



Title: Teaching as an evidence informed profession:
knowledge mobilisation with a focus on digital technology

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**TEACHING AS AN EVIDENCE INFORMED
PROFESSION: KNOWLEDGE MOBILISATION
WITH A FOCUS ON DIGITAL TECHNOLOGY**

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Ph.D

2014

UNIVERSITY OF BEDFORDSHIRE

**Teaching as an evidence informed profession: knowledge mobilisation with a
focus on digital technology**

by

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A thesis submitted to the University of Bedfordshire in partial fulfilment of the
requirements for the degree of Doctor of Philosophy

January 2014

Teaching as an evidence informed profession: knowledge mobilisation with a focus on digital technology

Richard Procter

Abstract

The use of research evidence to improve the practices of teachers is considered one of the ways of improving the educational outcomes for children. This study was focussed on determining how an online approach could be used to increase knowledge mobilisation in education, by giving teachers better access to research knowledge that they could use to support and develop their practices.

This study had two aims. The first aim was to investigate what research knowledge and research practices teachers were using and what value they ascribed to those practices; the second was to explore teachers' views and opinions of a new online approach to the presentation of research knowledge. This was a mixed method study using questionnaires, interviews and focus groups to gather a range of both qualitative and quantitative data.

The findings of this study show that practitioners value research practices more than they are able to participate in them, and that there is a consistent value-practice gap across the range of research practices. Exploratory factor analysis revealed five underlying factors; engagement with research, engagement with the research community, promotes professional discussion of research, promotes teacher knowledge generation, and promotes wider engagement of the school with research and the research community. These factors showed that teachers and their schools want to engage both with research knowledge and with the wider research

community so that the use of research knowledge can be enhanced in education. The findings also show that practitioners were receptive to the use of an online approach to the delivery of research knowledge and the piloted approach was accessible and intuitive. Practitioners exhibited interest in using the approach in a range of collaborative interactions with colleagues.

Overall this study revealed that online approaches to knowledge mobilisation have potential but that teachers need to be supported in their engagement with research and the wider research community. This thesis is a contribution to the knowledge of how online approaches can be developed and deployed to enhance knowledge mobilisation towards teaching being an evidence informed profession. Equally school leaders and policy-makers need to create environments that are supportive of teachers' use of research, if they want teachers to use research knowledge to inform their practices.

Declaration

I declare that this thesis is my own unaided work. It is submitted for the degree of Doctor of Philosophy at the University of Bedfordshire.

It has not been submitted before for any degree or examination in any other University.

Name of candidate: Richard Procter

Signature:

Date:

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Acknowledgements

I would like to thank my supervisors Marilyn Leask and Andrea Raiker, their encouragement and support has been constant. They have always answered my questions and been willing to provide feedback, comments and advice.

I would like to thank other colleagues at the University of Bedfordshire for their support and encouragement throughout my studies, Uvanney Maylor, Trevor Corner, Annika Coughlin, Perter Virnuls and Michelle Miskelly. I would also like to thank fellow PhD students at the University of Bedfordshire for their mutual support and the staff at the University of Bedfordshire library.

I would like to thank my family, Mum, Dad, Meesh, Erin and Freya for their support, encouragement and belief. It means more to me than I can write here.

Finally I would like to thank colleagues who gave up their time for my study, by answering my interview questions or filling in my questionnaires.

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1.0 Introduction

The aim of this study was to develop and test out a new digital technology to improve knowledge mobilisation in the field of education so that teaching can be an evidence informed profession. A two part approach was adopted. Levin defines the term knowledge mobilisation “...to refer to efforts to understand and strengthen the relationship between research and practice” (Levin, 2013, p.2). Firstly, this study focussed on how much teachers use research, and use research practices at present, and how much value they ascribe to the use of research and research practices. The findings from this study informed the development of the online approach. Secondly, the online approach was developed to provide teachers with access to research based knowledge so that they can improve their practices.

In recent years there has been an increasing use of the internet and internet technologies across the field of education. These have been in areas such as; access to courses, (see for example the Massive Open Online Courses (MOOCs) of edX¹), the number of resources available for students and teachers, (see the work of the Kahn Academy²), the iTunes university site, and research into improving both teaching and learning in the classrooms, (see the recent work of the Economic and Social Research Council (ESRC) funded Technology Enhanced Learning Projects³). These undertakings showcase some of the new ways that technology and the internet can be leveraged to improve access to education courses. These developments may change the nature of teaching and learning and the very nature of schooling in the future.

¹ <https://www.edx.org/>

² <http://www.khanacademy.org/>

³ <http://www.tel.ac.uk>

One opportunity for researchers, policy-makers and practitioners in education, is to develop new ways in which digital technologies can be leveraged to help the professional development of educational practitioners. The use of digital technologies for the provision of Continuing Professional Development (CPD) is at the moment generally fragmented (Clark, 2011; Jung, 2005). Therefore this research focusses on how digital technologies can be leveraged to improve access to research knowledge for teachers and further improve knowledge mobilisation in the field of education. The overall aim is to improve the development of the practitioner knowledge base to enhance the learning outcomes for pupils and their schools (OECD, 2007, p.1). One of the major challenges for this kind of work is to reduce the costs of CPD for practitioners, to improve the relevance of CPD, to improve access to research knowledge that is trustworthy and rigorous, to improve practitioner professional knowledge and to improve the overall knowledge base of the practitioner community in education.

