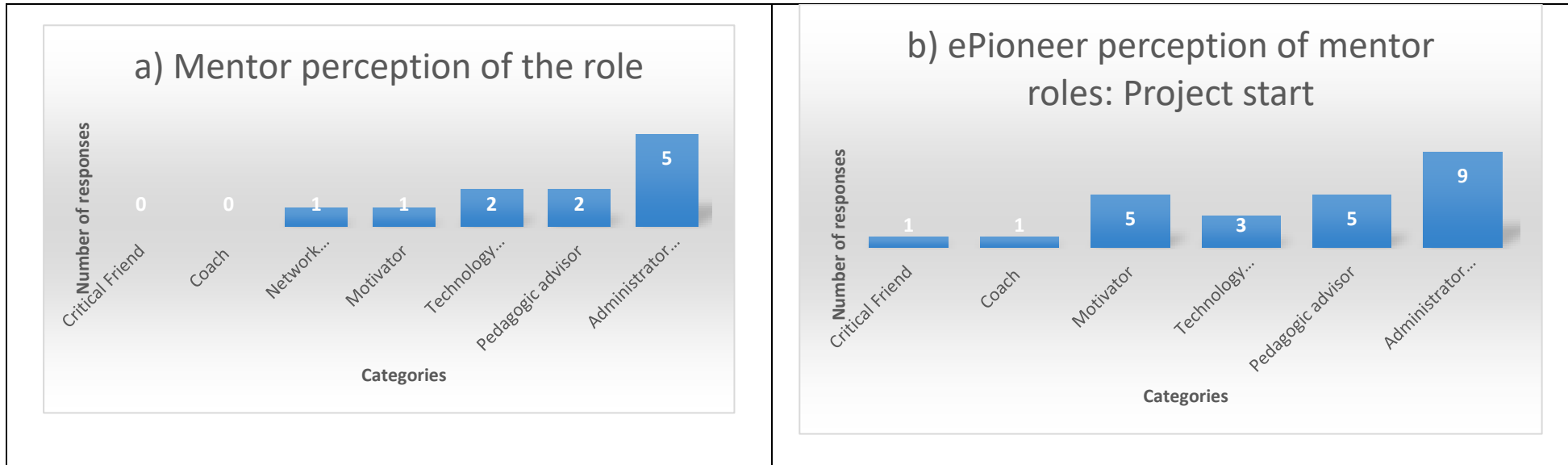


Figure 6.14 ePioneers perception of mentor roles

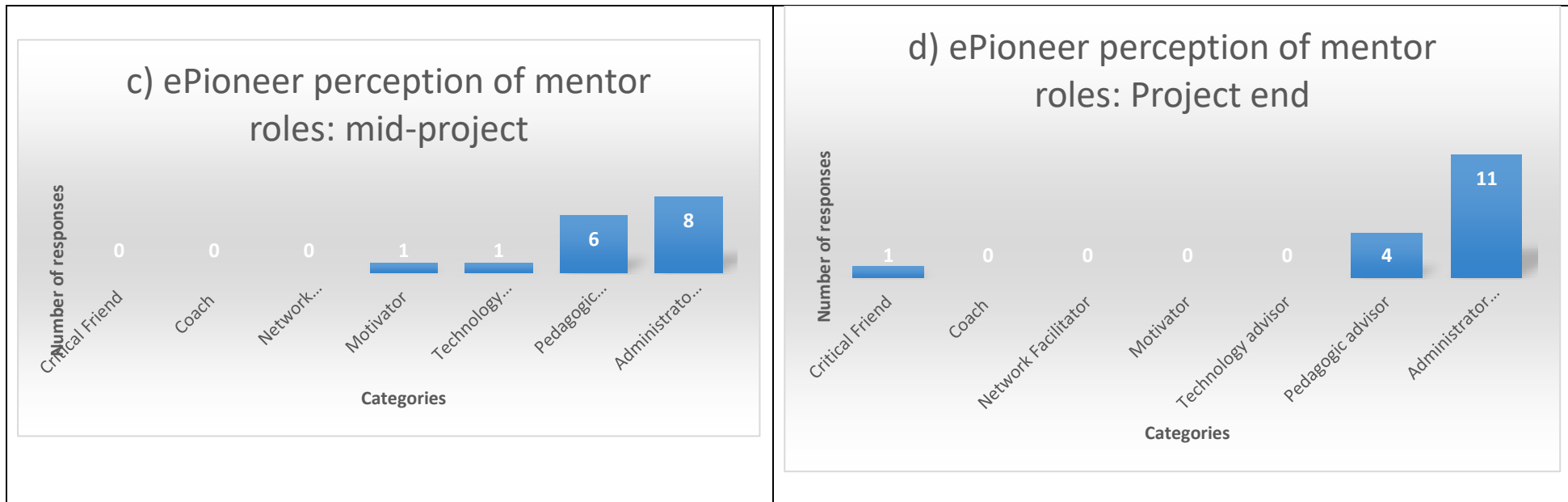


Figure 6.15 ePioneers perception of mentor roles

Figure 6.15 (a–d) charts the distribution of perceived mentor roles across all of the projects, based on data from Table 6.7. Figure 6.15 (a) summarises the mentors' personal perceptions of their roles at the start of the project. How these roles compare to the ePioneers perception of the mentor role are illustrated in Figure 6.15 (b-d), and further analysed in Section 6.4.

Figure 6.15 (a) shows that mentors saw their roles as technology advisors for the most part. For example, a mentor from the TS job family perceived their role to be as follows:

At the moment it's the technical sides of the project basically looking at the hardware and the beginning bits of the software which we've just come in contact with so I'm kind of more the technical side of the mentor because I have no experience in teaching. (Project 1 mentor)

Similarly, the ePioneers at the start of the project perceived the mentor roles as largely technology advisors together with administrator monitors and motivators (see Figure 6.15b). The ePioneers also perceived mentor roles to be a pedagogic advisor, critical friend or coach.

Figure 6.15 (c) shows a shift in the perception of the mentor role by the ePioneer as the projects develop working relationships between the mentor and the ePioneer. The ePioneers perceived the mentors predominantly as administrator monitors and technology advisors at that time.

He's kept the pot boiling if you like at times when I've been very busy with other things he's been working away in the background. He tried to arrange for us to go to an earlier exhibition. I needed to be around for my wife at home and he's been working in the background to keep this thing going. [...] he has done quite a lot of work in the background to make sure it doesn't die which I think is a good job. (Project 2 ePioneer)

Project 2 ePioneer recognised and valued the mentor's efforts to maintain the project momentum whilst also providing technical support.

By the end of the projects the administrator monitor role predominates followed by technology advisor indicating the shift from the dependence of specific content knowledge from the mentors.

I'll come to him, you know, [...] that's okay with me. I think if I had somebody on my back, you know, and I hadn't been doing anything, I'd start to feel guilty or irritable, you know, all these negative feelings (Overlapping Conversation) started to come up. So, I'm perfectly comfortable with the situation as it is because in a sense, I've got my own agenda. I mean, because I put a lot of work into this in the first place, I wouldn't want to just let it, you know, disappear into nothing anyway. So.... (Project 3 ePioneer) – Mentor as AM

No, I think it's the sounding board really. There's not been anything else that sort of come out of it in a sort of strategic direction shifting or any sort of technical or anything else. (Project 15 ePioneer)

There is also evidence of more trust between the mentor and ePioneer leading to project 1 participants forming a critical friendship (see Figure 6.15 (d)). In this context a critical friend is defined as 'a person who provides constructive critique through a mixture of both support and challenge' (Shulman 2013: 1).

But actually, as we both become more and more involved in the project and I think we're both drawing on our own strengths within the project, I think it's become a much more balanced relationship. But in the sense that, there are times when the mentor is definitely leading and then, I think there are other times where I am leading and kind of bringing the mentor up-to-date with what's happening. So it's kind...that kind of balance over time rather than kind of, you know, a kind of balanced discussion every time we meet. (Project 1 ePioneer)

Whilst the ePioneers perception of the mentor role changed as the projects developed, there is no evidence for the same perceived changes by the mentors themselves.

Instead, the mentors utilised a more flexible approach to supporting the ePioneer projects with a firmer knowledge of their own TDPCACK. This was exemplified by the approach taken by Project 3-5 mentor:

Well I've met with the projects team at the beginning to discuss the project outline the project proposal and then I've had a meeting with the team to discuss how the project has developed and those have been fairly informal meetings where we've raised specific issues its tended to be issue based so as particular issues has risen some of them could be technical issues like how do you produce a combination of voice and PowerPoint slides onto video iPods for podcasting, some them are around the technical educational designs and what makes them appropriate podcasts and about student engagement with podcasts. So they range from the technical to the more educational interaction. But they tended to be issue based when issues has arisen, but also to look forward to how they can take the project forward in a constructive way, it's partly looking back and how they can sort problems but also how they can take it forward into new areas. (Project 3-5 mentor)

Projects 6-9 mentor approached the role as an administrator facilitator:

What we were trying to do was help people know how to help themselves, to work within our culture, to respect them as professionals within their own areas, to then put them in contact with people in ways that they probably couldn't do themselves. So they would then feel confident about then continuing to solve those problems, and also being able to share that advice and that approach with other people. So, you know, it – so, as such, as a Facilitator, my role, I think, this is what I tended to do. (Projects 6-9 mentor)

6.3.3.8 *Summary of findings – Key theme 3*

In activity system terms this part of the analysis has scrutinised the role of the mentor as a tool in terms of knowledge and how this knowledge is utilised to support the ePioneers (subjects) in realising their individual project objectives. The analysis has demonstrated the 'relational expertise' of the mentors to anticipate the needs of the projects in order to meet the objectives. This additional expertise ensured that the mentors were able to work with the ePioneers. In cultural-historical terms, 'it is the ability to; a) recognise the standpoints and motives of those who inhabit other practices; and b) mutually align motives in interpreting and responding to a problem' (Edwards 2016: 135). The analysis has emphasised different types of knowledge identified in relation to the three main mentor categories and then identified perceived mentor roles within them. The mentor roles identified at the start of the project are an indication of the schema adopted by the mentors as they establish the relationships with the ePioneers. By constructing a taxonomy of mentoring from the point of view of the participants, the research has established definitive mentor roles within the study context. According to Haggard et al (2011), the definitive mentor roles determined in context are preferable to the substitute mentor roles determined by researchers themselves to fit the context being studied. This activity has identified the roles that will be further scrutinised for tensions between the mentors and ePioneer relationships and any contradictions resulting from these tensions, in Section 6.4.

6.4 Analysis of knowledge and relationship-building through selected project scenarios

The analysis in this section focuses on relational knowledge in conjunction with agency and job role. The aim is to further scrutinise the mentor-ePioneer relationship in order to ascertain the impact of these factors on the relationships that are building within the new e-learning community. Section 6.3.3.2 analysed the perceptions of the mentor roles across all of the projects. The analysis has already identified mentor roles based on core knowledge competencies. According to Shulman (1987) this knowledge included pedagogic and technological knowledge. However, this research has identified a further knowledge competency relating to administrator mentors within this research context. These mentors possess procedural administrative knowledge. Whereas TPACK theorising considers knowledge and the overlapping attributes for understanding teaching; this section examines teaching and administrator knowledge (DPCAK), paying special attention to the intersection TP/DPCACK. This is done through gaining a better understanding of the context knowledge of the mentors and ePioneers and how this knowledge impacts their working relationships during the project development process. Further, knowledge and agency are examined to analyse any tensions and their effect on relationship-building based on the job family pairings. In doing so, contradictions in relation to rules and the division of labour within the process shown in Figure 6.16 are carefully scrutinised to establish any conditions that contribute to barriers to innovation and the change process.

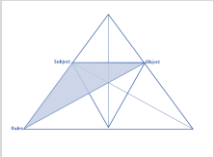
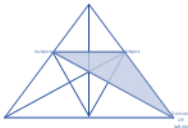
Contradiction 2:	Contradiction 3:
CONTRADICTION CAUSED BY IMPLICIT/EXPLICIT INSTITUTIONAL RULES & HOW SUBJECTS AND TOOLS SHOULD ACT WITHIN NEW CONTEXT	CONTRADICTION CAUSED BY TYPES OF KNOWLEDGE HELD OR PERCEIVED TO BE HELD BY EPIONEERS & MENTORS
Subject-rules-object	Subject- division of labour -object
	
1. How do the ePioneers and mentors manage decision-making in their new context, whilst reconciling their implicit job-related rules and freedom to act, in order to determine the division of labour for their project case contexts?	2. How do the different levels of knowledge and agency afforded by implicit job roles, affect the ability of the ePioneers to form relationships with their mentor?

Figure 6.16 Contradictions for Case study analysis

In Section 6.3.2 the discussion focussed on agency and in particular, transformative agency (Haapasaari, Engeström and Kerosuo 2014) in order to contextualise decision-making according to job roles. This type of agency had the ability to develop a person's capacity to influence change within a particular context. The results suggest that agency plays a role in the primary and secondary contradiction levels that are responsible for the changes encountered. Transformative agency develops and leads to positive changes in e-learning practices. Therefore, the notion of agency, and to a greater extent transformative agency, that presents itself within the case study context, is examined to illuminate different ways in which the ePioneers community developed and fostered change in e-learning practices. The project case studies are specifically organised by job family roles and as such, provide a suitable way of examining the level of agency in a practical context based on the job group pairings of mentor/ePioneer (Figure 6.12). There are four main groups of mentor/ePioneer roles across all the projects to be scrutinised, i.e. TS/RT, RT/RT, APM/APM & RT/APM.

Figure 6.11 identifies DPCAK as a replacement to PK because pedagogic knowledge was not found to be applicable with the administrators, because they did not work in teaching contexts. This knowledge is congruent with the APM staff and consistent with the roles described within their job descriptions. However, this finding is important for the

educational context as it acknowledges that the people we call administrators and take a secondary role, possess a particular knowledge, and act as agents of vital importance in the provision of the student experience. The administrators are not part of developing the teaching curriculum and they do not teach, but their knowledge plays a vital role in ensuring that student progress happens.

Mishra and Koehler (2009) assert that the relationship between content, pedagogy and technology should be examined in pairs in order to understand the relationship between each of the components. Accordingly, in this section, CK, TK, DPCAK and their intersections are examined to particularly scrutinise the knowledge and relationship-building in particular selected project cases. Although all of the project cases could be studied based on relationship-building, the following scenarios were selected as examples of their unique relationships and how they progressed during their projects (see Figure 6.17), whilst considering appropriate pedagogic, technological and procedural administrative knowledge. The analysis is appropriate to gain a better understanding of the mentoring process and add to our knowledge about people's learned experience of a technological change process.

Scenario	Project
Scenario 1: Mentor (TS), ePioneer (RT)	Project 2: (an example of a lack of contradiction through prior positive working relationships fostered through their existing job family roles)
Scenario 2: Mentor (TS), ePioneer (RT)	Project 1: (an example of contradiction through knowledge)
Scenario 3: Mentor (RT), ePioneer (RT)	Project 8: (an example of contradictions through prior problematic working relationships)
Scenario 4: Mentor (APM), ePioneer (APM)	Project 15: (an example of administrator knowledge-building)

Figure 6.17 Project cases

6.4.1 Scenario 1: An example of no contradiction through prior positive working relationships fostered through their existing job family roles

This case was selected to illustrate a positive working relationship without tension arising for participants from different job families. The aim of this project was for the ePioneer to learn how to use interactive whiteboards (IWB) in order to be able to model their use for Maths PGCE (Postgraduate Certificate in Education) courses. The quick gain for the project was for PGCE students to be able to go into schools and be prepared to use IWB technology, having seen its potential modelled by their tutors. This case was very successful for both the mentor and ePioneer. The mentor utilised their training with the IWB and the mentee to publish their achievements in a technical journal. The ePioneer trained other team members in the use of the boards and they integrated into their teaching curriculum for trainee maths teachers.

The roles of the mentor and ePioneer were clearly understood in terms of the rules and division of labour from the start of the project. The mentor for Project 2 was from the TS Job family and the ePioneer from the RT family. This project was selected because of the historical background of the participants. The project started from an interesting relationship standpoint, because the mentor was once the pupil of the ePioneer at

secondary school. Now the pupil is utilising his technological skills in a H.E context to support his former teacher.

I'm really pleased that [Project 2 mentor] is my mentor because I get on with [them] very well I used to teach [Project 2 mentor] once upon a time and [they] ever so helpful and I'm sure that between us we will get to a stage when we're spending a reasonable amount of time using the boards playing with the boards and actually developing some reasonable skills. (Project 2 ePioneer)

For example me and Project 2 ePioneer who's one of the other members of our team... he was my [subject] teacher at school. We've got a long history of understanding how and the best way to communicate with each other. So I think we work well as a team with our strengths and weaknesses, so I think at the moment it's going really well. (Project 2 mentor).

The participants are obviously very comfortable with this arrangement and there are clear, if implicit, boundaries and rules apparent from the outset. The mentor was clear that their role was to be a technical and advisory role only and stated, 'I'm kind of more

the technical side of the mentor because I have no experience in teaching' (Project 2 mentor).