1.1 International and national context

Recent research has shown that improving the quality of teacher knowledge has become a priority of many governments (OECD, 2009; OECD, 2010; Barber and Mourshed, 2007). These reports indicate that one of the biggest influences on student learning is the quality and effectiveness of teachers (OECD, 2009). Barber and Mourshed highlight this with the statement, "...the quality of an education system cannot exceed the quality of its teachers" (2007, p.13). Hence improving the quality of teachers and their teaching is considered to have a large effect on student learning outcomes.

A more recent Organisation for Economic Co-operation and Development (OECD) report highlighted that it is more difficult and far harder to "...reshape the core activities and dynamics of learning in the classroom..." than to change the "...surface structures..." and "...institutional parameters..." of schools (2012, p.26). These structure and institutional parameters are normally the areas that educational reforms tend to impact on, what may be termed the low hanging fruit. Examples of this in England include free schools and the academies programme (DfE, 2010a, p.21). The OECD report continues:

There is a tendency to focus on variables that are visible and relatively easy to change, resources permitting: it is altogether simpler, if expensive, to reduce class size and raise the numbers of computers in schools than it is, for instance, sustainably to improve teachers' capacities to respond to individual student differences. (OECD, 2012, p.26)

Bereiter (2002) has called this disengagement from problems of teaching and instruction, when considering school reforms, a "...fundamental malady..." with these problems being "...treated as somebody else's business" (2002, p.394). Thus these difficult problems need to be addressed. Although it is a difficult task to try to improve teachers' practice and the quality of their teaching, research has shown that improving the quality of teaching has a higher impact than other school level

variables (Alton Lee, 2003; Darling-Hammond, *et al.*, 2005; Hattie, 2003; Rivkin, *et al.*, 2005). Indeed research by Angrist and Lavy (2001) found a positive relationship between in-service training and student achievement. They suggest that “...teacher training may provide a less costly means of increasing test scores than reducing class size and adding school hours” (cited in OCED, 2007, p.36).

Along with the development of teachers and their professional practices, making better use of knowledge that already exists is seen as a key to future development (OECD, 2007, p.1). The OECD states that:

Improving the use and impact of knowledge for developing policy and practice at the national and EU levels would improve the quality and governance of education systems. (OECD, 2007. p.1)

For the OECD education systems can be improved through better use of knowledge, and by improving both their quality and governance. Knowledge that is already available from research studies should be put to better use for the improvement of both policy and practice within education systems. Although the OECD point out that there are a number of problems related to the use of knowledge. Firstly, “...policy-makers and practitioners have difficulty in finding evidence-based knowledge and getting access to it” (OECD, 2007, p.28). There are difficulties both in finding evidence that may be helpful for practitioners, but also, even if this evidence has been found, it may be difficult for practitioners to get access to it.

Secondly, policy makers and practitioners have difficulties with evidence even if they can find it and gain access to it. As the OECD state “...educational evidence is so closely bound to its context and the research/policy/practice relationship is often ideologically highly charged” (OECD, 2007, p.6). Thus ideology is involved at all levels of the process from gathering and generating evidence, to selecting

and using it. In each of these areas these processes become political acts.

1.1.1 International survey comparisons

The motivation to improve educational systems has to some degree, been driven by the recent number of international educational comparisons that are now available. The development and use of international comparison surveys in the field of education has provided a range of metrics by which a country's education system can be compared, ranked against other countries and league tables produced. There are now surveys such as the Programme of International Student Assessment (PISA) launched by the OECD in 1997, and the Trends in International Mathematics and Science Study (TIMSS) developed by the International Association for the Evaluation of Educational Achievement and first administered in 1995. Although there have been critiques of these surveys (Brown, 1998; Bracey, 2005; Dohn, 2007; Jerrim, 2011; Wutthe, 2007; Kreiner and Christensen, 2013) they are still highly regarded indicators of a country's education system.

These international comparison surveys allow a greater focus on student learning, learning outcomes and on teacher quality by both policy makers and the public (OECD, 2010a, p.20). This public focus on education, as opposed to other disciplines, is to some degree understandable as the majority of the public have been through their own country's education system. The OECD state that:

Public accountability is especially present in the education sector, in comparison to other policy fields, as lay people claim greater understanding of the sector than in the case for medicine for example. (OECD, 2007, p.13)

These types of large international surveys have taken place over a period of time where there has also been an "...inexorable rise of a wider audit culture or audit society" (Hodkinson, 2004, p.16). These audit cultures are dominated by outcome

measurements, target setting and a focus on effectiveness and efficiency (Power, 1997; Strahern, 2000; Hodkinson, 2004, p.16). In the field of education other initiatives have included the standards based education reforms in the United States and the No Child Left Behind act in the U.S. (No Child Left Behind [NCLB], 2002). In the UK there has been the use of national curriculum assessments (known as SATS) tests at the ages of seven, eleven and fourteen, the use of OFSTED inspections, and the development of school league tables.