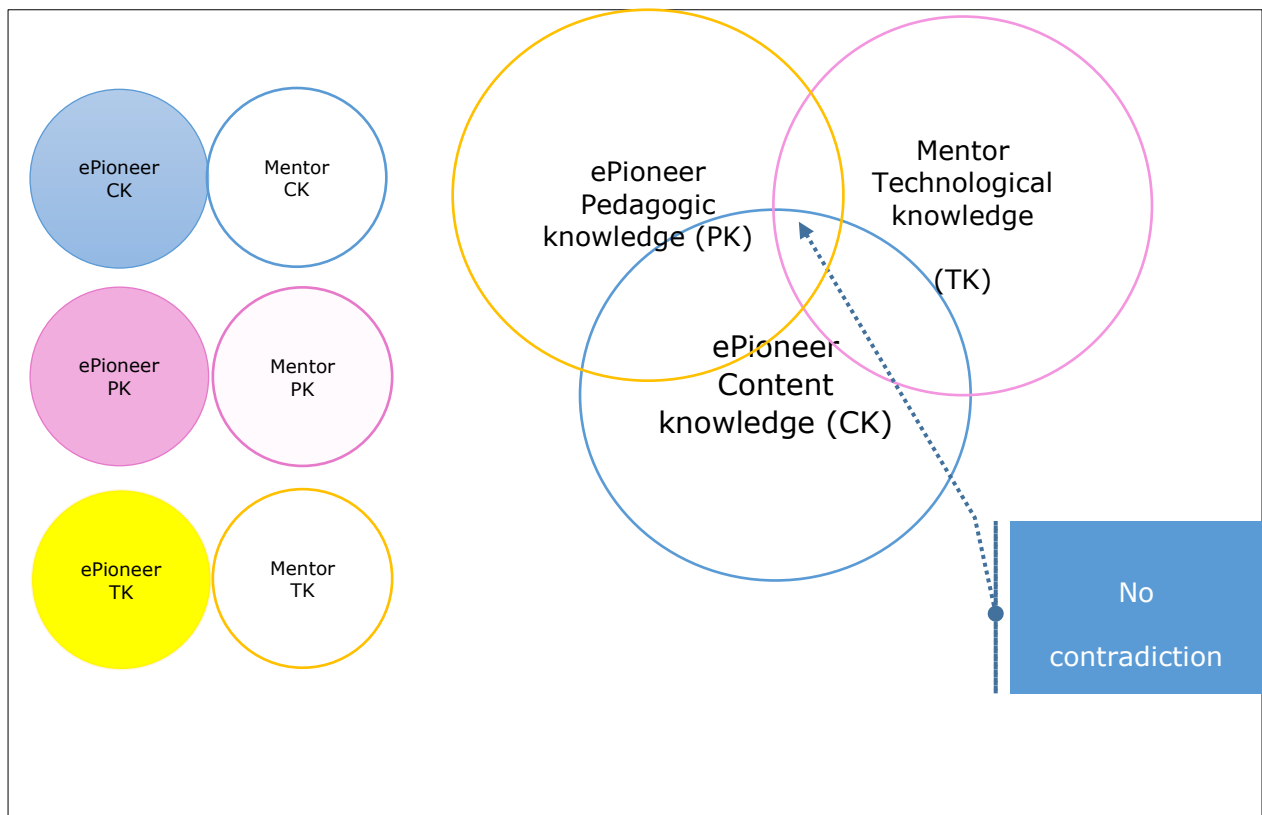


Figure 6.18 Knowledge between Project 2 mentor & ePioneer

Figure 6.18 shows the boundary of knowledge and expertise between the mentor and ePioneer in terms of technology and pedagogy. The mentor and ePioneer CK, PK & TK are shown as circles side by side. In this illustration the aim is to show that there were no contradictions of knowledge in the three areas of the TPACK model between mentor and ePioneer and their relationship was built upon mutual respect of each other's knowledge with the boundaries of the division of labour agreed by both parties.

The mentor was very knowledgeable about the set-up and use of interactive whiteboards (IWB) and was able to impart this technological knowledge and expertise to the ePioneer. They were also proactive in contacting the whiteboard manufacturer in order to maintain this knowledge. The ePioneer was quite clear about their pedagogic content

knowledge and that they would be working closely with the mentor and indicated that the close collaboration would be comfortable:

The idea of a mentor is somebody who doesn't sit in the chair and do it for you for example with computer stuff, they sit beside you and prompt you along and you do it yourself. I get on with [Project 2 mentor] and we're going to be spending periods of time together working. (Project 2 ePioneer)

The ePioneer was quite clear about the pedagogic aims of the project of training other staff to integrate the use of the IWB for teacher-training purposes. The ePioneer noted the value of the mentor as TA to maintain the momentum of the project because the ePioneer was constrained by work duties:

[Project 2 mentor] has made contact with the Hitachi people so [Project 2 mentor] has done quite a lot of work in the background to make sure it doesn't die which I think is a good job. People are quite busy it would be quite easy for some of these things not to happen. It depends how central to somebody's work their own project is this is not absolutely central to mine and therefore I could come in next year and still don't know how to use a white board. Without a mentor keeping me going it could just fizzle. (Project 2 ePioneer)

The ePioneer valued the efforts that the mentor applied to the project in terms of training needs and liaison with the IWB (interactive whiteboard) company.

Next steps, I know [the mentor] is looking in to getting the training company that do kind of training on behalf of the organisation. So to train a group of us. I have to say I think getting everybody together for the one or two days that it'll take is going to be the big...potential barrier to that.

I think Ben has been the main man. Very enthusiastic, very supportive, very "can do". Yeah, I'm very, very impressed with the support he offered.

In this project the mentor and ePioneer were clear about their roles at the start of the project and the boundaries of expertise clearly articulated. As shown in Figure 6.18 there was no tension between the roles because of the long-standing friendship between the ePioneer and mentor. This relationship allowed space for each person to gain valuable skills. The value of the experience gained by both parties was indicated by the comments that both made towards the end of the project.

Already I've been on a course and I've given a lot of the information that's of value to our project to [Project 2 ePioneer] so [Project 2 ePioneer] can have a look at it as well. But for example we had a session upstairs in one of the C floor rooms which didn't have an interactive whiteboard and I managed to set up a portable interactive whiteboard so anything technical [Project 2 ePioneer] gives me a ring to make sure everything is ok (Project 2 mentor)

Project 2 mentor was clearly confident that Project 2 ePioneer would contact him if he required any technical support. Similarly, the ePioneer had the confidence now to experiment with using other technologies to enhance their teaching practice because they had a mentor willing and able to readily provide that support.

This scenario therefore provides an example of clear boundaries of knowledge between the ePioneer and mentor from the outset. Their longstanding relationship provided a platform to develop their project devoid of tension because their mutual understanding of their own perceived agency, extrinsically motivated by the explicit boundaries of their job roles. This project case demonstrates the mutual respect by the ePioneer and mentor for each other's knowledge. Thus, enabling the project to grow and develop in a relaxed manner.

6.4.2 Scenario 2: An example of contradictions through knowledge

This scenario exemplifies contradictions through related technological knowledge possessed by the ePioneer and mentor. In this project the aim was to support the ePioneer to fulfil the objective of cascading a training approach to video conferencing to a larger group of staff. This would enable the staff members to utilise video conferencing facilities independently within the School and feel part of a community of video-conferencing users pooling their expertise. This case resulted in a collegiate collaboration between mentor/mentee to conduct further research and publish their work.

There were two phases to this project:

Phase 1 – develop a quick gain training approach for using video conferencing within the School of Education.

Phase 2 – cascading/trialling the approach to a larger group of people in order to develop a community of video conferencing users.

The ePioneer had worked through Phase 1 of the project gaining technological expertise with the video conferencing hardware. The mentor was new to the university but came with specialised technology knowledge. The ePioneer was trained and competent in the

using the video conferencing facilities as this was part of their role within the School. Therefore, both were equipped with technological knowledge albeit in different aspects of technology. In this project case the mentor role had to be negotiated and there were no rules of operation agreed, so it was not clear at the beginning how the roles and project would develop. Moreover, the mentor and ePioneer had not met before in any context. The initial set up within this project therefore clearly signalled contradictions within the activity system of this case study in the areas of division of labour and rules of operation based on the participants' knowledge and agency evident from the outset.

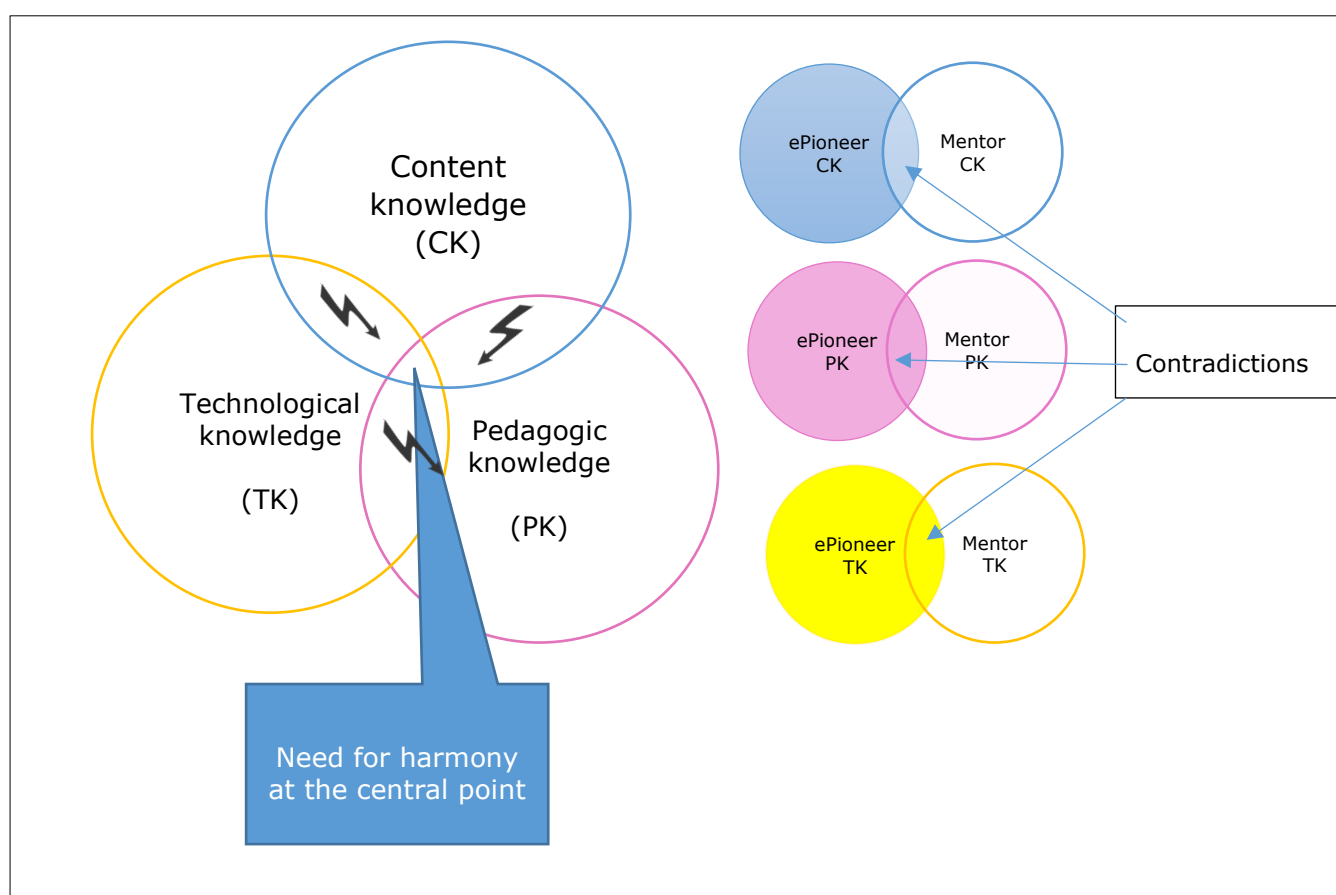


Figure 6.19 PK & TK Knowledge demonstrated between Project 2 ePioneer & mentor

Figure 6.19 illustrates the overlap of PK, CK & TK in which the image illustrates contradictions in the division of labour and the rules of operation within this case study activity system. It illustrates contradictions in the three areas of knowledge. The

ePioneer highlighted initial tensions in rules and division of labour based on knowledge when describing the mentor role:

It could be my perception that was wrong, but at the beginning, it very much felt like I was very much alone trying to do things and the mentor came along to check up on me. I mean, that's how it felt at the beginning. (Project 1 ePioneer).

The mentor, on the other hand, perceived the role differently and attempted to construct their own rules of operation to establish parameters for the initial stages of the project.

The monitoring was how the mentor attempted to construct their own rules/regulations for the project and thus build a relationship with the ePioneer.

The project should really be led from the bottom so even if you are providing help rather than dictating exactly what the best practise is, hopefully they would feel around and sort of determine for themselves. ...Just to sort of show them what the options are and to interact with them [...] in such a way that you find out what they are already doing and what's good about that. (Project 1 mentor).

Consequently, as the project progressed, and the participants developed a working relationship, establishing mutually acceptable rules of operation, the ePioneer's perception of the mentor role changed significantly:

But actually, as we both become more and more involved in the project and I think we're both drawing on our own strengths within the project, I think it's become a much more balanced relationship. But in the sense that, there are times when the mentor is definitely leading and then, I think there are other times where I am leading and kind of bringing the mentor up-to-date with what's happening. [...] It's a kind of balanced discussion every time we meet. (Project 1 ePioneer).

The division of labour normalised and became implicitly understood by both parties. The mentor was able to utilise their specific knowledge of computer systems control and networks to support the video conferencing hardware and to exploit their networks with the Information systems (IS) team to ensure that the video conferencing systems were monitored and supported across the University networks. They were also able to point out what the ePioneer needed to know in order to get the right kind of support from the IS team.

So, I've been a sort of value in encouraging a basic understanding of the technical issues and understanding that you don't actually need to know everything. But you need to know enough that you can ask meaningful

questions of other people. And it's their role [the mentor's] to know the other things so that the picture is complete. (Project 1 mentor)

The initial contradictions in agency was resolved bringing a positive change in the development of their working relationships. By the end of the project the ePioneer described the roles between them as a working partnership.

My mentor's background is computer science technology, my background is education, so when it comes to education he likes to learn from me or at least share the expertise that I have. [...] I think the relationship is a lot less formal than it was at the beginning. (Project 1 ePioneer)

Therefore, in this case the potential contradictions afforded by differences in agency that might have affected decision-making between the participants was resolved because the ePioneer and mentor developed a good working relationship whereby they learned technological skills from each other.

6.4.3 Scenario 3: An example of contradictions through prior problematic working relationships hindering relationship-building within the ePioneer context

This project started from a difficult standpoint between the mentor and mentee.

However, the outcome resulted in the ePioneer taking ownership and collaborating with other colleagues to further develop the website.

Scenario 3 exemplifies the contradictions through knowledge between the ePioneer and mentor where there was an historically problematic working relationship between the parties. This project case was based upon the developmental need of a website set up to support doctorate students with academic writing. The website was underused so the ePioneer initiative was a timely opportunity to seek assistance with developing it. The ePioneer's initial thoughts about utilising the ePioneer project was to seek the availability of someone to do work on the website for them.

There is a sum of money I attached to the ePioneers project it might be possible to get somebody to do the necessary work, to do the sorts of things that I wouldn't get around to doing. I don't think I would get around to doing it if it fell to me. (Project 8 ePioneer)

This academic felt at a disadvantage in attempting the project alone and welcomed the opportunity to collaborate with a mentor or other interested colleagues sharing similar pedagogic aims.

I think if one's working on one's own even with a mentor hovering in the background and prompting from time to time... I think it depends on your character and all sorts of other things that, I think it might have made a difference. (Project 8 ePioneer)

In this case the ePioneer was clear about their interpretation of what a mentor role should be in general, but not so clear regarding the role within the context of the ePioneer initiative. The ePioneer was clear about what they considered the role should take in terms of agency and division of labour. The ePioneer was also aware of the value the mentor might bring to the project, but on the ePioneer's terms.

In this project, the mentor and ePioneer were senior academic colleagues who had a history of collaboration on large funded projects within the School. The project in this case was unique in two different ways. Firstly, there were two mentors involved at the beginning, Project 8 mentor 1 (P8M1 – the researcher) and Project 8 mentor 2 (P8M2). In my role (the researcher) as P8M1 I also advised the ePioneer to seek project advice/support from central Information Services (IS) in the first instance. The change of mentor resulted from this advice, after which I suggested a mentor who could take the project forward based on their technical and pedagogic knowledge that suited the project context. The ePioneer commented that P8M1 fulfilled the criteria for a mentor from their perspective (in terms of division of labour) but they formed a different opinion of the mentor role for P8M2:

My mentor has changed recently... [P8M1] my first mentor, I think you were very helpful in the initial stages by talking to me about what I might do and pointing me in the right direction. Facilitating in a way that I assume that a mentor ought to. So I feel entirely positive about the kind of help that you gave me. So if I had a reservation to do with the overall structure will be how the role of mentor was conceived, rather than the way you interpreted that role in our relationship. (Project 8 ePioneer)

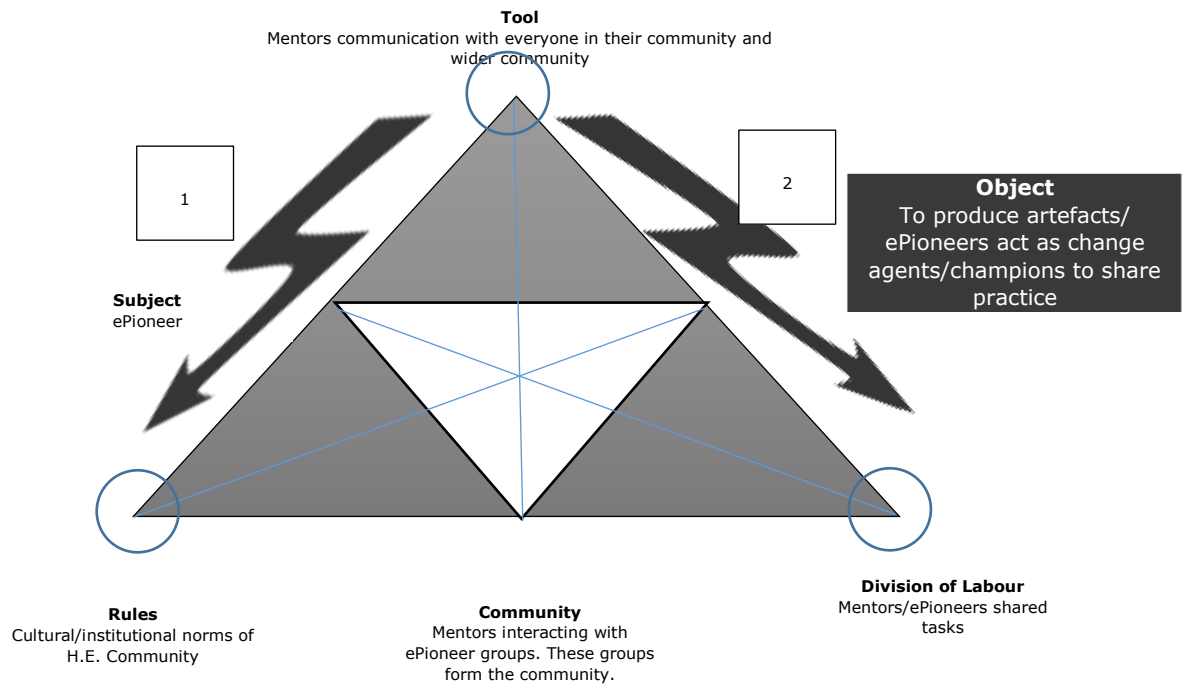


Figure 6.20 Scenario 3 Contradictions of Agency & division of Labour

Figure 6.20 illustrates the areas of tension of the subject with the tool with rules and with the division of labour. Tension (1) concerns the issues that the subject had with the negotiation of rules, in that there was an assumption by the ePioneer that they would direct the project while the mentor completed any necessary tasks (Tension 2). It is clear that Project 8 ePioneer had issues relating to agency and division of labour with P8M2. In addition, the ePioneer queried the conception of the mentor role for the ePioneers project in general. In other words, they did not discuss how the role should be acted out. There was no discussion about rules/regulations of action within the context. This was an interesting comment in light of the comment about the mentor role made by the ePioneer about P8M2 below.

For many a mentor is an adviser and I mean mentors can presumably operate proactively or reactively. And I'm not sure that the roles were specified particularly in the case of the ePioneers project. I think if the mentor role had been set up as a proactive one, if one knew that one was going to have to meet one's mentor every fortnight or every month and report on progress, again I think it might have acted as a kind of stimulus for a spurt to do something. That said knowing someone is there who is available to one, for advice, guidance, that's very helpful and reassuring as well. (Project 8 ePioneer)

[P8M2] I suspect, will see the role slightly differently and will be a bit more proactive in sort of pushing and not doing. I'd judge that on the basis that our other interactions in the school operate, which may be work better as far as I'm concerned in terms of getting me to do things, but we'll see. (Project 8 ePioneer)

Furthermore, the comments from project 8 ePioneer suggests that they had no intention of taking a proactive role and had a strong desire for the mentor to take the lead with their project development. The second factor to consider in this scenario was that P8M2 had been identified through the School e-learning audit as 'the e-learning expert'. This knowledge might immediately place anxieties and expectations on the part of the mentor and ePioneer at the start of the project and potentially hinder the building of a working relationship in this new context. The lack of agreement about intrinsic and extrinsic rules of agency in this context were definitely a cause of tension here. Moreover, P8M2 had already assessed the needs of the project and conceptually formulated their own rules and division of labour in relation to working with the ePioneer.

[...]It (the project) is (about) writing for masters' students. In their (the ePioneers) mind it's a transfer of a web based materials which aren't in WebCT to WebCT. It's interesting [Project 8 ePioneer] conceives who is doing the work on that.

In this particular case the mentor had full knowledge of the project context and used their own expert knowledge to assess the needs of the ePioneer.

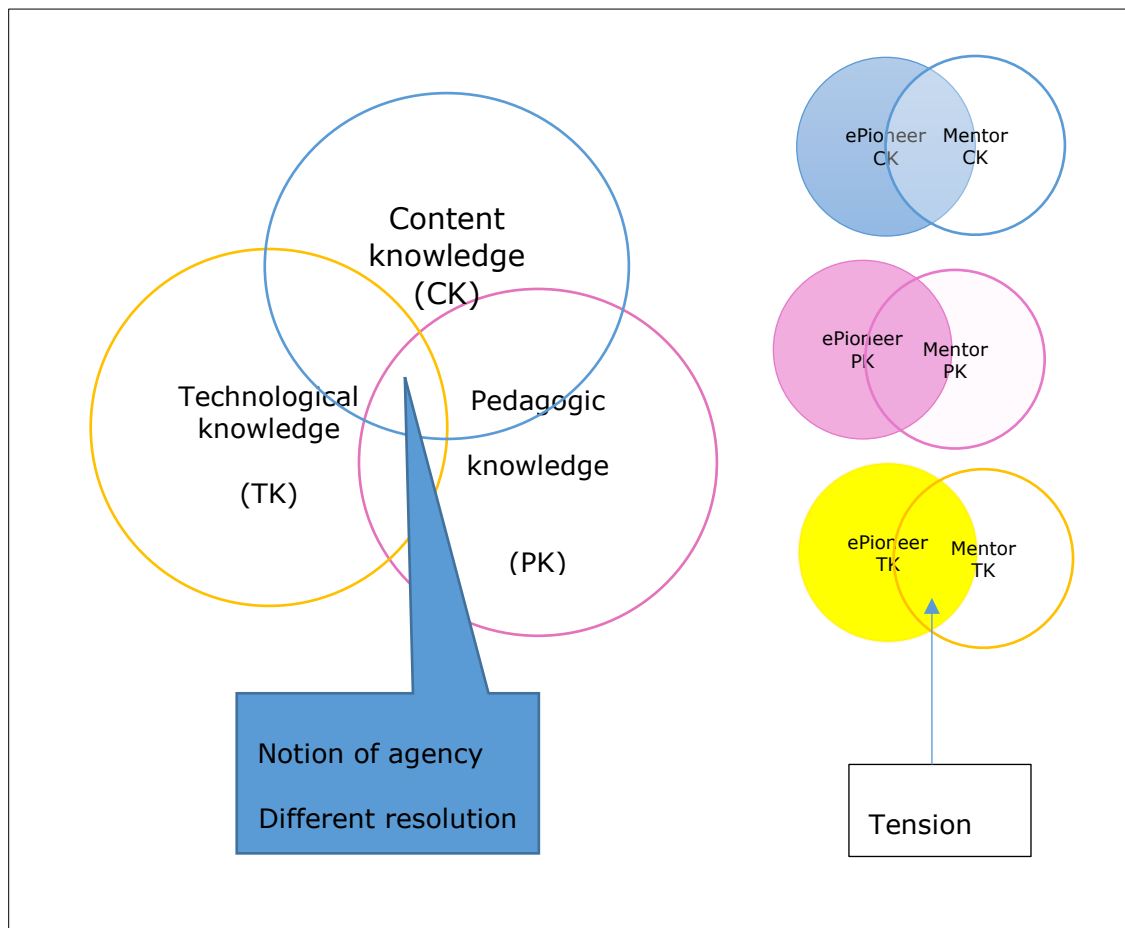


Figure 6.21 Project case 3 PK and TK Knowledge and contradictions

Figure 6.21 is a depiction of the knowledge perceptions of the ePioneer and mentor in this case. There was no overlap in project case 1, where the participants showed implicit and explicit boundaries of knowledge, and some overlap of technological knowledge in project case 2. However, in project case 3 the overlap of perceived content, pedagogic and technological knowledge was a great source of contradiction in relation to developing a suitable working relationship in which the projects could develop and reach a successful outcome. From the outset P8M2 and Project 8 ePioneers set their own albeit conflicting rules and expectations for working within the project context. P8M2 approached their role as a set of systematic stages as discussed in Section [chapter 1].

[...] Right, I think it's different in different phases. So I mean the initial phase is to try and help, I think the people involved get a better understanding themselves, reflect upon it is that they want to achieve [sic]. So it's actually asking quite grounded questions about what they want to do and help them keep within the remit of ePioneers which is to try and do something in a fairly achievable and it's a bridge building role, in other words particularly our

WebCT, it's a matter of simply prompting them to push them in the right directions, to connect with some of the other things that are happening across the school, across the university in relation to WebCT. (P8M2)

Existing and historical working relationships influenced the nature of the relationship formed with the ePioneer and mentor in this case study. Both parties were strong in their levels of pedagogic knowledge. However, the contradictions were based on their mutual perceptions of technological knowledge and how this should be played out in terms of project outputs.

You may not be able to define the role but I think you can say to both the mentor and the mentee, the expectation is that you will meet periodically at times to be negotiated to discuss progress and that to me, hasn't been embedded within the system. (Project 8 ePioneer)

The mentor standpoint and the ePioneer expectation were conflicting, although the objectives were the same. Whereas the P8M2 took a more passive stance to the role that the ePioneer expected, the ePioneer was apprehensive about the prospect of taking a proactive role with the project development. This casual approach and relinquishment of agency taken by the mentor could be the result of being identified as the School e-learning expert, or an expectation as previously highlighted by the ePioneer when using his own knowledge about what a mentor's role should be. The passive approach taken is conducive to Brockbank and McGill's (2012) developmental approach which acknowledges and respects the personal knowledge and experiences of the mentee. In this case, the shared history and knowledge of working with the mentee was clearly evident in the approach adopted by P82M (Appendix 9.12). The mentor taking a proactive approach would have been the expectation of the ePioneer who displayed a lack of agency and would therefore have been counterproductive to the aims of the project and cause further tension with the ePioneer/mentor relationship.

As the project matured the ePioneer formed a closer collaborative working relationship with two other colleagues working on the same academic programme.

I think other people within my team are interested in it and are supportive of it and I think what would move things on would be if we try to combine it with other things. For example, [...] has been, has done some recording of students talking about how they approach the writing with dissertation. And you can see how that might sort of fit together to form a kind of package of resource

materials that students could refer to. So, I think if there were one or two other people who are actively involved in thinking about how the website could be used then that would make a difference. So, you know, I expect those discussions to take place in the course of this year [...] Yeah I mean, the fact that, you know, this year, we're...the four of us, [...] are all working on one master's course. Whereas last year, there were two master's courses and we have a larger school project to work closely together on. I think that will make a difference. (Project 8 ePioneer)

This new working relationship changed the focus of the project and reinforced the mentor aim for ePioneers to form collaborations with other people in the School.

From what I know of [Project 8 mentor], I mean in other roles, he is a very proactive person, I mean, from the e-China (a large School project) point of view. He hasn't been in this case [...] I think there are different ways of fulfilling the role and you may have just come to the...you may just be assuming that if I need help or guidance, I'll come to him, you know, for that and, you know, that's okay with me. I think if I had somebody on my back, you know, and I hadn't been doing anything, I'd start to feel guilty or irritable, you know, all these negative feelings. [...] So, I'm perfectly comfortable with the situation as it is because in a sense, I've got my own agenda. I mean, because I put a lot of work into this in the first place, I wouldn't want to just let it, you know, disappear into nothing anyway. So.... (Project 8 ePioneer) (See Appendix 9.12 for further information)

In summary, there are several areas of tension that hindered relationship-building within this project. Firstly, these RT job family participants historically had a difficult working relationship through working together on other projects. Next, the ePioneer's schema to describe the role of a mentor was changeable depending on who the assigned mentor was to their project. In addition, the ePioneer was also indecisive about how the division of labour would in fact work with the mentor to achieve the project aims. In this project it was clear that the motivation to achieve a successful outcome was greatly assisted by the involvement of other team members' projects prompting the ePioneer to enlist their collaboration to support the development of this website project. The success of this ePioneer mentor relationship was due to the ePioneer recognising that agency rested with the motivation of the ePioneer him/herself and not with the negotiation of intrinsic or extrinsic rules to trigger action.

In terms of CPD development, this project has helped the ePioneer to consider newer pedagogical approaches to enhance student learning experiences. This has included

reflecting on the value of intrinsic motivation to becoming a member of a supportive e-learning community.

I think just going back to this question of the isolation, you know, the person working on their own as opposed to a group, I mean, it would be interesting to know if there are any other individuals who in a sense are, haven't made the progress that they hoped to because...for the same reason, you know, that they've been on their own. Whereas if they've been in a group, you know, there might have been this kind of shared pressure or something to keep things moving. (Project 8 ePioneer)

Reflecting on the benefits of participating in the project this ePioneer valued collegiate support to aid future pedagogic developments.

Yes, I think so. For me anyway, yeah. I mean, although I'd done some work on distance learning before coming to Nottingham, you know, in the early 90s none of which had taken an online form so I think lots of other people, I felt very much at a loss, you know, I mean, you hear about new developments taking place but, you know, it's, and, you know, if you're interested in the quality of education, enhancing what student, the student experience then, you have to take an interest in all modes of delivery, alternative modes of delivery. But, you know, it's finding enough time to do something other than just go to a talk and listen to somebody and then, you know, a week later and you've forgotten about it, you know. So, to be enrolled in a project which is actually doing something, you know, is hugely beneficial I think in opening your eyes to what can be done, nothing else. Because quite a lot of people have been involved, you know, and you know, one person's ideas spark ideas in somebody else. (Project 8 ePioneer)

In terms of relationships, this project has highlighted the difficulties of developing relationships, despite tensions in relation to perceptions of knowledge and agency. It also recognises that agency in this case rests with the ePioneer in order to encourage them to produce a suitable project output.

6.4.4 Scenario 4: An example of administrator knowledge-building

Scenario 4 is a project concerning the electronic submission of coursework. The success of this project would have a positive impact across the university. The ePioneer managed to gather a great deal of data regarding the feasibility of this change to submission from within the School. Indeed, the initiative was being followed by the administrator for central admissions. Unfortunately, this case raised many issues relating to academic preferences for coursework submissions resulting in the stalling of the project until those issues had been resolved.

This case was selected to examine the relationships between mentors and ePioneers at the same APM job level and who were strangers. In addition, the case served to examine procedural administrator knowledge characteristics which were not necessarily technology or pedagogy related within the project context. The mentor and ePioneer were responsible for their own teams of staff. Moreover, they worked in different departments associated with the School of Education.

The aims of project 15 was to offer a way of simplifying the administrative load of receiving coursework from a varying number of courses at different times, from various formats and submissions and to administer and return the work within a 6-week time period. As the participants were completely unknown to each other they needed to meet and to develop their working relationship from the outset. At the start of Project 15 the ePioneer was quite pragmatic about the need to meet their mentor and stated that the meeting was a vital trigger to initiate the development of the project or risk it being subsumed by a busy workload:

I don't know [Project 15 mentor] we have had a few telephone conversations but I've never met up with her before, and I think when you don't see somebody it doesn't strike you to remind you that you haven't got on with it yet. I don't mean it in a negative way, but if it was you (researcher) and I saw you in the corridor, I would be feeling guilty. Frankly, I could walk past [Project 15 mentor] and not know I had seen [them]. So we just need to get over that first initial meeting. (Project 15 ePioneer)

The ePioneer clearly had an open mind about the mentor and had not formed an opinion about the division of labour between the pairing. Project 15 ePioneer was also clear that

the mentor role should be related to project management and the mentor should have the expertise to turn an idea into reality. The role also should be facilitative in nature.

Well, I would assume they would have a sort of project management background. You are the laymen and they are the technician. It is not necessary that they will know exactly how to do something but they would know who to go to, to find out how to do something. (Project 15 ePioneer)

This description of the role would be congruent with the nature of the ePioneer's normal job role in which they would manage a task or group of people to reach a conclusion. By comparison, Project 15 mentor perceived their role to be advisory and facilitative through the use of networks.

Probably advice networking offer of help when I can, introducing people to the introducing the project people to people that I know that could help them hence the networking side and hopefully some valuable guidance if I can offer some (Project 15 mentor)

This interpretation of the mentor from Interview 1, was indicative of the knowledge that Project 15 mentor would bring to the project. The perceptions of the role of a mentor by the ePioneer and mentor were very similar from the outset, whereby both were receptive to receiving support from wider sources internally and externally to the University. There were no explicit rules signalling how the parties should act while forming their relationship within the project. However, the mentor clearly articulated their own rules and indicated that their role was to facilitate and offer advice. Whereas, the ePioneer's expectation was for a project manager to turn their ideas into reality i.e. the mentor does some aspects of the management work for the ePioneer. In this case the contradictions are in relation to pre-conceived ideas about roles and the division of labour relating to those roles.

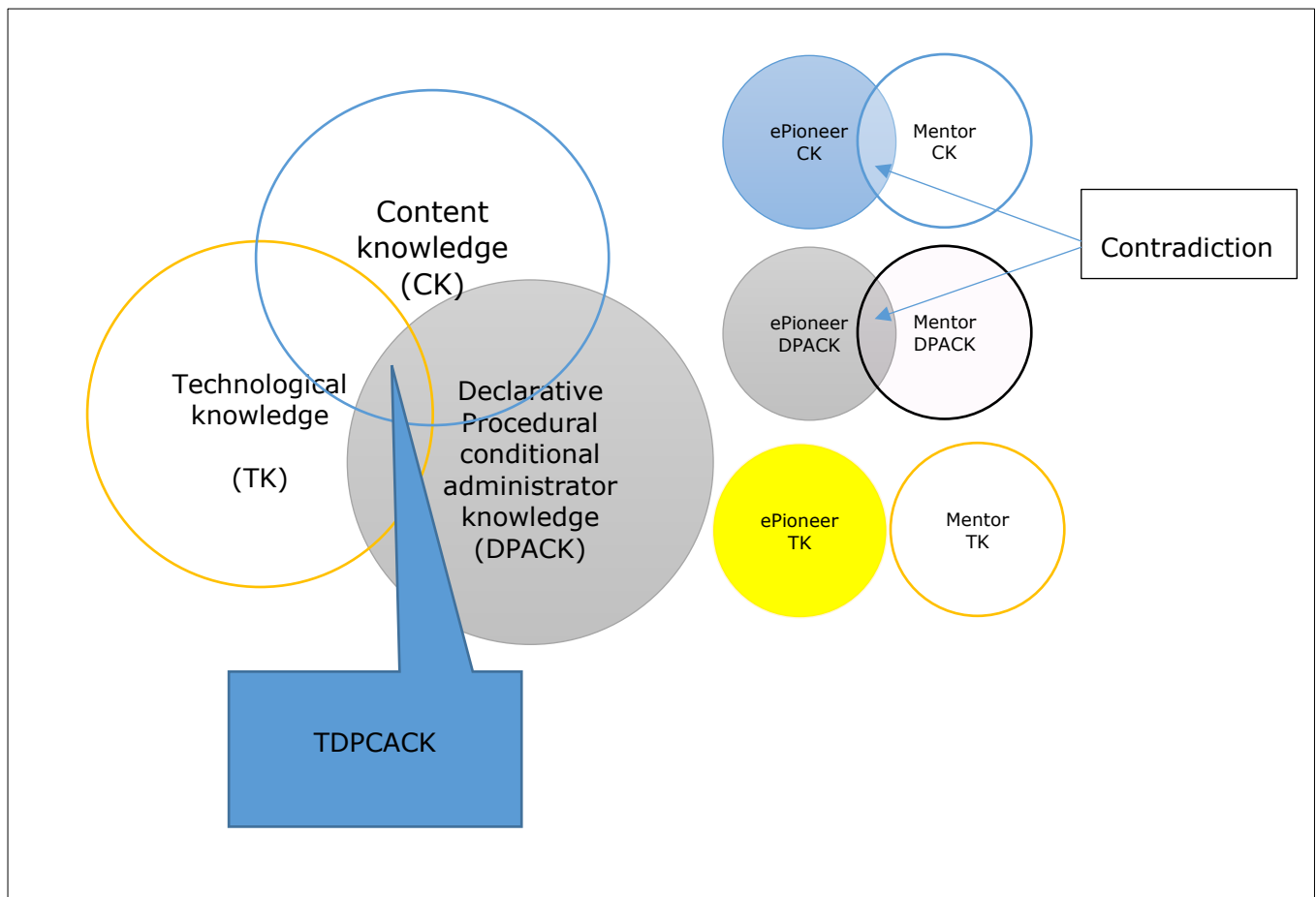


Figure 6.22 Case 4 Administrator knowledge

Figure 6.22 shows that declarative procedural conditional administrator knowledge (DPACK) is predominant in this case and replaces pedagogic knowledge. The illustration also shows that there is no overlap with TK. Both ePioneer and mentor possess DPACK in relation to their job roles. This could be a source of tension as they both run teams of administrators and command their own levels of agency within their job roles. Moreover, they did not have an historical working relationship to fall back on. However, their management roles would provide a good platform upon which to build that working relationship. Project 15 mentor took the view that they would use their own personal administrative experiences in the institution as a way of supporting the ePioneer. In this way, they would show empathy to the mentee and learn from the process themselves.