Large international surveys and standards reforms within an audit culture provide the public and policy-makers with information to look at the development of practitioners. This audit culture creates a need to provide evidence for teachers on which their practices can be based. Hence in an audit culture, the use of evidence on which to base practice is self evident. The problem with this approach is the lack of evidence that is easily available to teachers. Hence, how can evidence be provided for teachers, how they can use this evidence and how can this evidence be managed so that it can be made easily available to them?

1.1.2 International knowledge management

International and UK reviews of the use of evidence in education show that evidence needs to be made available to practitioners so that they can base their practices upon it and so that their practices improve the learning outcomes of their pupils (OECD, 2007; Pollard and Oancea, 2010). One of the difficulties of this approach is, as the OECD state, "...the education sector, unlike other sectors, [health and engineering], has little scientific knowledge to underpin it, and not a strong enough body of research evidence about what works to inform it" (2007, p.13). Although this statement is strongly positivist in its tone, there is debate about whether the idea of 'what works' will actually work in education (Biesta, 2007, 2010a; Sanderson, 2003). As Biesta suggests, "...research, in short can tell us *what worked* but cannot tell us *what works...*" emphasis in original (Biesta, 2007 p.16). There is an argument that education does need a body of knowledge

on which it can be based (OECD, 2007). This body of knowledge needs to be managed so that it is trustworthy and available to practitioners. As the OECD have highlighted, knowledge management is seriously under-developed in the field of education (OECD, 2000; 2004). This gap between educational research and policy and practice has been called the “...great disconnect” (Berliner, 2008 cited in OECD, 2010, p.26). To fill this gap between research, policy, and practice more innovative ways are needed to create links between these three areas (OECD, 1995; 2007).

Levin uses the term knowledge mobilisation (KMb) “...to refer to efforts to understand and strengthen the relationship between research and practice” (Levin, 2013, p.2). As he states many other terms have been used, for example, 'dissemination', 'knowledge exchange', and 'knowledge translation'. Levin and his research team use this term because it “...captures the interactive, social and gradual nature of the connection between research and practice and makes it clear that this is not a one way process” (Levin, 2013, p.2).

The OECD (2000) have highlighted that knowledge management is under-developed in the field of education. This project sought to develop and test an approach to improve knowledge mobilisation so that rigorous research evidence can be presented to teachers in a form that is both useful and easily accessible. This study aims to do this through the development and testing of an online approach to knowledge mobilisation.

1.1.3 National context - England

The OECD international call (OECD, 2009; 2010) for improving the quality of teachers has been echoed in the UK by the government's recent white paper on education. “The evidence [...] shows us that the most important factor in determining the effectiveness of a school system is the quality of its teachers” (DfE, 2010b, p.20). The white paper further commits the UK government to

“...continue to improve the quality of teachers and teaching and to raise the profession's status” (DfE, 2010b, p.20). The Secretary for State for Education, Michael Gove stated in a speech to the National College for Teaching and Leadership⁴ in June 2010 that:

I want to see more data generated by the profession to show what works, clearer information about teaching techniques that get results, more rigorous, scientifically-robust research about pedagogies which succeed and proper independent evaluations of interventions which have run their course. We need more evidence-based policy-making, and for that to work we need more evidence. (Gove, 2010a, cited in Brown, 2012b, p.60)

Although this quote hints at more practitioner generated research knowledge, the overall sentiment is for more evidence to be generated and used as the basis for both policy and practice.

1.1.4 National context - funding councils

In many countries there has been increasing attention paid by research councils to the impact of the research they fund on connecting research to practice (Tetroe *et al.*, 2008). In the UK, Research Councils UK⁵ have adopted impact as their way of making the research community consider how their research has a direct effect on either the people involved in the studies that the researchers carry out, or on people in the wider society. A large section of the bidding process for UK research funding involves explaining what impact a project may have. Researchers have to show “...the demonstrable contribution that excellent research makes to society and the economy.” (RCUK, 2011, p.2). For the Research Councils UK impact is both academic impact, with advances across and within disciplines, including understanding of methods, and theory, and economic and societal impact (RCUK, 2011, p.2). In their strategic plan the Economic and Social Research Council (ESRC), which is the research council under which the discipline of education

⁴ Formerly the National College for Leadership of Schools and Children's Services and before that the National College for School Leadership

⁵ <http://www.rcuk.ac.uk/Pages/Home.aspx>

research is mainly funded, wish “...to achieve this active two-way dialogue and collaboration between social scientists and potential users throughout the research process and beyond is crucial” (ESRC, 2009, p.23). Thus impact and user engagement are ways in which the ESRC tries to bridge the link between research, policy and practice (2009, p.25).