I think probably feet on the ground kind of scenarios [...] and hopefully just be more involved because they're very interesting projects from my point of view for administration and also things I've been battling with the institute for quite some time for administration purposes [...] so I think it's also going to be a

learning process for me it's the first time I've done some sort of official mentoring so I think it will be a challenge as well. (Project 15 mentor)

The benefit that the mentor brought to the project included taking a passive approach to helping the ePioneer conceptualise their ideas and provide prompts to make them actualise the ideas themselves. In this way, the division of labour within the project encouraged the ePioneer to take ownership of the progression within their project.

[...] well hopefully just somebody (ePioneers) can speak to and come to and for me to listen and understand what they trying to do and offer some advice on not what they should do but probably just prod them a little bit and let them mentally think things through and write things down and have more of a plan process that's what we'd be trying to do [...]. (Project 15 mentor)

[...] hopefully being able to say to them these are the problems I've hit before I can see what you're trying to do but trying to take it a little bit further than what they want to do [...] to them to get them to actually mentally process it a little bit more because the thing with projects they change and they grow don't they so that's what I've been trying to do so far so value hopefully just listening and offering advice and a little bit of pre-knowledge (Project 15 mentor)

At the end of the project, it was interesting to note from this analysis how the explicit rules of engagement helped to foster good relationship-building that enabled a successful progression within the project. Project 15 ePioneer noticed the similarities and differences between themselves and their mentor in terms of complementary knowledge and expertise. This observation of the relationships formed is similar to Project 1.

It's a different relationship than I expected it to be. [...] I think I also had a perception that [the mentor] will be more knowledgeable than me. And it's not actually necessarily true in this particular case. I mean, [they] have a different sort of knowledge, a different sort of background, and [they] certainly bring something to the table.[...] [they] are better placed to answer questions [...] I suppose it's just about having two different types of minds and two different types of experience to put to the same problem.[...] So, as far as my relationship has changed, then there is a lot more I know about [the mentor] than I did at the start [...] we're friendlier than we were at the start. (Project 15 ePioneer)

The relationship in this project was therefore built around the mutual respect for the complementary expertise from both participants. On a surface level, this respect is no different from that found in any of the cases analysed in this section. The difference here is that the mentor role developed into one in which the mentor became a critical friend - or 'sounding board' as described by the ePioneer.

I think of [...] more of a sounding board than anything else, rather than...I mean practical assistance in terms of she might source things for you but really, she's

a.... Yeah, I mean...I quite like the description of sounding board. You say what it is that you want to do, and [...] is just there as a reality check for you, and sort of more, "That's nonsense [Project 15 ePioneer], that won't work," or "Have you thought of..." or you know, "Can you see this and can you see that, and how will the academic staff react to that and actually, is that saving you any time?" So, she puts the questions back on you to make sure that whatever it is you are saying, you have looked at from enough angles to be sure it's the right thing in the first place. And that she's not...but she doesn't then run with it herself or anything. And I think I had the perception that that was more of...that there would be more of her doing that. (Project 15 ePioneer)

According to Brockbank and McGill (2012) developmental mentoring agreed by the mentor and mentee leads to transformation through its person-centred approach. This case sees the mutual development of the mentor and the ePioneer and is congruent with the definition of classical mentoring as 'a naturally chosen, personal and emotional enabling relationship in an organizational and professional context' (Morton-Cooper and Palmer 1993 in; Brockbank and McGill 2012 pg. 64). In terms of the activity system within this case, the levels of knowledge and agency by the ePioneer and mentor were complementary, and the division of labour intrinsically articulated within the context through the rules set by the participants. Contradictions of content and procedural administrator knowledge were neutralised through the roles adopted by the participants to enable them to reach the project objectives satisfactorily.

6.5 Chapter summary

This chapter has used the process of mentoring to scrutinise the technological change process through a comparative case study analysis. The aim is to offer an interpretation of relationship-building through the course of technological innovation processes. The analysis utilised the Activity system framework as the overarching analytical tool to facilitate the close scrutiny of the data within the sub-components. Issues of motivation to innovate by the ePioneers and mentors, together with associated knowledge within the context were also scrutinised. Each of the key themes identified were analysed to provide answers to the research questions.

Key theme 1 examined the motivational traits of the mentors to suggest their appropriateness as actors of change. The specific issue of knowledge indicated that

intrinsic and extrinsic motivational factors played an influential role in the process. The standout example of this concerned the emergent role of the mentor coordinator. This role prompted a positive object-orientation for the participants that encouraged them to value the achievements reached by meeting their personal project objectives through their own developmental actions. Examples of this were shown in section 6.3.1.2 with comments from mentors and ePioneers. Moreover, the results suggest that the positive object-orientation displayed by the actions of the mentor-coordinator invoked extrinsic motivational traits that maintained the momentum of the project and steered the ePioneers to fulfilling their project objectives.

Key theme 2 focused on understanding the personal factors that might inhibit the innovation process. Specifically, the theme focused on providing examples of experiential barriers encountered and how they affected the process. Moreover, the theme begins to unpick some of the personal issues that slow down the process in order to be able to construct strategies to mitigate these factors. Perceptions of agency relating to job roles and identity within the new ePioneers community was a strong contradiction identified in this theme. Examples of identity and role were exemplified in Section 6.3.3.7, with each scenario playing out different factors of agency and role. These examples provide evidence of the types of mentoring required to help smooth the transition of supporting innovative processes across HEIs. The notion of transformative agency (Haapasaari, Engeström and Kerosuo 2014) is an important issue to be followed up here because agency and job role will be very influential in affecting change.

Key theme 3 concerned the evaluation of the mentor role in terms of the mentor acting as a change agent within the change process. The theme created a taxonomy of mentoring roles from the point of view of the participants. By constructing the taxonomy, the research has established definitive mentor roles within the study context. These roles are preferable to substitute mentor roles determined by researchers, and therefore makes the research more credible (see Section 6.3.3.2). The results also show

that within this taxonomy, the participants identified how the mentor roles changed within their project contexts. This identification of change also enabled the ePioneers to understand when to take control of their own technology innovation journeys and relinquish the mentor support that they initially required.

The final part of the analysis focuses on the examination of project cases, selected to gain an understanding of the connections between knowledge and relationship-building within the project scenarios. The TPACK model is used to theorise knowledge relating to technological innovation within the expanded context to incorporate non-teaching staff. The analysis revealed technology knowledge competency to complement the unique roles that administrators have in the process of managing the processes of the learner experience in the H.E. context. The example within Scenario 4 in Section 6.4.4, highlights how the ePioneer and mentor utilised their knowledge within the institution for their project. Moreover, the participants had clearly identified how they would utilise the agency afforded by their job roles for their mutual benefit to advance their projects. The analysis in this chapter point to several areas that contribute to the process of innovation that could lead to further research in the area. Chapter 7 will consider the implications of these findings in relation to the literature and research questions and make suggestions for possible directions to follow up the research.

7 -Discussion

This study utilised activity theory to understand the management of technological change and the effects of institutional policy over innovative practices. The research adopted a case study approach to explore the tensions between technological change policies, and pedagogic innovation in a higher education context. The aim has been to determine the role of mentors as change agents during the process of technological innovation and to identify their role in determining the ideal conditions for sustainable innovation processes. The study has provided a valuable insight into the shifting roles of mentors as change agents from the participants' perspective as they work towards their innovative objectives. Concurrently, the research has analysed the intrinsic and extrinsic mentor motivational factors that prompt the mentees to take ownership of their personal development journeys. Moreover, the study identified the optimal contextual conditions that contribute to sustainable innovative practices within an H.E. work context.

7.1 Introduction

In this research I have investigated the process of technological innovation by end-users in order to understand some of the conditions that contribute to sustainable technology innovation in an educational context. Specifically, I explored the role of mentors as potential change agents to support the e-learning innovations of novice users of technologies during a CPD intervention. The research questions for the study were as follows:

1. How do change agents influence technological innovation processes?
2. How can the influences revealed by technological innovation processes be articulated for application to other technology innovation contexts?
3. How can the technological change process be evaluated within a voluntary CPD intervention?

In the Preface to this thesis, I outlined the factors that led me to embark on this research. I also explained my frustrations as an early adopter of technologies used for teaching and learning purposes; noting that there was very little training and support that encouraged the more sustained use of technologies in work-related contexts. This study uses a socio-cultural lens to contribute to knowledge regarding some of the

working conditions that may promote sustainable technological innovation using a mentoring approach. Using this lens, it may be possible to scrutinise the working conditions from the end-user perspective that might result from the implementation of e-learning policies. It also highlights the contradictions that may result in positive changes in practices when mentors as potential change agents support the innovation process. This chapter begins with a summary of findings from the analysis in Chapter 6 and discusses how those findings may contribute to sustainable innovation. The discussion is divided into three main areas that use the principles of activity system analysis to answer each research question. The analysis is used to highlight areas of impact and how they contribute to changes in practice in university schools and departments wishing to enhance their use of e-learning technologies. The three sections are as follows:

1. Change agent influence on the process of technology innovation
2. Conditions for the process of innovation
3. Change agent roles in the process of innovation

7.2 Change agent influence in the process of technology innovation

RQ 1: How do change agents influence technological innovation processes?

7.2.1 Mentor relational expertise

The aim of RQ 1 was to understand and interpret the motivations and drivers of the mentors during the process of innovation, this would provide a framework for understanding the process itself. The mentors in this context were drawn from an e-Strategy group with others invited to participate based on their knowledge and skills. They were not trained in any specific mentoring skill. The term 'mentor' was used as an umbrella term because of its frequent and familiar use in educational contexts. In Chapter 5, the actions of the mentor-mentee dyads were scrutinised during the innovation development process to understand the learning taking place as the projects progressed. Analysis identified specific mentor roles and categories based on the unique

relationships that developed between the participants. The significance of this is that these mentor categories (see Section 6.3.3.2) were not predetermined by the researcher, nor derived from mentoring literature (Section 2.4.2). It is clear however, that the mentors had specific relational expertise and knowledge (Edwards 2016) that enabled them to respond to the e-learning problem within their project contexts. This knowledge was the ability of the mentors to interpret the needs requires to support the overarching project. Moreover, in activity system terms, it is manifest as the ability of the mentor to be able to respond to the object(ives) of the activity, i.e. to produce artefact of improve processes). This implicit form of expertise means that the mentors were able to interpret and expand their roles beyond the needs of the project cases. Moreover, this inherent characteristic of the mentors' links to the findings about the types of mentor knowledge analysed through the TPACK framework.

Whereas the TPACK framework evaluates technology integration in terms of pedagogy, content and technology knowledge in the classroom context, this research evaluated this knowledge within the wider H.E context of an academic school. Moreover, the analysis was more wide-reaching and included the knowledge of administrators and learning technologists as mentors. In doing so, a new category of mentor with declarative procedural conditional administrative knowledge (DPCAK) was identified. Mentors with DPCAK differ from other categories of mentor role within the TPACK framework and it applies to administrators as mentors. The results indicate that these mentors did not have pedagogic content knowledge and it was not needed for their mentor roles. These findings provide empirical evidence of user-related knowledge in terms of evaluating technology integration into wider contexts away from classroom-based pedagogies utilising a mentoring approach. It also provides knowledge of a motive in practice which is a form of common knowledge, in the sense that both the mentor and ePioneer want to progress their professional practice with the e-learning knowledge they gain from the innovation process.

7.2.2 Mentor motivation

RQ 2: How can the influences revealed by technological innovation processes be articulated for application to other technology innovation contexts?

The analysis of mentor motivational traits centred on the subject-rules-object quadrant of the activity system and used Birkinshaw's (2012) three workplace motivational factors (intrinsic, extrinsic and internalised extrinsic motivation) and questioned the rules of operation, communication and motivational drivers.

Careful scrutiny of the mentors-mentee dyadic relationships for the duration of the project concluded that the driving factors that promoted relationship-building were intrinsic and extrinsic motivation through the relational expertise within the identified mentor roles (see Section 6.3.1.1). Moreover, it was the positive orientations to the mentors that influenced the innovation process with both intrinsic and extrinsic traits helping to maintain the momentum of the collective technological innovation process.

Clarification of the positive orientations of the mentors was further consolidated with the emergence of the mentor-coordinator role. The practices associated with the mentor-coordinator elicited strong intrinsic motivational traits and acted as an extrinsic motivational trigger for the participants to continue with their project developments. These included maintaining the momentum of the entire project to ensure that the project developments moved forward. The presence of the mentor-coordinator was a controlling and extrinsic motivation factor that prompted progress. In other words, the mentor-coordinator role provided a visible trigger and extrinsic motivator and driver that provided the momentum for the participants to continue with their projects. The role of the mentor-coordinator is an important change agent role within the wider context of technology innovation processes. This person needs empathy and needs to be an integral support mechanism within the new e-learning community. The mentor-coordinator is intrinsically motivated, and the role serves as an enabler that encourages

other mentors to maintain their support strategies with their mentees. The mentees, in turn, will take control of their own technological innovation development.

7.2.3 Barriers to the process of innovation

Key theme 2 problematized mentor-mentee decision-making in the subject-rules-object quadrant of the activity system. This theme specifically highlighted contradictions directly related to relational agency and the job roles of participants. Although the participants were from different job families (in some cases), their project goals were the same; i.e., to produce quick-gain e-learning objectives for their particular working contexts. However, there were contradictions in the reporting of individual project progress on SharePoint (see Section 6.3.1), due to several factors relating to both the tool for reporting and the relationships between the participants. The reporting of negative or unproductive information was a particular problem, especially within such a professional and hierarchical context. Both mentors and mentees were reluctant to report their perceptions of failures (or indeed, the successes) within their projects. Their reasoning was that they wanted to build trust and confidence with the mentees and encourage them to take ownership of their own technological developmental journeys. This was a fundamental objective of the ePioneers project.

The contradictions in this theme is related to job roles in the wider institutional context verses job roles and knowledge of the mentors in the new context. Haapasaari, Engeström and Kerosuo (2014) (Section 6.3.2.4) propose that transformative agency can predict new possibilities resulting from the examination of disturbances, conflicts and contradictions. The notion of transformation in this context is the mutual respect that developed between the dyads with the exclusion of expected knowledge and role expectation of the wider institutional context. It was inconsequential that mentor expertise worked against hierarchy for some mentees. Within this new community, collegiality was nurtured and developed as the projects matured and the dyadic relationships developed.

The notion of agency highlights an important factor during the reporting process, raising issues of conflict and decision-making issues caused by job roles. However, the presence of these disruptions and contradictions are insightful for understanding the barriers to technological developments and warrants further research.

7.2.4 Change agent roles in the process of technological innovation

RQ 3: How can the technological change process be evaluated within a voluntary CPD intervention?

Key Theme 3 identified the perceived change in mentor roles by the participants during the project development process. This enabled an understanding of perceived mentor roles in a real context, enabling a comparison with roles cited in the literature. The mentoring and coaching terms in the literature review (2.4.2) are numerous and, when attempting to adopt them within identified contexts, this can add confusion to generally understood meaning of mentoring/coaching. It is for this reason that this research sought a baseline definition that could be utilised within the study context from the outset. The definition that offered the most flexibility for the research purpose was:

A mentor is a person who helps to grow an individual personally and professionally while adopting a flexible coaching approach based on individual need. (Lord, Atkinson and Mitchell 2008: iii)

This definition usefully helped to contextualise the baseline definitions of the mentor role offered by the mentors and mentees at the start of the project intervention.

The analysis of mentoring/coaching literature support the approaches mooted by researchers within pre-determined teaching and learning contexts. In addition, the complexity of mentoring/coaching approaches suggested the need for a personalised approach according to knowledge/need. However, this study has succeeded in adding to knowledge in terms of identifying the fluidity of the changing mentor roles within specific learning contexts. Moreover, the roles identified are specifically applied to the changing processes of technological innovation within a CPD context.

7.3 Contribution to knowledge

In summary, the research makes the following claims that contribute to knowledge:

1. The changing role of the mentor during the process of innovation

In RQ 1, I wanted to know how mentoring could support technological innovation and how the approaches could be applied to contexts wanting to improve innovation in their educational institutions. My primary focus was the role of the mentor in such processes. The literature shows that defining the role of the mentor is a very difficult task. By way of understanding the role of the mentor specific to this study context, this research has devised its own taxonomy of mentoring roles from the point of view of the participants. By constructing the taxonomy, the research has established a definitive set of mentor roles that are specific to the study context. The results also show that within this taxonomy, the participants identified the roles that were specific to their own contexts. With this knowledge the ePioneers were able to judge how the needs from their mentors changed, while they developed the expertise to enable them to take control of their own technology innovation journeys.

The contribution to knowledge is to recognise that the construction of a taxonomy of mentoring roles from the end-user perspective can provide a realistic view of mentoring that the mentee can use as a bench-mark in which to measure progress in innovation practices. For researchers and managers wishing to adopt a similar practice, the list of mentor roles and their meaning in a practical context (as demonstrated in this study), is a useful starting point when selecting mentors for an H.E. context.

2. Mentor knowledge to support technological innovation is specific to the user

In RQ 2, I wanted to understand how the knowledge of technology that users possess is used to support others to develop their own practice. To answer this question, I needed to ascertain what this technology knowledge consisted of, and how its use in practice could be evaluated. The research used the TPACK framework to evaluate types of mentor knowledge, and motivation theories to assess how this knowledge is accepted by the ePioneers to support their development. The results show that mentor knowledge evaluated through TPACK has identified that administrator mentors possess knowledge that differs from the teaching context. These mentors possess declarative, procedural, conditional administrative knowledge (DPCAK). This is knowledge that is specific to mentors that work outside the classroom context. This technological knowledge is more wide-reaching than classroom-based pedagogic knowledge. The contribution to knowledge from this perspective demonstrates the wide-reaching nature for mentors with DPCAK. Moreover, this knowledge supports the argument for staff users to be accepted as technology practitioners (not administrators) into the fabric of managing the student learning experience. It is therefore of vital importance that their skills are recognised, and their development is supported by mentors with DPCAK.

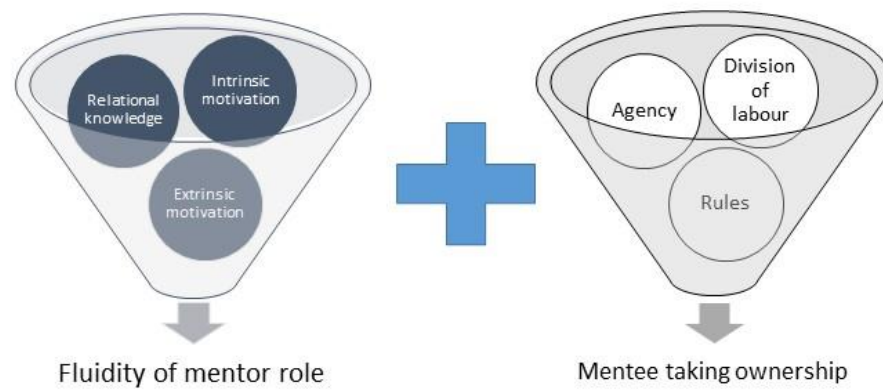
3. Evaluation of the technological process

In RQ 3, the aim was to evaluate the process within the CPD framework. The research study focused on the analysis of a voluntary CPD intervention, partly due to the researcher's personal notions and from anecdotal evidence that CPD with technologies was often hindered by institutional pressures and time constraints. One of the research objectives was to develop a set of criteria that captured how mentors contribute to technology adoption sustainability and to

better inform policy makers of the difficulties of embedding new technologies across HEIs. (Section 3.5) during technological innovation. The CPD models reviewed in the literature however, focussed on goals but not knowledge developed during their technology innovation development process. The analysis has resulted in identifying three main types of knowledge category and identified specific mentor roles within each category that changed as the dyads built relationships while their projects developed (Figure 6.12). The significance of these roles and knowledge categories consolidate the personal nature whereby mentor-mentee relationships can be nurtured and developed for mutual benefits. In summary, the factors that contribute to change agents' influence on technological innovation processes are illustrated in Figure 7.1.

- Relational knowledge
- Positivity through intrinsic/extrinsic motivational traits to promote sustained innovation development
- A mentor-coordinator role with strong intrinsic motivation to act as an extrinsic motivator
- Administrator mentors with declarative procedural conditional administrative knowledge

The model illustrated in Figure 7.1 serves as an evaluation of the process of innovation that can be developed with further research.



Conditions for sustainable technology innovation by
end-users of technologies

Figure 7.1 Change agent attributes to support technological innovation

7.4 Study limitations

This research was conducted in 2005, at the start of the push to introduce e-learning into HEI teaching practices. Since that time and to the writing of this thesis there have been many changes to the utilisation of technologies in educational practice. For this research context there are some limitations to consider:

- The research has not been able to offer any conclusions as to the success and/or outcomes to the individual project cases. It would have been preferable to continue the study for a longer time period to gather further data.
- The analysis of the data should be generalised with care given with the current data set. However, I would argue that the analysis provides a good starting point for further research (see below).

7.5 Next steps

Whilst this is the final chapter of this thesis there is still much work to do to understand how barriers to technology adoption may be addressed through forms of organised professional support. This challenge is getting more difficult with the speed of technology development and with the demands of learners as they enter higher education.

Furthermore, the gap is widening between students' knowledge and expectations of technology use for their studies and the HEIs' ability to meet these needs. This research has been able to unpick a tiny part of this challenge by gaining an insight into the process of supporting pedagogic technology acceptance from a developmental perspective. The next steps for further research are as follows:

- Test the mentoring role as a change agent in different contexts to form a better understanding of knowledge and motivation
- Gain a better understanding of technology acceptance through the analysis of other mentor-mentee dyad relationships
- Develop a mentoring model and its context

- Conduct further research – perhaps form links with university service providers to enhance the mutual knowledge and bridge the gap between technology and pedagogy in which to develop better efficiencies and outputs.

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9 Appendices

Appendix 9.1 School of Education e-learning policy

University of Nottingham School of Education

e-learning@nottingham.education

"We have undergone an irreversible shift in technology and successive intakes have progressively higher expectations as to the potential which new technology offers. E-learning is therefore here to stay... Even if our ambitions were solely confined to providing a better product to our existing campus-based market, that would still require significant investment to ensure that appropriate developmental support was available and that best practice could be disseminated." (e-learning@nottingham, 20.1)

Background, Aims and Definition and Skills Requirements

In June 2001 the paper 'e-learning@nottingham' was adopted by Senate. The paper had been drafted by the University's E-Learning Strategy Group, chaired by Professor David Greenaway.

This School of Education strategy paper was drafted in the light of the University's strategy in January 2002, by a working group comprising the School's ICT Coordinator, the Chair of Learning and Teaching Committee and the Staff Development Coordinator.

The School of Education strategy aims to:

- Provide a basis for the further development of e-learning in the School
- Establish a clear relationship with the University's e-learning strategy.

The University's strategy identifies relevant aspects of the wider context and rationale for e-learning and it is not our intention to rehearse these here. In that sense we take the notion and importance of e-learning as a given.

Definition of 'e-learning'

However it will be helpful to define what we mean by 'e-learning'. We propose that we work to the same definition as used in the University's strategy, being that

"E-learning is used here to mean the use of new communication and information technologies (C&IT) to support student learning. As such it does not imply a mode of learning (distance or campus-based) since the technologies can be used to enhance existing provision as well as open up new markets." (e-learning@nottingham Para 3.1)

In the light of this inclusive definition it will be seen that all courses in the School utilise at least some aspects of e-learning to some extent. Rather than inadvertently creating a false dichotomy between 'e-learning' and 'non e-learning' courses, our use of aspects of e-learning is best conceptualised as a spectrum of intensity of use. At the 'low intensity' end of the spectrum would be a 'traditional'

face-to-face course in which the use of e-learning is restricted to the use, say, by students of the University of Nottingham Library Online Catalogue to seek out references. At the 'high intensity' end of the spectrum would be a distance-learning course that is experienced largely on-line, using a Virtual Learning Environment such as WebCT and other electronic tools.

Thus an understanding and critical appreciation of e-learning is a matter for all staff, and not just those involved in specific projects seeking to develop particular approaches.

The use of e-learning should be pedagogically sound and should be led by academic staff and should reflect academic priorities. Notwithstanding the need to widen access and compete in a changing educational market, all extension of e-learning should be driven by the enhancement of student learning experiences.

The development and support of e-learning requires the ready availability of a wide range of related skills. Some of these must of necessity be provided within the School. Others can be provided within and beyond the wider University. Appendix 1 contains a list of skills identified in the University's Strategy.

School of Education Context

As suggested above, e-learning is not a new concept in the School of Education, though the term itself may not be widely used at present. Most, if not all, staff make use of new technologies, directly and indirectly, to support student learning in a variety of what may be thought of as conventional settings.

In addition there are specific projects that are more innovative in their explicit use of e-learning. Currently there are six:

- PGCE modular course
- EdD (Teacher Education)
- The Teaching Observatory
- MA TCTFL (CLIL)
- E-PARS
- ELT module development for distance learning (with English Studies)

The technology context at the School of Education supplements the University's wider technology environment in a number of ways.

- An ICT suite (A37) with data projection and workstation management software, also available as a student-access area
- Student access computers in the Resources Centre
- A network manager / ICT technician
- The School's network server supports software not widely available on the University network
- Bookable data projection
- Interactive whiteboard and video conferencing in A34
- ICT support from designated staff

In addition to the large number of staff involved in using new technologies in teaching there are several staff who are actively engaged in research into one or more aspects of e-learning. Thus there is developing in the School a pool of

experience and expertise in the use of the technologies themselves, of experience and expertise in conducting research into e-learning, and of knowledge developed through that research.

The School has a reputation built on the quality of face-to-face teaching. Whilst the wider context is clearly shifting towards a greater use of e-learning, we should consider any potential developments most carefully.

Potential Directions for E-Learning Development and their Implications for the School

The University's strategy identifies three possible lines of development which "are not alternatives; the first at least is not optional." (introduction to Section C) These lines of development are:

- Development 1: Enhance provision for campus-based students
- Development 2: Programmes for distance learning
- Development 3: CPD programmes for commercial clients

Current activity in the School can be seen to be located in Developments 1 and 2, though we should be alert to opportunities that may arise in relation to Development 3.

We should build effectively on what has already been achieved; in order to do this certain implications for infrastructure will need to be addressed. These are identified in the University's strategy, and most are also relevant within the School. They include the following:

- *Staff development* for academic, administrative and technical staff is vital. Training sessions are less likely to provide an appropriate means of achieving this than processes of facilitation and network development built around local strengths.
- *Staff reward* for the enhancement of teaching through the development of e-learning approaches.
- *Student administration* including new means of administering student progression under different patterns of attendance and teaching, and possible opportunities for streamlining of procedures.
- *Quality assurance, IPR and succession*. At present QAA guidelines for distance learning tend to emphasise paper-based rather than technologically-mediated approaches. IPR is a sensitive issue, but of more concern may be issues of succession when key staff associated with a particular project move or retire.
- *Teaching facilities and network access*. More staff may need portable computers to make best use of data projection and network access in teaching rooms. The development of a University-wide student portal should provide straightforward access to the University network for off-campus users.

Conclusions and Recommendations for the School

- *Recommendation 1*: Executive Group should assert publicly the importance of e-learning in existing markets together with a commitment to support its development.

- *Recommendation 2:* E-learning and distance learning are clearly related, but should be treated separately in the School, with increased use of the former being an imperative and the latter an option.
- *Recommendation 3:* The School should further integrate e-learning issues into the Learning and Teaching strategy. The School should set up an e-learning group as a sub-committee of Learning and Teaching Committee and should identify an e-learning champion.
- *Recommendation 4:* The School should review the integration of e-learning annually in order to reflect developments in the school plan.
- *Recommendation 5:* All teams should consider their use and development of e-learning as defined above as a standing agenda item.
- *Recommendation 6:* The School's strategy should support a bottom-up approach in terms of development, with the School taking responsibility for the fostering of initiatives, whilst also responding positively to policy.
- *Recommendation 7:* The School should build on recent experience of widening the reach of the PGCE and EdD (Teacher Education) by considering whether further new or existing courses could beneficially be offered wholly or in part as technologically mediated distance learning.
- *Recommendation 8:* The School should review the scope of staff development activities and seek ways of increasing the spread of e-learning related knowledge and skills to a greater number of staff.
- *Recommendation 9:* The School should provide designated in-house support for the development and maintenance of e-learning approaches and materials, including those projects currently given support.

Appendix 1

We repeat here the skills requirements as identified in the University's strategy: "The introduction and delivery of high quality technology-mediated learning environments, whether to support learning *in situ* or at arm's length, requires expertise and availability in all the following areas.

- *Course and course material designers:* academic staff, with scholarship in teaching who can make a major time commitment
- *Course developers:* subject-based web designers and software writers to work closely with course and course material designers
- *Course tutors:* academic staff with skills in on-line tutoring who can make a major time commitment
- *Information specialists:* to assist with copyright clearance, licence negotiation, digitisation of materials etc.
- *Software developers:* to build portals and virtual learning environments to hold courses, track usage and develop tools to assist course developers
- *Technical support staff:* providing systems, server and network support
- *Hardware and software platforms*
- *Project managers:* to plan and drive developments
- *Administration of courses and student progress*
- *Student support:* particular to the needs of distance learning students
- *Financial, marketing and distributing expertise"* (e-learning@nottingham Para 6.1)

Briefing for mentors

The role of the mentor within a project is difficult to predict. This is because the scope of the project, expertise required, and the e-learning experience and confidence of the mentee will vary. This guide therefore only offers suggestions for approaches to take based on our experience within the School of Education.

Mentoring a colleague new to e-learning:

- Encourages the sharing of skills amongst colleagues
- Gives a sense of purpose for the e-learning idea
- Enables you (as a mentor) to articulate ideas that help in your own practice
- Ultimately aims to raise the technological profile and abilities of the mentee
- Enables you to be, for example, a sounding board/critical friend/working partner/provider of technical and/or pedagogical expertise

Challenges

- To meet regularly with your mentee(s)
- To have the time to be both reflective and proactive with projects as they develop
- To help to set and keep to the project timeline
- To maintain a focus on the project as other demands and priorities crop up
- To develop and maintain a relationship whilst supporting the mentee towards independence

Practicalities

1. Identify e-learning champion(s) (e.g. e-learning enthusiast, School Manager, academic leader of learning and teaching) to have overall oversight of your e-learning goals for your team.
2. Your first meeting should be used to:
 - discuss the feasibility of the project
 - set initial goals and outcomes
 - produce a draft time line for the completion of the project
3. Suggest monthly update meetings. Note: Get dates in your diaries ASAP. This will help to ensure project continuity and progress especially with wider workload issues.
4. If possible, plan informal (lunchtime) meetings with other mentors/mentees to provide the opportunity for all to share experiences and develop as a community.

University of Nottingham Code of Research Conduct and Research Ethics		 The University of Nottingham
Authorised by:	Date: January 2010	
The Research Committee	Version: 3.0	

1. To whom, and to what, does the Code apply?

The University of Nottingham requires all of its staff and students who are engaged in research to maintain the highest standards of integrity in the conduct of that research. This Code of Research Conduct provides a framework for the governance of all research throughout the University. It requires that all researchers adhere to the highest standards of performance and ethical conduct and to all applicable statutes and Government guidelines in carrying out their research.

The Code follows the principles set out in University Statutes (Section 35) and seeks to ensure that academic staff have freedom within the law to question and test received wisdom, and to put forward new ideas and controversial and unpopular opinions, without placing themselves in jeopardy of losing their jobs or privileges.

The Code applies to all employees, students, visiting and emeritus researchers, whether they are working on the University's premises or elsewhere.

The Code applies to all research deliverables and outputs in whatever form, and to all research activity, however it is funded.

The document refers to "Schools" throughout. This term is taken to include stand alone Institutes and centres where this is appropriate. A list of terms and definitions is given in appendix A.

2. The Context

This Code takes reference from and follows the UK Research Integrity Office's Code of Research Conduct, 2009. The overarching UKRIO Code was written on behalf of the University sector and provides a basis for the conduct of all research in academia. The UK Research Integrity Office (UKRIO) is an independent advisory body, offering advice and guidance on the good practice of research and how to address misconduct in research. It is hosted by Universities UK and funded by a range of stakeholders including the funding councils, the UK Departments of Health and the research councils.

The Code is linked to and operates in conjunction with other University policies and procedures which are described in the [Staff Handbook](http://www.nottingham.ac.uk/staff-handbook/section-3/), which forms part of each contract of employment (<http://www.nottingham.ac.uk/staff-handbook/section-3/>) and the

[Quality Manual](http://www.nottingham.ac.uk/quality-manual/) (<http://www.nottingham.ac.uk/quality-manual/>) which is relevant to both staff and students. Some policies derive from Acts of Parliament, such as Health and Safety at Work, Data Protection and the Medicines for Human Use (Clinical Trials) Regulations. Other policies derive from guidelines issued by government departments, such as the Department of Health's Research Governance Framework for Health and Social Care.

Many funders of research have developed their own codes of conduct and/or detailed terms and conditions of award which must also be adhered to by grant holders, their host departments and the host institution. Some terms and conditions may require confidentiality concerning the research project. In some research areas there will be other considerations to be taken into account, such as profession-specific codes of conduct or practice and the need for specific qualifications or skills accreditation. Those undertaking research are required to observe new developments in their field and to meet any requirements for good research conduct as they arise. The Code also includes a definition of, and procedures for dealing with, allegations of research misconduct. These are linked to the University's staff and student disciplinary procedures and procedures on public interest disclosure.

The Code and its implementation will be reviewed on an annual basis taking into account changes and recommendations from external research funders, Acts of Parliament and other legislations. This review will be undertaken by the University's Research Ethics Committee, in conjunction with and ratified by the University's Research and Knowledge Transfer Board and coordinated by Research Innovation Services.

3. Foundations and specific requirements for good research practice

Everyone involved in research in the University owes a duty of accountability to society, to their profession, to the University, to all participants in the research and to its funders. Staff must accept full responsibility for their own conduct of that research and the activities of all staff, students and others under their direction or supervision.

Researchers must be honest and lawful in respect of their own actions in research and in their responses to the actions of other researchers. This applies to the whole range of research work, outputs and deliverables, including applying for funding, experimental design, generating and analysing data, publishing results, and acknowledging the direct and indirect contribution of colleagues, collaborators and others. Plagiarism, deception or the fabrication or falsification of results shall be regarded as research misconduct and a serious disciplinary offence. Researchers should declare and manage any real or potential conflicts of interest.

The training needs of academics at all career stages should be considered, to ensure that research project management skills reflect best practice in the sector, and discussion of these should be included within the University's Activity/Performance review process. Senior research staff should ensure that appropriate induction and training is provided for researchers who have recently joined the University or are new to the research studies they are about to undertake. They should also ensure that all personnel associated with the project are competent to perform the technical, scientific and support tasks required of them. Personnel undergoing training must be supervised at a level such that the quality of the results is not compromised by the inexperience of the researcher.