1.1.5 Other national bodies

A number of other bodies have been set up to try to bridge the link between research, policy and practice. These have included the National Educational Research Forum (NERF)⁶ set up in 1999 by the then Secretary of State for Education David Blunkett with the remit of developing a national strategy for educational research in the UK. NERF was disbanded in 2006. More recently the Strategic Forum for Educational Research (SFRE)⁷ was run from 2008 to 2010. SFRE was a group of researchers, policy-makers and practitioners interested in knowledge mobilisation and educational research. Other UK initiatives that have been used to try to bridge the link between research policy and practices have included; the National Strategies and Teachers TV funded by the then Department for Children, Schools and Families (DSCF), and the Teacher Training Resource Bank (TTRB) funded by the Training and Development Agency for Schools (TDA). Initiatives from the ESRC funded Teaching and Learning Research Programme included project research briefings and practitioner applications. The General Teaching Council of England (GTCE) commissioned the Centre for the Use of Research and Evidence in Education (CUREE) to publish summaries of educational research on the GTCE website as Research of the Month. All of these initiatives, although good, have been short lived having been disbanded by the Coalition government elected in May 2010. Regrettably these websites and resources were unsustainable without government funding. Some of these websites are now only available on the National Archives website⁸. Unfortunately

⁶ <http://www.eep.ac.uk/nerf/index.html>

⁷ <http://www.sfre.ac.uk/>

⁸ <http://www.nationalarchives.gov.uk/>

there is still a lack of a coherent model of knowledge mobilisation between researcher, policy-makers and practitioners in the UK.

1.1.6 Summary

These four areas; the international call for improvement of the quality of teaching, the greater use and awareness of international educational comparison surveys, the recognition of the poor use made in the field of education of knowledge management strategies, and the work towards a building knowledge base for education through the use of knowledge mobilisation, all indicate the timeliness of this study. These areas have been recognised both internationally and nationally as important at this time. Hence the aim of this study was to develop and test out a resource that would attempt to bridge the gap between research and practice in education for practitioners, to improve the quality of teachers' knowledge and therefore the learning outcomes of their pupils. This project sought to improve knowledge mobilisation through the use of knowledge management strategies so that rigorous research evidence could be presented to teachers in a form that was both useful and easily accessible. This study aimed to do this through the development and testing of an online approach to knowledge mobilisation.

1.2 Teachers, research and technology

In this study, as well as the development and testing of an online resource to present and make available research knowledge to teachers, it was considered logical to find out to what extent teachers use research and research practices, and the value that they ascribe to those practices.

1.2.1 Teachers' values and practices

As the OECD state “...teachers’ beliefs, practices and attitudes are important for understanding and improving educational processes” (2009, p.89). Other researchers have also highlighted the importance of what teachers believe and value, and what their colleagues believe and value, and how this has an effect on their professional behaviour. Levin *et al.* state that it is “...probably more typical that research first acts on people's ideas and beliefs, with those changes later translating into changes in policy or behaviour” (2010, p.4).

Teachers' values have been looked at in other areas of educational research. James and Pedder looked at teachers' values in their work on assessment for learning, stating that “...the importance of this values dimension is underplayed” (2006, p.111). They go on to elaborate their argument:

Webb *et al.* (2004) argue that changing practices can lead to change in opinions and values, so it is worth focusing directly on efforts to change practice. However, older, but highly regarded, psychological research, for example by Ajzen and Fishbein (1980), advances the contrary view that changing behaviour depends on first changing beliefs. Beliefs are not sufficient to guarantee behavioural change but they provide the necessary reasons to act. (James and Pedder, 2006, p.111)

Whether changes in practice lead to changes in values, or changes in values lead to changes in practice, it was essential to have some insight into both teachers' values and practices. Consequently it was important not just to look at teachers'

use of research and research practices but also their value of those practices, as these may be a determinate of their proclivity to the use of evidence.

1.2.2 Digital technologies

This study was focused on the development and testing of an online approach to both improve the access to research knowledge for practitioners and to improve knowledge mobilisation in the field of education. This new approach was designed to move beyond the static knowledge repositories model of resources for teachers such as the Teacher Training Resource Bank and Teachers TV to a model in which the resources could be updated, quality assured and in which the practical knowledge of practitioners could be captured. The scrapping of online resources by the Coalition government provided a new opportunity to re-think approaches to knowledge mobilisation in education. Researchers have noted the importance of using knowledge that is already in existence so that it can be transformed and leveraged by teachers to improve their practices (Foley and Hargeaves, 2003; Pollard, 2008). In many cases there is an assumption that practitioners have access to a professional knowledge base (Leask, 2011, p.645).

This study built on earlier work funded by the Training and Development Agency (TDA) for schools (Leask and White, 2004; Leask 2011). Although knowledge repositories have been used to support educational research projects and knowledge transfer (Procter, 2007), this model of putting what was the equivalent of thousands books and articles online, was not particularly helpful for busy teachers who need to find the knowledge that they require at the time they need it. A better solution using the potential offered by digital technologies to allow cost effective updating of online materials was sought by Leask and Younie, building on their work on online communities of practice and the internet (Leask and Younie, 2001).

Thus a solution was needed that supported the ongoing review and development of knowledge but also ensured that knowledge was available in a format that was accessible to the user. Consultations with teachers, teacher educators and software developers led to the funding of the project that underpins this research. Industry consultants⁹ advised a dialogue with medics who had used and developed an online approach, which has been developed for training, and supporting, medical doctors¹⁰. This online technology used graphical pathways or flowcharts (see Appendix A and B for examples) as a way of presenting complex knowledge to practitioners. The pathways are made up of a series of nodes with representations linked in-between. Each node in the pathway provides a web link to the display of more in-depth knowledge. This knowledge is in the form of written explanations of research, or evidence with references to original research articles and papers, and may also include links to video or audio resources. As this research has progressed, a number of attempts by educators to provide a similar resource have been identified *e.g.* the work of Professor Siribanpatak and colleagues at the University of Bangkok, Thailand, the Institute of Physics, England and the Dyslexia Association in England.

This study developed educational pathways from research-based knowledge that is currently held by academics or published in academic journals and reports, so that it can be used by practitioners (see Appendix B for an educational example). Thus this study looked to provide a way for research knowledge to be mediated to practitioners, so that they are able to engage with it and improve their professional practice.

⁹ Cisco Systems

¹⁰ See <http://www.mapofmedicine.com>

1.2.3 Personal context

I was a Design and Technology and ICT teacher for a number of years in schools both in the UK and in Africa. I have been a full time researcher and worked on a number of research projects focused on teachers changing their practices, and on a number looking at developing technology to support practitioners in their work. Both of these previous experiences have allowed me to have a number of insights into how to improve knowledge mobilisation through the use of digital technologies.

This study also combines a number of areas of my own interest. These include technology enhanced learning, technology to support learning, teacher professional development and, by the nature of these disciplines, their inherent interdisciplinarity (Procter, 2009). Hence this study builds on previous work and experiences, for example in the use of technology to support collaboration in a single education project (Procter, 2004), and the use of virtual research environments to support the development of educational research across a number of educational research projects (Laterza, Carmichael and Procter, 2007; Procter, Carmichael and Laterza, 2008). In addition, I am interested in the use and development of educational resources, including digital repositories to support educational research projects (Procter, 2007).

My experience also includes work in the field of teacher education and teachers use of research (Menter *et al.*, 2010; Murray *et al.*, 2009; Murray *et al.*, 2008) and in the use of technology to support teacher education (Wall *et al.*, 2009; Carmichael and Procter, 2006). Furthermore work has been undertaken involving teachers' professional development and the use teachers make of networking and their own professional networks for their professional development (McCormick *et al.*, 2010; McCormick *et al.*, 2007; Fox *et al.*, 2007). These previous studies have also given insights into how practices 'move' across teachers' professional networks, and how specific practices such as formative assessment and

assessment for learning strategies are used and developed in the classroom (James *et al.*, 2007; James *et al.*, 2006).

So it can be seen that this study, which involves both teacher education and development of resources to support teachers, complements and extends previous work undertaken by the researcher.

1.3 Research questions

The background context explained in the above sections shows that this study is timely. There is a recognised need, both internationally and nationally, for the development of rigorous and robust resources to support teachers, their professional development and teacher educators. There is also a recognised need to develop knowledge mobilisation in the field of education, using knowledge that is already available to work towards the development of a knowledge base for teachers' professional development. The use of digital technologies provides a new opportunity to develop a knowledge base for education. This study is also interested in what research and research practices are used by teachers, and what value teachers ascribe to those practices. All these areas combine to inform the development of the online pathways resource. Thus the overall research question for this study is:

In what ways might online pathways be used to enhance knowledge mobilisation and improve teaching as an evidence informed profession?

Taking the three broad themes of knowledge mobilisation, teacher development, and digital technologies, a number of subsidiary research questions were developed, these are outlined below:

Research Question 1 –What research practices are currently used by practitioners and schools?

Research Questions 2 – What value do practitioners place on these current practices?

The first research question gives some insight into the ways in which research

knowledge and research practices are currently being used by practitioners, and their schools. The second question explores the value that practitioners ascribe to the use of these practices.

Research Question 3 – What are the processes that need to be undertaken to take research knowledge in reports and journals and present it in online pathways?

This question looks at the specifics of how research knowledge can be transformed or translated from what researchers produce into something that practitioners can use and which can then be presented as online pathways that are meaningful to practitioners.

Research Question 4 – What views do practitioners have of the online pathways approach as a way of presenting research knowledge?