Guidelines for the allocation of responsibility between the Chief/Principal Investigator, the School and Research Innovation Services for the project management, costing and pricing and authorisation of research proposals with external funders is detailed in the Responsibilities Document:

http://www.nottingham.ac.uk/ris/local/funding-systems-and-guidance/Responsibilities_document_version3.pdf

In addition Research staff, particularly research team leaders and Chief/Principal Investigators, must take responsibility for:

- 3.1 The ethical basis and design of their research projects – researchers must ensure that research projects are ethically sound and have received the approval of the relevant ethics committee(s) and all relevant statutory regulatory authorities before they commence;
- 3.2 The safety of all involved in the research process, ensuring that the research is carried out in accordance with health and safety policies and legislative requirements;
- 3.3 Ensuring that research is conducted in a suitable working environment with appropriate equipment and facilities;
- 3.4 The probity of the financial management of all research projects, and for seeking to provide the optimum value for the public or private funders who have invested in them including effective project management to agreed project plans and appropriate quality standards, as well as the timely delivery of any scheduled tangible outcomes;
- 3.5 Management of research data in accordance with the Data Protection Act 1998 and any other legal provisions, conditions and guidelines that may apply to the handling of personal information (see 4.1, below);
- 3.6 Undertaking professional development appropriate to the research;
- 3.7 Ensuring that personal records of research progress, including authorised laboratory books, are maintained to the recommended or required standards, and that no falsification of results occurs. Laboratory books must be signed and dated by the researcher, and signed off by the supervisor;
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- 3.8 Ensuring confidentiality in order to achieve protection of intellectual property rights where appropriate;
- 3.9 Ensuring that research findings are suitably disseminated;
- 3.10 Ensuring research subjects participate in a voluntary way, free from any coercion;
- 3.11 Avoiding harm to participants and minimising any adverse effect that the research may have on people, animals and the natural environment and property.
- 3.12 Be alert to the ways in which research derives from and affects the work of other people, and respect the rights and reputations of others.

4. Data

Distinction shall be drawn between personal and research data. Personal data is any data by which possession of could identify an individual. Research data are the metrics collected as part of the research and solely by which an individual cannot be identified. Personal data may also be research data.

All processing of personal data (which includes the obtaining and storage of data) must comply with the terms of the Data Protection Act 1998. It is recommended that researchers familiarise themselves with published guidance which interprets the application of the Act and any other relevant legislation that is pertinent to specific fields of research.

Some central issues for researchers are:

4.1 Personal data

- 4.1.1 All staff and students using personal data in research have a duty of confidence to the individuals concerned;
- 4.1.2 Unless there are ethically and legally justified reasons for doing otherwise, researchers must ensure that they have each study participant's explicit informed written consent to obtain, hold and use their personal information;
- 4.1.3 Only personal information pertinent to the research should be collected;
- 4.1.4 Data security arrangements must be sufficient to prevent unauthorised breaches of confidentiality;
- 4.1.5 Personal data should not be kept for longer than is necessary.

4.2 Research data

- 4.2.1 Data must be recorded in a durable form with appropriate references;
- 4.2.2 Data must be retained intact for a period of at least seven years from the date of any publication which is based upon them. Data should be stored in their original form – i.e. tapes/discs etc should not be deleted and reused, but kept securely as outlined.
- 4.2.3 Schools must have procedures for the retention of data. These procedures must be made known to all of their staff and students, who must comply with them.
- 4.2.4 Confidentiality provisions relating to publications may apply in circumstances where the University or the researcher has made or given confidentiality undertakings to third parties or confidentiality is required to protect intellectual property rights. It is the obligation of the research leader to inform researchers as to whether confidentiality provisions apply and of researchers to enquire of their research leader whether there are any obligations with respect to these provisions.

4.3 Confidentiality

- Individual participant personal information obtained as a result of research is to be considered confidential and disclosure to third parties is prohibited with the exception of statutory notification as applicable to the particular research.
- Participant confidentiality should be ensured by utilising identification code numbers to correspond to research data in any research paperwork and computer files.

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5. Publications

For the purposes of the code, publications include reports and technical reports in printed and electronic form, where these are related to a programme of research (including internally and externally funded research), even where these have a limited circulation and have been prepared to report on progress of the research.

Researchers are encouraged to disseminate their research and research findings in an appropriate form, usually as papers in refereed journals. Publication and wider dissemination of research and research findings must be carried out responsibly and with an awareness of the consequences of dissemination in the wider media.

- 5.1 A publication must contain appropriate reference to the contributions made by all participants in the relevant research;
- 5.2 The research funder should be notified in advance when research might be published, publicised or disseminated.
- 5.3 Any person who has not participated in a substantial way in conceiving, executing or interpreting at least part of the relevant research is not to be included as an author of a publication derived from that research;
- 5.4 In addition to meeting the requirements of the points above, an author must ensure that the work of research students, research assistants, research officers, and technical officers is recognised in all publications derived from research to which they have made a contribution;
- 5.5 A publication which is substantially similar to other publications derived from the same research must contain appropriate reference to the other publications;
- 5.6 A researcher who submits substantially similar work to more than one other publisher should disclose that fact to the publishers at the time of submission;
- 5.7 Publication and dissemination of work electronically or on the Web should be treated with the same degree of integrity as every other form of publication.
- 5.8 Individuals who are or have been the subject of the research should not be identified or identifiable in any publication. Measures should be taken to disguise the identity of research subjects unless explicit consent is given by them for revealing their identity.

In addition to publications, all external communications, whether through websites, e-bulletins, press releases, media briefings, or events should be undertaken with the core principles of openness, transparency and accountability.

6. Intellectual Property

The University has specific policies arising from Intellectual Policy and these must be adhered to (<http://www.nottingham.ac.uk/ris/local/ip-and-commercialisation/index.php>)

6.1 Data Sharing

- The principles of data sharing are widely recognised and underpin many international activities. A report on "*Promoting Access to Public Research Data for Scientific, Economic and Social Development*" by the Organisation for Economic Co-operation and Development (OECD, www.oecd.org) which represents the governments of its 30 member countries (including the UK) highlights the following principles:
 - Publicly-funded research data are a public good, produced in the public interest
 - Publicly-funded research data should be openly available to the maximum extent possible

The report concludes that widespread data sharing will enable researchers, empower citizens and convey tremendous scientific, economic, and social benefits.

The University subscribes to these data-sharing principles and aims to see the widespread ethical use of high quality data to advance research endeavour. We are committed to creating a scientific culture in which data sharing is embedded to facilitate more rapid scientific and social advances. Researchers will be responsible for liaison with discipline specific external data repositories to ensure that publically funded research data should be openly available. Where no such resource exists applicants may consider sharing data *via* other third party mechanisms such as journal websites and / or open access repositories, many of which are now able to capture and share data underpinning publications.

7. Supervision

Schools must adopt guidelines for the supervision of research undertaken by staff and students in accordance with requirements prescribed from time to time by the Senate and as specified in the [Quality Manual](http://www.nottingham.ac.uk/quality-manual/) for Staff and Students (<http://www.nottingham.ac.uk/quality-manual/>). The workload of all staff carrying out research shall be considered and moderated by research team leaders, Chief/Principal Investigators and Directors of Research or Heads of Schools as appropriate.

All supervisors must observe and undertake the responsibilities set out in these guidelines.

A person must decline appointment as a supervisor unless he/she expects to be able to discharge the responsibilities set out in these guidelines.

7.1 Lone Working

Where research involves lone working or contact with research subjects outside of the University premises a lone-working policy should be set up. Where possible, lone-working is to be avoided. Particular consideration should be given to lone-working where there are vulnerable populations of research subjects involved (such as children or adults with a mental incapacity).

Guidance on lone-working can be found at:

<http://www.nottingham.ac.uk/safety/fieldwork.htm>

7.2 Criminal Records Bureau

Where the research involves participation of children or vulnerable adults the participating organisation via whom the researcher hopes to recruit the study participants may request a CRB check of the researchers and researchers must be prepared to undertake this.

The CRB is an Executive Agency of the Home Office and its aim is to help organisations in the public, private and voluntary sectors by identifying candidates who may be unsuitable to work with children or other vulnerable members of society.

Note: Only organisations entitled to ask an exempted question under The Rehabilitation of Offenders Act 1974 (Exceptions) Order 1975 are eligible to request CRB checks. These organisations must either be registered directly with the CRB or apply through an organisation that is already registered (an Umbrella Body).

- 7.3 An individual who needs to work with either children or vulnerable adults must be registered with the Independent Safeguarding Authority in order to do so. It is a criminal offence under the Safeguarding Vulnerable Groups Act, 2006 for either an employer or an employee to allow work to be conducted with children or vulnerable adults without this registration.

The University's guidance on the Protection of Children and Vulnerable Adults:

<http://www.nottingham.ac.uk/wideningparticipation/downloads/Guidance%20on%20the%20Protection%20of%20Children%20and%20Vulnerable%20Adults.pdf>

8. Conflict of Interest

The University has a policy on external work undertaken by Academic and Academic-Related Staff. This policy states that external work, whether or not remunerated, has to be regulated in order to ensure that it either does not create a conflict of interest or, if necessary, it has received formal sanction from the University. The policy sets out cases where permission to carry out external work is automatic, procedures by which permission may be sought in other cases, and the consideration that will be taken into account when

it is decided whether permission shall be granted (<http://www.nottingham.ac.uk/staff-handbook/>)

The University has a policy on Conflicts of Interest, Gifts and Hospitality. This policy states that if members of staff have any third party pecuniary or non-pecuniary interests which may give rise to conflicts of interest in carrying out their University duties, they should report them to their Head of School and to the Registrar. The Registrar shall enter them on a register kept for this purpose. (<http://www.nottingham.ac.uk/staff-handbook/>).

Where there is a potential conflict of interest in research that falls outside the areas covered by the above policies, this must be discussed with the Director of Research Innovation Services at the earliest opportunity. Conflicts of interest may occur where researchers have an affiliation or financial involvement (including direct financial interest, provision of benefits and provision of material or facilities) with more than one organisation sponsoring or providing financial support for research. The Director of Research Innovation Services can refer any potential conflict of interest to the Pro-Vice-Chancellor for Staffing.

9. Ethical Review

Origins of Research Ethics

Consideration of ethical issues has long been a feature of medical research and most notable has its origins in the *Nuremberg Code 1947*, following the trials of the Nazi war criminals. It is the most important document in the history of the ethics of medical research and the first of its kind to ensure the rights of subjects.

The Nuremberg Code includes such principles as informed consent and absence of coercion; properly formulated scientific experimentation; and beneficence towards research participants.

The *Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects* first issued in 1964, is the policy-statement of the World Medical Association.

Although this text was written primarily for medical practice, many of the principles have general application; for example regard for human dignity; care for human and animal welfare, consideration of risk, and informed consent of human subjects in research projects.

Many statutory, professional and regulatory and other bodies, for example Research Councils, have adopted either Codes of Practice or Guidelines. Two examples are the UK Economic & Social Research Council's *Research Ethics Framework* and *Respect Code of Practice for Socio-Economic Research* which is intended to form the basis of a voluntary code covering the conduct of social-economic research in Europe.

Ethics Committees

The *Declaration of Helsinki* enunciated the principle of independent assessment of experimental procedures involving human subjects. In full this section (B13) reads:

"The design and performance of each experimental procedure involving human subjects should be clearly formulated in an experimental protocol. This protocol should be submitted for consideration, comment, guidance and where appropriate, approval to a specially appointed ethical review committee, which must be independent of the investigator, the sponsor or any other kind of undue influence. This independent committee should be in conformity with the laws and regulations of the country in which the research experiment is performed. The committee has the right to monitor ongoing trials. The researcher has the obligation to provide monitoring information to the

committee, especially any serious adverse events. The researcher should also submit to the committee, for review, information regarding sponsors, institutional affiliations, other potential conflicts of interest, and incentives for subjects.”

The National Health Service was the first public body in the UK to give effect to these principles. The operation of RECs in the NHS is coordinated through the National Research Ethics Service (NRES). NHS RECs review and give ethical approval to all research involving the NHS and/or the use of investigational medicinal products or devices.

University Ethics Committees

As the importance of ethical scrutiny of research projects has grown, the value of having ethics committees in other institutions has been recognised. Most universities now have ethical approval systems in place. In Nottingham there have been several committees in existence (see sections below) for several years and these are all sub-committees of the newly formed (2009) over-arching University Research Ethics Committee.

The purpose of ethical approval within the University is positive and threefold:

- i) The University is committed to following good ethical practice, as a principle in itself and as a means by which the public can be assured of confidence in the work of staff and students of the University.
- ii) The provisions for ethical review and approval assist researchers in the identification of ethical issues and to address them in the structuring of research protocols. The resultant development of good practice is expected to cascade down to students and inform their own emerging practice at both undergraduate and postgraduate level.
- iii) The approval process acts as a safeguard to researchers, supervisors and students who can be confident of the ethical propriety of their project once it has been approved.

Need for Ethical review and the review process

Ethical review (and approval) is required where the research involves the participation of human subjects (participants, see Appendix A for definition), their data and/or their tissue. Where the use of animals is involved this is subject to regulation and the ethical review is carried out by the University’s Ethical Review Committee – see section 9.3 – in line with the legislation. Researchers are advised that if in doubt about the need for an ethical review of their research to speak to their School Ethics Officer or the Research Governance staff in Research Innovation Services.

Responsibility for ensuring proper ethical review lies with the Chief or Principal Investigator, reporting on behalf of co-investigators through his/her Head of School, and involving the University Ethical Review Process for licensed work as appropriate. The Research Governance Manager will monitor compliance and develop best practice through the University.

Each School must ensure that the appropriate internal or external systems are employed to review the ethical implications of research undertaken by its academic and research staff and students before any research commences. Normally, external research sponsors will not release funds unless they receive evidence that approval has been given by the relevant research ethics committee.

Heads of Schools who are able to support research with School funds must ensure that Research staff are especially vigilant regarding the potential need to seek the approval of one or more ethics committees. If there is any doubt about the need for ethical approval in relation to their proposed research, staff should seek advice from the University Research Ethics Committee, the Research Governance Manager or the appropriate external ethical review board.

9.1 Non-medical research

Non-medical research involving human participants or subjects can be reviewed by internal review routes – via the individual School’s ethics committee where this exists or where this does not exist through the University Research Ethics Committee or via another School’s committee if appropriate.

9.2 Medical or clinical research

9.2.1 Medical or clinical research NOT involving the use of an Investigational Medicinal Product (IMP) or medical device and involving the participation of healthy volunteer research subjects only is reviewed by the Medical School Research Ethics Committee.

9.2.2 Medical or clinical research involving NHS resources, staff, patients and biological materials or data derived from them and ALL clinical research involving the use of IMPs or medical devices on human participants must be approved by a UK Ethics Committee Authority registered ethics committee. These are part of the National Research Ethics Service.

Also, any research involving resources, staff, patients and biological materials or data derived from them will also require approval from the R&D Office of each NHS Trust involved. Standard Operating Procedures available on the RIS web page under ‘Research Governance’ give instructions on how to do this.

9.2.3 Medical or clinical research involving NHS resources, staff, patients and biological materials or data derived from them and ALL clinical research involving the use of IMPs or medical devices on human participants requires the nomination of a Research Sponsor. The University of Nottingham acts as the Research Sponsor for all of its medical/clinical research where appropriate. The Research Governance Team reviews all applications for Sponsorship prior to the submission of approvals for ethics and regulatory approvals. Standard Operating Procedures available on the RIS web page under ‘Research Governance’ give instructions on how this is done.

Furthermore, the University’s Research Innovation Services office checks and maintains records of ethical approvals in relation to the grants it administers.

9.2.4 Any research involving the use of Investigational Medicinal Products (IMPs) or medical devices will also require the approval of the Medicines and Healthcare products Regulatory Agency (MHRA). The Chief Investigator is responsible for obtaining approval where it is appropriate. Standard Operating Procedures available on the RIS web page under Research Governance give instructions on how to do this.

9.3 Research involving the use of animals

The Animals (Scientific Procedures) Act 1986 (ASPA) requires that a local Ethical Review Process is maintained by establishments (designated by the Secretary of State) to apply regulated procedures to protected animals (Section 1.1 of ASPA) . The University of Nottingham’s local Ethical Review Committee is required to mobilise institutional expertise and resources in order to promote good animal welfare and humane science by ensuring that the use of protected animals at

designated establishment is justified. The process should ensure that proper account is taken of strategies to identify, and opportunities to apply, appropriate strategies to replace, reduce and refine animal production and use (the 3R's).

The Ethical Review Committee should therefore be notified of all work involving protected animals in the establishment. This will ensure that corporate consideration is given to the research proposal and appropriate advice provided to both the Principle Investigator and Certificate Holder. Subsequent ethical approval, subject to Home Office licence authority (as appropriate), may then be granted on a case by case basis.

Full details of the local Ethical Review Process may be obtained from the Registrar at registrars@nottingham.ac.uk with information on the Animals (Scientific Procedures) Act 1986 available at this link: <http://scienceandresearch.homeoffice.gov.uk/animal-research/animal-welfare/>.

9.4 Occluded or Covert research

Occluded research is where full information cannot be given to the research participant because this would introduce bias (such as the participant's knowledge of use of a placebo); be meaningless (such as in crowd observation); or invalidate the research (such as in psychological experiments).

Research may be undertaken in a covert way where the full written informed consent of the participant cannot be obtained because this may pose a risk (such as criminal disclosure) to the participant; or where the research necessarily involves concealment of the real objectives of the research without knowledge of this by the research subjects. Thus the people being studied are not fully informed about the research. There are different types of covert research and these can include concealment, misrepresentation, and camouflage. All of these raise a number of ethical issues.

All such research *must* be ethically reviewed by a suitable ethics committee. The choice of committee depends on the nature of the research and whether the research is of a medical basis or not. Where the research is to investigate a medical condition then ethical approval as in section 9.2 must be sought. Where the research is non-medical ethical approval as in section 9.1 must be sought. In the latter instance advice can be sought from the University Ethics Committee at any time to inform any sub-committee's decision.

9.4.1 The withholding of information from participants should only occur when the researcher is clear that the aims and objectives of the research cannot be achieved by any other means and that the welfare of the participants is assured.

9.4.2 Covert methods necessarily violate the principles of informed consent and may invade the privacy of those being studied. Participant observation in non-public spaces or experimental manipulation of research participants without their knowledge should be resorted to only where it is impossible to use other methods to obtain essential data. In such studies it is important to safeguard the anonymity of research participants.

9.4.3 Where it is possible and practicable, and where it is judged that the consequences of doing so will not be harmful (e.g. cause distress) to participants and will not potentially jeopardise the research, disclosure and debriefing should follow participation as soon as possible. Here the participant should be offered the option of withholding their data in accordance with the principle of participation by informed consent.

9.5 Research involving sensitive data

Research that involves investigations using sensitive data, such as "sensitive personal data" as defined in the Data Protection Act 1998 – see below, should also undergo an ethical review by a suitable ethics committee as in section 9.1.

Note: "Sensitive personal data" in the Data Protection Act, 1984 means personal data consisting of information as to—

- (a) the racial or ethnic origin of the data subject,
- (b) his political opinions,
- (c) his religious beliefs or other beliefs of a similar nature,
- (d) whether he is a member of a trade union (within the meaning of the [1992 c. 52.] Trade Union and Labour Relations (Consolidation) Act 1992),
- (e) his physical or mental health or condition,
- (f) his sexual life,
- (g) the commission or alleged commission by him of any offence, or
- (h) any proceedings for any offence committed or alleged to have been committed by him, the disposal of such proceedings or the sentence of any court in such proceedings.

9.6 Research involving participation by children or vulnerable adults

Research that involves participation by children (under 16 years old) or vulnerable adults such as those with a mental incapacity or prisoners should undergo an ethical review by a suitable ethics committee as in sections 9.1 or 9.2 depending on the nature of the research. See section 7.3. There are legislations specific to research involving vulnerable adults and children. Researchers must ensure that they are familiar with the requirements of these legislations before designing their research. Advice can be sought from the Research Governance Manager.

10. Adverse Events

Researchers are responsible for monitoring and reporting any adverse events occurring in the course of the research and each School must have systems in place to ensure that all such adverse events are recorded and, if appropriate, investigated.

For clinical/medical research where ethical approval has been sought and granted from an NRES Research Ethics Committee there are specific reporting requirements for serious adverse events. In addition to these, specialised reporting requirements and actions apply in relation to clinical trials involving the use of Investigational Medicinal Products that are regulated by the 'Medicines for Human Use (Clinical Trials) Regulations 2004,' the UK implementation of the EU Clinical Trials Directive 2001/20/EC and the International Conference of Harmonisation's Good Clinical Practice guidelines. Standard Operating Procedures available on the RIS web page under Research Governance give instructions on how to meet these reporting requirements.

11. Insurance

The university holds insurance policies that provide indemnity for claims against both the University and the individual for:

- 11.1 Property and business interruption;
- 11.2 Employers liability: this covers for claims made for death, injury or disease to any person arising out of and in the course of their employment;
- 11.3 Public liability: this provides indemnity in respect of claims made for death, injury or disease to persons other than employees or loss or damage to third party property arising out of and during the course of the business;

- 11.4 Professional indemnity: this provides indemnity in respect of legal liability to third parties for breach of professional duty due to negligent act, error or omission in connection with your business; and
- 11.5 Clinical trials: this provides indemnity against legal liability for damages in respect of accidental injury of any research subject arising out of the business of conducting clinical trials

Each separate policy carries specific inclusions and exclusions. The Employer's Liability policy extends world-wide. All the other policies are limited to Great Britain (England, Scotland, Wales), Northern Ireland, Channel Islands and the Isle of Man.

Details can be found on the Procurement web page or by contacting the University Insurance Officer (details on the web page):

<http://www.nottingham.ac.uk/procurement/>

12. Additional Requirements

Any special standards of work performance and ethical conduct that are imposed by law or by the University in relation to particular categories of research are deemed to be included in this Code in its application to persons engaged in that research in the University. Project managers have a responsibility to inform staff about the implications and ensure that they agree to and accept the terms.

Researchers have a responsibility to read the terms and conditions of funders and contractors before signing grant applications and contracts to ensure that they understand the implications of those terms and that they agree to, and accept them as a basis for that research. All research grants applications and commercial research contracts whose Principal or Chief Investigator is employed by the University must be approved by Research Innovation Services <http://www.nottingham.ac.uk/rso/>.

Multi-Funder Requirements

Where research is funded by more than one funding body or contractor, researchers have a responsibility to read the terms and conditions of the different funding bodies, to ensure they understand and agree to the terms and to ensure there is no conflict between the terms and conditions of the different funding bodies.

13. Procedures for dealing with allegations of research misconduct

Research misconduct means fabrication, falsification, plagiarism or deception in proposing, carrying out or reporting progress or results of research and deliberate, dangerous or negligent deviations from accepted practice in carrying out research and from this Code of Conduct, whether or not it causes harm. It includes failure to follow established protocols if this failure results in unreasonable risk or harm to humans, animals or the environment. It also includes assisting in misconduct by other researchers by collusion in, or concealment of, any of the actions listed above. It does not include honest error or honest differences in design, execution, interpretation or judgement in evaluating research methods or results or misconduct (including gross misconduct) unrelated to the research process. An allegation of research misconduct is a serious and potentially defamatory action and could lead to a threat (or even the instigation) of legal proceedings. Consequently for the protection of the complainant and of the party against whom the allegations are made, all enquiries (including the formal investigation, if any) should be conducted on a basis of strict confidentiality (wherever possible) as well as of integrity and non-detriment so that neither party should suffer solely as a consequence of the allegation being made. Allegations of research misconduct will be subject to formal investigation and may be dealt with in accordance with the provisions of University procedures which may

include the following University procedures (published in the [Staff Handbook](http://www.nottingham.ac.uk/staff-handbook/) at: <http://www.nottingham.ac.uk/staff-handbook/>)

- Disciplinary procedure for staff subject to University statutes, section 35;
- Disciplinary procedure for staff not subject to University statutes, section 35;
- Procedure for public interest disclosure by staff or students of malpractice: <http://www.nottingham.ac.uk/staff-handbook/section-3/public-interest-disclosure.php>

or in accordance with [The Code of Discipline for Students](http://www.nottingham.ac.uk/registrar/calendar/code-of-discipline.pdf). <http://www.nottingham.ac.uk/registrar/calendar/code-of-discipline.pdf>

The University is required to report annually through Audit Committee whether any issues of research misconduct have arisen concerning any Research Council funded researchers.

14. References and major research funders' guidance

Where appropriate to the research being undertaken, researchers should refer directly to the following guidance, and any other guidance relevant to the sponsor and/or specific research area.

We acknowledge the use of some of the following documents in the preparation of this Code:

[NHS Research Governance Framework \(2001; second edition: 2005\)](http://www.dh.gov.uk/en/Researchanddevelopment/A-Z/Researchgovernance/DH_4002112)
http://www.dh.gov.uk/en/Researchanddevelopment/A-Z/Researchgovernance/DH_4002112

[MRC Policy and Procedure for Inquiring into Allegations of Scientific Misconduct \(1997\)](http://www.mrc.ac.uk/index.htm)
<http://www.mrc.ac.uk/index.htm>

[MRC Ethics Series 'Personal Information in Medical Research \(2000\)](http://www.mrc.ac.uk/index.htm)
<http://www.mrc.ac.uk/index.htm>

[AMRC Guidelines on Good Practice in Research](http://www.amrc.org.uk/homepage/Default.aspx?Nav=815,523)
<http://www.amrc.org.uk/homepage/Default.aspx?Nav=815,523>

[The Wellcome Trust guidelines for researchers](http://www.wellcome.ac.uk/node3610.html)
<http://www.wellcome.ac.uk/node3610.html>

[UK Data Protection Act \(1998\)](http://www.opsi.gov.uk/ACTS/acts1998/19980029.htm)
<http://www.opsi.gov.uk/ACTS/acts1998/19980029.htm>

[EU Clinical Trials Directive \(2001/20/EC\) and ICH Good Clinical Practice Guidelines](http://www.mhra.gov.uk/home/idcplg?IdcService=SS_GET_PAGE&nodeId=136)
http://www.mhra.gov.uk/home/idcplg?IdcService=SS_GET_PAGE&nodeId=136

[DEFRA Code of Practice.](http://www.defra.gov.uk/)
<http://www.defra.gov.uk/>

[ESRC Research Ethics Framework](http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/Images/ESRC_Re_Ethics_Frame_tc_m6-11291.pdf)
http://www.esrcsocietytoday.ac.uk/ESRCInfoCentre/Images/ESRC_Re_Ethics_Frame_tc_m6-11291.pdf

[National Research Ethics Service \(NRES\)](#)

<http://www.nres.npsa.nhs.uk/>

NHS Research & Development Forum

<http://www.rdforum.nhs.uk/>

[Animals \(Scientific Procedures\) Act 1986](#)

<http://scienceandresearch.homeoffice.gov.uk/animal-research/legislation/>

[Human Tissue Act](#)

<http://www.hta.gov.uk/>

[Medicines and Healthcare products Regulatory Agency](#)

http://www.mhra.gov.uk/home/idcplg?IdcService=SS_GET_PAGE&nodeId=5

[Genetic Manipulation Approval](#)

- HSE guidance document that supports the Genetically Modified Organisms (Contained Use) Regulations (<http://www.hse.gov.uk/biosafety/gmo/law.htm>)
- [ACGM Compendium of Guidance](#) - Guidance from the Health and Safety Commission's Advisory Committee on Genetic Modification (<http://www.hse.gov.uk/biosafety/gmo/acgm/acgmcomp/>)

[Council for Science and Technology](#) "Universal Ethical Code for Scientists"

<http://www2.cst.gov.uk/cst/reports/>

[Statements from Research Councils'](#) on how their policies and procedures reflect the provisions of the Council for Science and Technology's (CST) "universal ethical code for scientists"

<http://www.rcuk.ac.uk/cmsweb/downloads/rcuk/documents/univethicalcode.pdf>

Biological, Toxin and Chemical Weapons, and Radiological or Nuclear Materials:

"Do no harm: reducing the potential for the misuse of life science research" (2004) [The Royal Society & Wellcome Trust.](#)

<http://www.royalsoc.ac.uk/document.asp?tip=0&id=2830>

[Biological and Toxin Weapons Act 1974](#)

<http://www.dti.gov.uk/europeandtrade/non-proliferation/chemical-biological/btwc/bwa-1974/page26600.html>

[UK Chemical Weapons Act 1996](#)

<http://www.opsi.gov.uk/ACTS/acts1996/1996006.htm>

[UK Anti-terrorism, Crime and Security Act \(ATCSA\) 2001](#)

<http://www.hmso.gov.uk/acts/acts2001/20010024.htm>

[Export of Goods, Transfer of Technology and Provision of Technical Assistance \(Control\) Order 2005](#)

<http://www.hmso.gov.uk/si/si2005/20050468.htm>

[Human Fertilisation and Embryology Authority approval](#)

<http://www.hfea.gov.uk/cps/rde/xchg/hfea>

[Office of Research Integrity \(ORI\) - US Department of Health and Human Sciences - Model Policy for Responding to Allegations of Scientific Misconduct](#)

http://ori.hhs.gov/policies/model_policy.shtml

Appendix A

Definitions

Adverse event:

Any untoward or unexpected occurrence in a research subject which may not necessarily have a causal relationship with the research procedures.

Chief Investigator (clinical research only):

The authorised health professional, whether or not he is an investigator at any particular site, who takes primary responsibility for the conduct of the trial.

Covert Research:

Covert methods of research involve the researcher concealing their real role and identity and information about the research being withheld. The people being studied are not fully informed about the research. There are different types of covert research and these can include concealment, misrepresentation, and camouflage.

Informed Consent

A study participant's willingness and voluntary undertaking of participation in a research study after having been informed of all aspects of the study that are relevant to their decision to participate. No details of the study are withheld. Informed consent is usually documented by means of a written, signed and dated consent form.

Investigational Medicinal Product:

A pharmaceutical form of an active ingredient or placebo being tested or used as a reference in a clinical trial, including a product with a marketing authorisation when used or assembled in a way different from the approved form or when used for an unapproved indication or when used to gain further information about an approved use.

Occluded Research:

Occluded research is where full information cannot be given to the research participant because this would introduce bias (such as the knowing they were taking a placebo drug), be meaningless (such as in crowd observation); or invalidate the research (such as in psychological experiments where prior disclosure would invalidate the responses).

Principal Investigator:

1. The authorised professional, whether or not he is an investigator at any particular site, who takes primary responsibility for the conduct of the trial.
2. For clinical research the authorised professional at a particular site, who takes primary responsibility for the conduct of the trial at that site.

Research:

Any form of disciplined inquiry that aims to contribute to a body of knowledge or theory.

Research Ethics:

The moral principles guiding research, from its inception through to completion and publication of results and beyond – for example, the curation of data and physical samples after the research has been published.

Research Ethics Committee (REC):

A multidisciplinary, independent, body charged with reviewing research involving human participants to ensure that their dignity, rights and welfare are protected. The

independence of a REC is founded on its membership, on strict rules regarding conflict of interests, and on regular monitoring of and accountability for its decisions.

Research Sponsor:

An individual, company, institution, or organization which takes responsibility for the initiation, management and financing (or arranging the financing) of clinical research.

Research Subject or Participant:

- i) Individuals (humans or animals) who are the recipients of the research interventions or procedures.
- ii) 'Human participants' (or subjects) are defined as including living human beings, human beings who have recently died (cadavers, human remains and body parts), embryos and fetuses, human tissue and bodily fluids, and human data and records (such as, but not restricted to medical, genetic, financial, personnel, criminal or administrative records and test results including scholastic achievements).

Appendix 9.4 Models of Continuing Professional Development. Adapted from Kennedy (2005)

Model	Summary	Relevance to the research study
Training	This is a skills-based approach to CPD providing up-skilling opportunities for teachers in order to demonstrate competence. The training is usually delivered by an 'expert' with the participant playing a passive role. The training is often delivered off-site and therefore subject to criticism about its lack of connection to the participants' workplace according to Kennedy (2005:237). She criticises this model for its focus is on coherence and standardisation instead of meeting the needs of teachers to be proactive in the identification of their needs and personal developments. However, despite these negative aspects the training model is acknowledged to be effective in presenting knowledge even though the setting is not work-based.	This mode of training is far-removed from the research context in approach and delivery as the approach taken was not formal and externally led. The intervention fostered an inclusive work-based context displaying an active and supportive approach.
Award-bearing	This model supports external award-bearing programmes mostly validated by universities. External validation may be a useful quality assurance tool.	This intervention aimed for an entirely voluntary approach with internal validation across the institution.
Deficit	The Deficit model uses CPD to attempt to resolve weaknesses in perceived individual teacher performance. The problems may also be linked to organisational and management practices (2002).	Although innovative use of technology was identified as lacking in the School, it was not perceived to be directly related to weakness in individual performance or organisational management practices. There was, however, a desire to promote more use of technologies to enhance best practice.

Cascade	The Cascade model involves the dissemination of information to colleagues from individuals attending training sessions. This model is frequently used where there are limitations to resources.	Dissemination of the results was a condition of the funding supporting the intervention.
Standards-based	Kennedy describes the Standards-based model of CPD as one that “belittles the notion of teaching as a complex, context-specific political and moral endeavour; rather it represents a desire to create a system of teaching, and teacher education, that can generate and empirically validate connections between teacher effectiveness and student learning”. Beyer (2002: 243) in (Kennedy 2005). This is a very critical description of a model because of its potential negative connotations towards promoting conformity in teaching. However, Kennedy agrees that the model provides the potential for standards to provide the foundations for professional development and promote dialogue between teachers. The standards approach may suppress the development of ideas related to teaching and result in teachers becoming more reliant on the standards at the expense of creativity	The Standards-based model is based on pre-determined criteria related to teaching and teacher education. It therefore does not match the flexible approach for staff development promoted in the study context. The aim was to enhance work processes utilising a bottom-up approach rather than the top-down methodology articulated in the standards-based model.
Coaching/mentoring	Based on philosophical underpinnings, the coaching/mentoring model is based on a one-to-one relationship between colleagues in order to support CPD. Both coaching and mentoring are modelled on the one-to-one relationship but differentiating between the two suggests that mentoring involves a lengthy relationship with ‘counselling and professional friendship’ (Rhodes and Beneicke 2002: 301). In a school context the mentoring or coaching relationship may be collegiate (peer coaching) or hierarchical with novice/experienced teacher relationships. The essential	The coaching/mentoring CPD model corresponds well with the research study as it is based upon developing a close working relationship between the participants. The ePioneers were paired with mentors in order to create an impersonal relationship devoid of hierarchical constraints.

	purpose of coaching/mentoring CPD model is to foster good interpersonal relationships between the two parties. Kennedy (2005) also points out that the model may support either a transmission or a transformative conception of CPD (pg, 243).	
Community of practice	Community of Practice (CoP) and coaching/mentoring are both mutually supportive roles in CPD. The difference is with CoP where the relationship is group-based. Lave and Wenger (1991) define community of practice as “a set of relations among persons, activity, and world, over time and in relation with other tangential and overlapping communities of practice” (1991: 98). Moreover in 1998, Wenger made more explicit the link between community and practice, showing how communities are more consistent through their practices: • <i>Mutual engagement</i> through negotiated actions • <i>Joint enterprise</i> through negotiating and understanding shared processes • <i>A shared repertoire</i> resulting in creating shared resources and artefacts belonging to the community and used for negotiating meaning (Wenger 1998pg. 95). Wenger’s CoP is based on social theory of learning that acknowledges that the CoP occurs as a result of the community and its interactions and not planned learning e.g. courses. Kennedy (2005) also argues that a person’s awareness of the existence of the community plays a positive and proactive or passive experience, if the combined opinions of dominant members influence the shape and understanding of the community group.	This model coupled with the coaching/mentoring model form the most directly relevant CPD context.