The use of the online pathways approach has been successfully adopted in the medical field to support practitioners when diagnosing patients presenting symptoms with which they may not be familiar. A similar approach has also been used in Special Educational Needs (SEN) settings in education. However it cannot be automatically assumed that practices and processes developed in the medical and SEN fields can transfer into the wider field of education. This question will find out if an online pathways approach, developed to increase knowledge mobilisation, resonates with practitioners and provides them with access to research knowledge that could help them improve their practice.

Research Question 5 – What processes do practitioners adopt to take the knowledge presented in online pathways and use it their practice?

This question will highlight the practitioner's processes that may be underlying the use of evidence informed practice and exploring whether practitioners do this individually, in groups, or as an organisation. Therefore models of professional learning, such as constructivism and social constructivism, will need to be considered. The data gathered to answer these five subsidiary questions will give useful insights into the overall research question.

1.4 Summary

This study is not only very timely but of interest to both the national and international teacher development agendas, and aims to explore the potential to improve the education system of teachers through an online approach to knowledge mobilisation. The study aimed to find out what research knowledge and research practices teachers were using and if the online pathways approach developed in this project fitted with these practices.

This study aims to provide some insights into the development of knowledge mobilisation using digital technologies, thus working towards the goal of teaching being an evidence informed profession. This study extends and develops the work of the researcher, building on a body of work around using research for teachers' professional development and the development of technology to improve access to research knowledge.

1.4.1 Structure of the study

In this thesis there are six main chapters. After the Introduction, Chapter two provides a review of the literature and gives a short historical context to the debate about the use of evidence-base practice in the UK. The review then looks at types of knowledge that have been identified as being used by practitioners and ideas of knowledge management, transfer and mobilisation. Teacher learning and continuing professional development are also discussed.

Chapter three discusses the methodological underpinnings of the study and the ontological and epistemological reasoning for the research design. The range of methods that have been used in this study and how they were developed and deployed to gather the data needed are also discussed. The problems encountered with the use of some methods are also discussed and the ways that these

challenges were overcome.

In Chapter four the methods of analysis are discussed followed by the findings of the study by the research method used, thus both quantitative and qualitative findings are discussed and how these findings relate to the literature.

Chapter five discusses and evaluates the findings and provides a synthesis of the findings around a number of themes. Answers to the original research questions are then presented in Chapter five.

Chapter six presents the conclusions of the study, and further recommendations and implications of the findings. How further research could be conducted is then suggested. References and appendices follow.

2.0 Literature review

The purpose of the literature review is to acknowledge the current state of knowledge in the topic to date to highlight both the findings from previous studies but also the debates what have been played out within a body of knowledge. The sum of knowledge within a topic is not static and thus a literature review is the best attempt at a snap shot of that knowledge at any one time. This review is both a snap shot of the present and a historical review at the same time.

This literature review locates the present study within the work that has been carried out by others. It also critically reviews that work and provides the background context to this study. This study builds on the work of others and extends the knowledge in this topic.

This review starts with the historical context of the field of educational research and evidence informed practice, thereby locating this study in its historical context. This is followed by a discussion about the types of professional knowledge that are used by, and are available to, teachers. The review goes on to consider how knowledge is managed and how techniques from the business and medical fields might be used to inform the development of digital technologies to support education with the goal of providing a solid knowledge base for educational professionals. These areas inform research questions three, four and five and provide some ideas as to how research knowledge could be presented to practitioners.

Knowledge mobilisation, teacher's use of research knowledge and the barriers to the use of research knowledge are also considered. These areas are reviewed to inform research questions one and two about teacher use of research practices. The review concludes with discussions about teacher learning and how teachers use knowledge in their continuing professional development and how technology can be used to support this use of knowledge. Again these areas will inform research questions three, four and five as to how teachers can use new knowledge.

In the reviewing of the literature the approach was what "...Hammersley (2001a) characterises as a 'narrative' approach (he criticises the rhetoric of the 'systematic' reviews done by the likes of EPPI)" (McCormick, 2010, p.399). This is a nuanced approach to the literature rather than following a systematic set of strict rules that may miss important papers. Thus a narrative approach allows the researcher to use their professional judgement to follow links and references that are relevant to their study rather than being constrained by what may be a narrow view of the research designs that have been used in other studies.

2.1 Educational research in the UK - an historical context

In the late 1990s there were a number of influential reports written that criticised educational research in the UK. These included:

- David Hargreaves (1996) for the Teacher Training Agency;
- Tooley and Darby (1998) for the Office for Standards in Education (OFSTED);
- Hillage *et al.* (1998) for the then Department for Education and Employment (DfEE);

(Whitty, 2007, p.3)

One of the first critiques in the 90s was that of David Hargreaves (1996) who spoke at the then Teacher Training Agency (TTA) annual conference. He argued that, “...whilst teaching needed to be evidence-informed like medicine, educational research – unlike medical research – was not up to the job” (White, 2007, p.28). This was one factor that led to the commissioning of the Hillage report for the then Department for Education and Employment (DfEE).