Action research	In the most general contexts action research is defined as research seeking action (change) and research (knowledge or understanding) at the same time time (Bourner, et al. 1996). Somekh (1995) describes action research methodology as a bridge between research and practice because the research is carried out by the people directly concerned with the social system being studied. Action research as a model of CPD has been acknowledged as being successful in allowing teachers to ask critical questions of their practice Kennedy (2005)	Action research is characterised by the nature to improve practice through a rolling programme of research. The intervention was motivated by the desire to change the current working practices of staff in a collegiate setting. This was not motivated by research. On the other hand Action learning is a process of action and learning where the purpose is to learn from experience within a mutually supportive group (2005) . This approach is more appropriate for the context because the participants were members of staff from the School of Education motivated by a shared desire to change their current working practices.
Transformative	The Transformative Model for CPD is a combination of processes and conditions taken from other models. The model within this CPD context is not clearly definable according to Kennedy (2005). The model integrates different models and adopts a sense of awareness of the agendas being addressed through the process. It provides flexibility which contradicts the accountability, standards and performance management CPD agendas. The transformative model recognises a range of different conditions that enables personal changes in practice to occur.	Kennedy (2005) argues that the transformative model typically represents a range of models linked to an awareness of power issues i.e. the agendas addressed through the process. Aspects of the models outlined are conducive to the change process aspirations within the study context.

PARTICIPANT CONSENT FORM

Project Working Title:

From eLearning to eCulture: The Role of Mentoring in Technology Adoption in the School of Education

Researcher's name:

Elaine Arici

Advisors name(s):

Gordon Joyes & Edward Sellman

- As a participant in the School of Education ePioneer Project I understand the nature and purpose of the project and agree to take part.
- I understand the purpose of the research project and my involvement in it.
- I understand that I may withdraw from the research project at any stage and that this will not affect my status now or in the future.
- I understand that while information gained during the study may be published, I will not be identified and my personal results will remain confidential.
- I understand that I will be audio taped / videotaped during the interview.
- I understand that data may be stored as electronic copies in ePioneers personal project folders. These folders are not accessible to the public but may be accessed by other members of the ePioneer project.
- I understand that I may contact the researcher or advisor(s) if I require further information about the research, and that I may contact the Research Ethics Coordinator of the School of Education, University of Nottingham, if I wish to make a complaint relating to my involvement in the research.

Signed (Research participant)

Print name **Date**

Contact details

Researcher: Room B86 School of Education: elaine.arici@nottingham.ac.uk

Advisor(s): School of Education

School of Education Research Ethics Coordinator(s):

john.holford@nottingham.ac.uk; alison.kingston@nottingham.ac.uk

Appendix 9.6 Barriers to reporting

Project	Barriers	
	ePioneer	Mentor
1 Video Conferencing	In terms of what you want to share publicly and what you would be happy with to discuss with a mentor or somebody working on the project but you wouldn't be happy to share that publicly. Well yes if the blog was being used by a group of people who were very familiar with the project who can contextualise easily all the comments that were made on the blog. Then maybe I'd feel happier with that.	
2 Interactive Whiteboards		
3 Doctoral supervision at a distance	No. Have you been in it? No. Any particular reason? I came to that session, the presentation and that was it. And I haven't looked at it, the blogs come and I delete them. First of all, I'm not a very bloggy person. I haven't quite got into blogs yet, I'm not interested in blocks yet. And secondly I just haven't got the time to do it so I haven't. I wouldn't know what it was, I would know how to use it, I don't know what it's for, I don't know. So that to me would be a secondary issue that the needs to be a project in order to use something. I was and therefore go to something when the was nothing else happening. I wouldn't know what it was for. You really haven't got that far. I haven't even looked at it. Only the last session that was the last time. I know you've sent some blogs. I started kind of looking But I thought I don't know what this is about so I just can't. One of the things I've been doing is to go to my ePioneers and show them how to use it, how to get into it and how to get into the block area when they've got something to put up there. But obviously you haven't got to that stage yet so maybe later on in your project. Maybe, I don't know how but you can sense I'm being pretty negative about not just about this but about things in more general with the amount of time available. So it's not a good time to be starting a new project. Maybe not but going along those lines all of blogs and things, you said	I was just feeling so bad about it. Well, that's me my personality. I was aware of writing it in the blog – I've got to have another go at IS and just because that's the way I felt, that's how it is. Then I thought I can't put that on the blog because they might see it and it's negative. Erm and yet, at the time it is negative because I can't really get anywhere with it. It's just finding the right form of words. And then, I thought I can't do that, I can't do that

	you glanced at them. When the emails came in and I started but then I thought I don't know what this is about who so I didn't see the point. They were talking about ongoing things and there isn't anything on going in my project so I ignored them.	
4 Podcasting Project		
5 Podcasting for MA ELT/ELTD students	Cause there is a concern that you've got to put a professional front on what you do and if we are out there in the wide world with a large number of ePioneers saying this is crap this is difficult this doesn't work. There seems to be a more product more than process at the moment. Well the product is reporting about the process but you're posting up some sort of finished document every time you do a progress report a mean you think about it quite carefully what you're posting things up there and its not about hey what do you think there isn't that kind of ongoing dialogue there because then you don't know who's reading it I suppose and maybe that's putting off some people responding.	Anything that's directly critical of the project. I think that I would want to discuss it through with the project and come up with a consensus form of words I wouldn't want to use it for sounding off about critical negative aspects not that I have been particularly critical negative aspects for this one, but I wouldn't want to do that if there were. And also I wouldn't want to claim responsibility myself for what the project team had done and that's another reason for not contributing, but I feel I wouldn't want to claim their credit if I was putting something on about their success it would feel like me claiming credit for what they've done.
6 Development of support materials for BA Fine Art		I've not put a blog up. Why? Erm, I don't know Because I am not got anything I really want to say in relation to the mentors' role. I've read other people's and that's OK but at the moment I don't really want to go, in the way I was trying to see the sort of things other people as saying because I think it's a matter of being sensitive about that was saying up there in terms of how we're, because it's public. Everyone out there and they can be looking at what we are saying about our role and may be thinking, actually I don't I quite agree with that. So in a way I'm waiting until I've met all of my groups before I put anything up. Because I want to feel that everyone is comfortable with what they're doing and they'll put a blog up and then I think I'll put something up about my role. So that's what I'm waiting for. I think that there are only a couple of in the mental one that I've seen. You for one up and I think that's another one I think. I'll put one up around the end

		of this week. In a way it's partly checking out that I'm in concert uppor note or three groups who before I put something up and I think that's quite interesting. I'm too sensitive about making sure that I'm not saying anything out of turn with them. I'm trying to build a relationship with these people and I'm not quite sure how they see me and I think if then I'll put in a locked up and they think I'm posting a lot up, then it's almost as if I'm a yet again the expert, and I'm trying not to be. Although I can't help but being put in those positions.
7 Certificate in Art History e-learning	[]I think we can be reasonably open with the things that we are doing. It's not as if we hit on any need not to be. []Although if that's if we're talking who about sharing it just amongst the ePioneers group. I don't know that that necessarily want to bear or if it was open to anyone reading it. I just feel that I would come across cried to ineffectual which I know I am. My public persona that matters to me but I'm quite happy to share the reality and the difficulties with colleagues. At the moment the blog is open to all. I may word things slightly differently if it's going on the blog than if I'm putting it on our area.	
8 Encouraging learning from a website	Personal barriers, anything I thought I couldn't say? Yeah. No, I'm quite willing to admit to the world my incompetencies and so on.	
9 Use of WebCT to administer and present RLOs (reusable learning objects) in ITE (initial teaching education) courses		
10 Learner Autonomy	I haven't got to grips with that. I've seen the alerts but I haven't had time to look at them and it just induces guilt every time I feel oh god there's another ePioneer tonight so I'm just collecting it all together.	One of the worries would be putting things up in too detailed. That's all just simplify what we put up, just a summary of what we've done rather than a full detail report of everything we've done.

	Well it's probably be just a time element No. Well as long as I know how to do it and I've got something to report I don't see a problem. That's fine	
11 ePioneers and Local History	Well, I can't for the life of me remember what I have to do on this Share thing. Put my blog on, and not much help with anything being down. So I've somehow got to work that out. But, that's where I come in to help. Yes, to assist. But between now and tomorrow (laugh), I've got to put something on and I'm still not convinced. I don't like the idea of sharing thoughts about a project that all and sundry can read. Yeah. That's not the way I do things.	
12 Email Newsletter		
13 Research Education Student Peer Online Network Support	I do it really because I was going to write bits about, you know I didn't think I'd gotten very far and my lack of knowledge of the that but it all sounded negative really so I didn't do that in the end. I think it was thoroughly positive but I was just conscious that I didn't think I'd actually gotten very far that I really couldn't do much of a blog and so I kind of kept it fairly simple and used and kind of said where I thought we were.	
14 Research Application Tracking	Actually it will be nice to have another one of this meeting is because I've found that rather interesting. To see what other people are doing. But now I haven't been back on, I certainly haven't. Partly because it's who complain they're sort of embarrassment who have not having really got on with the project.	I think that there might be certain barriers [...] possibly the barriers that I can probably see is two things one is people's inexperience I've never used it and possibly how real, your blog as it were being conceived by somebody else's opinion 'cos I'm sort of I like quite friendly so I just wondered if people would frown upon that because probably my blogs would be quite chirpy and I suppose from support to academic that might be the only other one I could see perhaps I suppose because it's non facing so it's totally up on the web and everything and you're not sitting face-to-face it's slightly different so the only thing I could see is if you're not used to doing it so I'm not so it's just getting on there and having a go I think. Yeah it will be that
15 Electronic Submission of Coursework	I am just a bit concerned because I don't know what other people, especially people outside the school and the university can see. I don't want to have things in there like SMS documents and stuff and find out the whole world	

	can see what is supposed the confidential documents. The initial things that came out on those although we're not smart were confidential but presumably they're not for public consumption. They are all pre-tender to documents. Reference 2 - 2.90% Coverage Yes, I suppose I haven't talked any documents on there because I wasn't sure who could view them and I wasn't sure whether they were confidential or not. I think that beyond that most of the other stuff that I'm doing to the moment has really been contacting people and having conversations and things so that one of course be of interest in blog who went I think there's something more interesting to say which hopefully will be fairly soon.	
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**University of Nottingham
School of Education**

Innovation consolidation and dissemination in e-learning

The School of Education e-Pioneers Programme

Building on experience in developing the use of e-learning approaches in several courses and areas of activity in the School, the School of Education is launching a group of **e-Pioneers** to take forward the next phase of development.

Each **e-Pioneer**, supported by an experienced mentor, will develop an appropriate aspect of e-learning in his/her area of activity.

The **e-Pioneers** Programme aims to move forward the adoption of e-learning approaches in the School, whilst at the same time providing a researchable opportunity in order to capture, learn from and disseminate aspects of the process.



 The University of Nottingham

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**Innovation, consolidation
and dissemination in
e-learning**

www.nottingham.ac.uk/education/e-learning

The ePioneers shared blog

What is the ePioneers shared blog?

- This is a space for ePioneer project members to report and share what is happening in their projects
- Its public nature will afford opportunities for stimulating other users;
- The blog will constitute a cumulative report **in exchange** for the traditional reports required at the end of a project.

Where can I find the ePioneers shared blog?

1. click on the following link: <http://www.nottingham.ac.uk/lsri/>
2. Click on the Intranet tab.
3. If you are accessing the system from home, type in your Novell username and password.
4. Choose the ePioneer tab from the Site list on the left of the screen.
5. On the next page, click on the Sign In tab (top right)
6. Type in your username with the prefix ad\, then your password.
7. You should now be able to access the ePioneer site and the blog.

Why use the ePioneers shared blog?

- The ePioneers project sets out to develop a community of practitioners within the School of Education who have a common interest in exploiting e-learning more fully. The blog is a tool that can support this community in achieving their common goal.

What should appear in the shared blog?

- It will be helpful if entries used the following headings that reflect the action research cycle
 - Planning & development
 - Integration (into practice)
 - Evaluation & reflection.
- We would encourage you to include resources in your blogs through attachments and URLs. You may be able to share the materials you have developed, such as WebCT courseware, by providing a guest access.

How frequently should I contribute to the blog?

- There is an expectation that all projects make two blog postings each month and read the latest blog entries. In periods of high activity in the project more frequent postings would provide a useful record.

How long should a blog entry be?

- This will depend upon your project activity; more frequent blog postings may result in shorter entries. You can judge whether you blog entries are adequate by considering whether your blog at any point in time reflects your project activities.

E-Pioneers Proforma

September 2006

**Please complete the form and return (electronically)
to Elaine Arici by 23.10.06**

This form should be completed after initial discussions with your e-pioneer mentor.

Name/s:

Mentor:

Project Title:

(Try to make this clear and brief since it will be used to identify the project in future)

1. Overall aim/s and intended outcomes (please refer here how this will move the e-learning agenda forwards)

2. Quick-gains highlighted

3. Resources: (essential/desirable)

4. Evaluation procedures

5. Action Plan/Time line (including start/end date)

6. Financial Support

Each project will have access to £1800.

How do you envisage this being spent?

7. Note here any major concerns which you would like to draw to the attention of the E-Pioneer Advisory Group?

Appendix 9.11 ePioneers meeting Delphi analysis

What do you see as the 3 main successes to your ePioneer project?	What do you see as the 3 main challenges to your ePioneer project?	What do you see as the 3 main things you have learned as a result of doing the ePioneer project?
• begun to learn interactive whiteboard skills • Now getting comparative overview of available hard/soft ware • Working closely and effectively with mentor • None • The project has 'brought back to life' the TLO system in A2 which in turn has improved access to VC within the School of Education. It is now being used more regularly and we are more aware of its idiosyncrasies/ upgrading needs. • The opportunity to work on a 1:1 basis with a motivated learner has given me a clearer insight into the learner perspective and which aspects of using the TLO are perceived to be more difficult (manuals often don't take account of this). This information is being fed into training support materials. • The number of trained TLO users within the School of Education is growing and more people are interested in being trained.	• Will we be able to afford to buy a smartboard • will we be able to fit in training sessions before school term ends • Will MSi be able to share acquired skills with colleagues in time for new term at Uni? • main challenges have been time (my ability to allocate time when there are so many other tasks competing for that time) • Isolation (I feel that if I'd been working with one or more others who were also committed, things might have been different). • Time • Insufficient time • Staff turnover • Reliability of and access to the technology • Developing a shared language to talk about e-learning • Pressure of other work • Shortage of time	• begun to learn interactive whiteboard skills • Now getting comparative overview of available hard/soft ware • Working closely and effectively with mentor • Money needs to be available to buy-in time • Purpose and authenticity are key factors in the training process and help to ensure that the knowledge/ skills are retained through regular use of the VC equipment. • A new experience – contributing to a Blog! • How to train new TLO users really quickly. • User and builder views of WebCT are quite different • Focus groups can be a source of incredibly rich feedback • E-learning modules need to be very carefully mediated in a variety of administrative and academic ways. • Not sure

• High quality of feedback about users' view of WebCT in Flexible PGCE from our focus group of 9 students • Development of an action plan based on focus group feedback • Highly coordinated integration of administrative and tutor viewpoints in our project team • Taking part in something which is very new (to me) and with which I am not really at ease • Obtaining very good first essays from my students • Not sure • Project was successful in being accepted as a viable e-pioneers project. • Has been flagged as an area of interest in the wider University. • Will be relevant to the administration of student records within the School. • The project has encouraged us to persevere with learning about and starting to use WebCT. • Students reacted positively to the opportunity to do microteaching and to have their microteaching sessions video recorded and seemed to put a lot of time into this part of the module	• Persuading all my students to engage with the project • Producing a paper for a conference which makes sense and looking as though I know what I am talking about! • Answering questions at the conference • Finding the time to do it • Deciding on the first focus for the development • Not feeling I know enough about the technology involved (yet) • Allocating time to research the project single handed within the working day. • Maintain momentum when the project is effectively 'on hold'. • Getting modules and content set up and functioning in time to be useful for the run of the module. • Getting students' access set up. • Developing the sites beyond simple availability of 'handout' material. • 2-minute video clips (imposed by file size constraints within Pebble Pad) gave peers who had not witnessed the whole session too little to base their comments on • It's possible that a few students may have delivered pre-set lessons in order to jump through the hoops?	• There is much I have to learn about the technology. • Nothing is as straightforward as one might expect! • The time required is greater than we expected. • It's vital to have ongoing technical support for a project like this • Time needs to be built into courses to train students in planning, giving peer feedback and doing self-evaluation • Such a project works best when fully integrated into the course • Vital to have technical support, training and advice (thanks Terry, Brett and Mike) • Vital to seek out and respond to feedback from both users and non-users • Important to involve students in all aspects of the process, so that it doesn't become a 'Them talking to Us' phenomenon
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• Students were generally willing to give critical feedback and generally found it useful to receive group or whole class feedback from the peers who had seen their microteaching session 'live' • There were no major technical problems (thanks to Matthew!) • Ten podcasts recorded in Fall 2006 and uploaded to our LSRI site and made available to MA ELT/ELTD students (and ePioneers) to listen to, download, and respond to: the recordings were doable on a weekly basis and the technology works [Other recordings also made but not yet available] • A friendly, informal pattern of conversation developed, providing a good contrast with the sort of classroom discourse the students are usually exposed to • Positive response from self-selected sample of the target students	• Improving the feedback process, so that students think about giving feedback more carefully and value the feedback they receive more highly • Involving students more in the production of and feedback to the podcasts • Integrating the podcasts with the course, so that it's not just a handy (but avoidable) peripheral • Learning the technical skills so that we can take over the process of editing, uploading and managing the site (largely a time factor) • Ensuring that we keep going with weekly recordings (as we did in Fall 2006) even when work pressures are heavy	
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Appendix 9.12 Further notes from Project mentor 8

He wanted monitoring more regular meetings YET he would find these problematic and actually preferred to the space to get on with the project in his own way and ask for advice when needed. Do you think this relationship established itself in this way because of assumptions made about effective ways of working based on previous working relationships. Which in effect turned out to be suitable for progress to be made on the project. The ePioneer would 'blame' others for their lack of progress yet know what they had to do which was to organise their time so that they could do this. The mentor was not in a position to motivate the mentee to do this – monitoring would irritate him and have a negative effect to the intended one. It works out that interest from team members was the motivation needed to progress the work. There was a recognition in fact that agency rested with the ePioneer – the key factor was how motivation could be achieved.

MORE INFO this was always the case with this academic even on the larger project – he was always 'tardy' but influenced by the progress others were making and felt he had to step up his efforts to match what others were doing. – - reprimands or monitoring did not work. In fact my experience on the larger project was to involve him less and expect him to do less. You can see that there is a history here. I felt knew the strategy that worked. Leave him to take responsibility and keep him updated with the progress others were making – he did not mention this but I am certain this was a factor in motivating him to seek a solution, that of working with his MA course colleagues to achieve the objectives.