The Hillage report (1998) provided a number of recommendations that are summarised here:

- there should be a national education research strategy and a new, government funded, but independent body to run this;
- there should be a publicly funded system to enable the production of 'systematic reviews' of existing educational research;
- there should be a drive to raise the quality of research by means of explicit

quality standards and better training of researchers;

- there should be a much greater emphasis on research dissemination both to policy-makers and to practitioners;
- the Department should establish dedicated specialised education research centres.

(White, 2007, p.28)

After the publication of the Hillage *et al.* (1998) report into educational research in which it was concluded “...that the impact of research on policy and practice was minimal...” (Sebba, 2004, p.34), the then Department for Education and Employment set out its plan of action (Budge, 1998) to address the recommendations of the report. These “...focused on two underlying aims: making better use of existing evidence and investing in a better evidence base for the future” (Sebba, 2004, p.34).

One recommendation from the report was the establishment of dedicated research centres. These were “...conceived as a way to enhance research capacity in the system as a whole, as well as to build a cumulative evidence base which could inform policy development” (White, 2007, p.21). These research centres included the Centre for Economics of Education, the Centre for the Wider Benefits of Learning, the Evidence for Policy and Practice Information and Coordinating Centre and the National Education Research Forum (NERF) which was established in 1999.

Another recommendation made by the Hillage Report was that there was the “...need for a more robust and cumulative evidence base to support education policy” (White, 2007, p.20). In the following ten years there was an increase in the commissioning of large scale longitudinal work. These included, a study on teachers work and lives (Day *et al.*, 2006) and a large longitudinal study on

effective pre-school and primary education (Sylva *et al.*, 2004; Sammons *et al.*, 2006a, 2006b) in (White, 2007, p.20).

The Hillage report also “...concluded that greater coordination was required in terms of setting research agendas and priorities” (Gough, 2004, p.48). This led to the setting up of the National Forum for Educational Research, additionally it was decided that “...synthesis and dissemination of the products of research...” was needed similar to that which had been achieved in medicine via the Cochrane Collaboration. Hence a public competition lead directly to the setting up of the Centre for Evidence Informed Policy and Practice, the EPPI-Centre (Gough, 2004, p.48).

Somekh highlights that “...in effect Hillage said that educational research was irrelevant to policy-makers largely because policy-makers did not pay it serious attention or fund it properly” (Somekh, 2007, p.38). Thus with the large scale funding of research centres and large longitudinal studies there would be a chance that educational research evidence would be able to influence future policy and practice.

These critiques of educational research in the late 1990s have been summarised succinctly by Whitty (2007, p.3) as:

- lack of rigour
- failure to produce cumulative research findings
- theoretical incoherence
- ideological bias
- irrelevance to schools

- lack of involvement of teachers
- inaccessibility and poor dissemination
- poor cost-effectiveness

These critiques led to a number of initiatives to increase the quality of educational research. For example, the ESRC funded Teaching and Learning Research Programme (Pollard, 2007), which was the largest coordinated programme of educational research ever funded in the UK, and later the ESRC and EPSRC funded Technology Enhanced Learning Programme (Noss, 2012).

Around this time there were also calls for evidence based practices to be adopted at a policy level. In 2001 the then Secretary of State for Education, David Blunkett gave a lecture at the Economic and Social Research Council (ESRC). He called for a “...revolution in the relationship between government and the research community” (2001, p.21). This was “...coupled with an emphasis on research that demonstrates what types of policy initiatives are likely to be most effective” (Whitty, 2007, p.5). These agendas were also being pursued in a number of other fields at the time such as medicine, public policy and management (Nutley and Davies, 2000).

These critiques and reviews lead to a greater interest in educational research to be used to support both policy and practice. Other researchers have critiqued the whole approach of evidence-based practice thus:

Intuitively, basing policies that affect people’s lives and the economy on rigorous academic research sounds rational and desirable. However, such approaches are fundamentally flawed by virtue of the fact that Government, in its broadest sense, seeks to capture and control the knowledge producing processes to the point where this type of ‘research’ might best be described as ‘policy-based evidence’. (Boden and Epstien, 2006, p.226)

For these researchers the approach leads to the capture of the means of production of knowledge by Government, thus Government defines the research knowledge that should be produced. Nedeva and Boden state that:

...academic knowledge is increasingly characterised as knowledge that is short term and of immediate use to non-academic domains. That is, research knowledge is increasingly defined as that which solves practical problems rather than striving for deeper understanding. (2006, p.278)

This argument is still relevant in the debate around evidence-based policy and practice; should knowledge be used to solve immediate policy and practice issues set by the Government, or should researchers be engaged in broader issues of “...striving for a deeper understanding” (Nedeva and Boden, 2006, p.278). These debates about evidence-based practice highlight a number of issues such as, what is evidence, what types of evidence should be considered, how should this evidence be gathered, how should evidence be used and what are the implications for the practitioner. These issues are addressed in the following section.

2.2 Knowledge and evidence

2.2.1 Data, information and knowledge

Throughout this dissertation terms such as knowledge, research knowledge and evidence are used, and have been defined following a review of the following literature. Davenport and Prusak whose work is based on the field of business and focusses on knowledge management, rather than education, identify three entities, data, information, and knowledge (1998, p.2). Thus for them in the organisational context, data is “...structured records of transactions...” (1998, p.2) and information is “a message, usually in the form of a document or audible or visible communication” (1998, p.2) with a sender and a receiver. Their working definition of knowledge is:

...a fluid mix of framed experience, values, contextual information and expert insight that provide a framework for evaluation and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organisations, it often becomes embedded not only in documents or repositories but also in organisational routines, processes, practices and norms. (Davenport and Prusak, 1998, p.5)

Davenport and Prusak themselves say that their definition “...expresses the characteristics that make knowledge valuable [...] and make it difficult to manage well” (1998, p.5).

For Nonaka and Takeuchi “...information is a flow of messages...” and can have two perspectives; the “...syntactic (or volume of) and [the] semantic (or meaning of)...” (1995, p.58) while knowledge is created “...by that flow of information, anchored in the beliefs and commitment of its holder” (1995, p.58). Finally they add that both information and knowledge are context-specific and “...relational in that they depend on the situation and are created dynamically in social interaction among people” (1995, p.59). Thus for all of these authors knowledge is something

that is not static and absolute, in the traditional Western epistemological view, but has a focus on 'truthfulness' as an attribute of knowledge (Nonaka and Takeuchi, 1995, p.58). Also that knowledge resides in experiences, values, context, routines, processes, practices and social interactions.

Manuel Castells', the sociologist, in his seminal text 'The Information Age' does not attempt his own definitions of information and knowledge, rather he builds on the work of others. Thus for information he uses the one "...proposed by Porat in his classic work (1977, p.2): 'Information is data that have been organised and communicated' " (2000, p.17). This aligns closely to the definitions used by both Davenport and Prusak (1998) and Nonaka and Takeuchi (1995). For knowledge he states that "...I have no compelling reason to improve on Daniel Bell's (1976, p.175) own definition of knowledge: 'Knowledge: a set of organised statements of facts or ideas presenting a reasoned judgement or experimental result, which is transmitted to others through some communication medium in some systematic form' " (2000, p.17). However here Castells uses a definition of knowledge that is very static and absolute in its nature which is very different from the view of knowledge used by business and knowledge management authors.

For this study knowledge is defined as something that is not static and absolute, or that only resides in some textual form, but knowledge is "...embedded not only in documents or repositories but also in organisational routines, processes, practices and norms" (Davenport and Prusak, 1998, p.5). As Fenwick and Farrell state "...knowledge is inscribed within objects such as texts, tools, technologies and bodies" (2012, p.3). Thus in this study knowledge is not just within the online pathways but within the way that the pathways are put together and designed and how practitioners interpret these into their practices. The forms of professional knowledge that need to be encapsulated in a resource such as online pathways are discussed in more detail in section 2.4.

2.2.2 Evidence

As well as data, information, and knowledge, the use of the term evidence also needs to be considered. Thomas and Pring state that “...evidence may take different forms, and be valued differently, in different places” (2004, p.1). Although prosaic in its nature this statement does highlight that evidence can be in many different forms and will mean, or be valued, differently in different places and by different people.

For Sebba (2004) there are many different types of evidence. She uses the work of Davies *et al.* (2000) who “...argue that they include the means of providing an unknown fact, support for a belief, use of testimonies and witnesses...” but however construed “...evidence can be independently observed and verified and there is broad consensus as to its contents, even if the interpretation of it is contested” (cited in Sebba, 2004, p.35). This highlights one of the difficulties for researchers as they have very little idea of how their work will be interpreted by people who want to use it. How it is put into practice is not up to the researcher but up to the practitioners as it is they who have to interpret evidence into their specific context. All research, however large-scale, brilliantly conceived, executed and communicated, needs to be actively interpreted by users for their own context (Cordingley, 2008, p.49).

Thomas and Pring explain that for the practitioner there are many types of evidence available to them “...from observation, from documents, from the word of others, from reason or reflection, from research of one kind or another” (2004, p.1). Accordingly practitioners assemble evidence in practice and “...distil it in everyday heuristic, knack and rule of thumb. They engage in, have confidence in, a kind of vernacular accumulation of evidence that enables what Schatzman (1991, p.304) calls 'common interpretive acts' ” (2004, p.13). Thus whatever the researcher may consider to be evidence on which to base practice, practitioners will have assembled a much larger collection of forms of evidence that they will

be deploying on a daily basis in their specific contexts. As Biesta has stated, educational practitioners have to make “...judgements in a way that is sensitive to, and relevant, for their own contextualised settings” (2007, p.5).

It can be seen that concepts such as knowledge and evidence do not have definitions that are agreed by all authors and there is debate around what these concepts mean in different contexts and to different user groups. The producers of knowledge or evidence may have a different conception of what evidence is compared to users of knowledge or evidence. Teachers and researchers may have different ideas about what evidence is and how it can, or should be, leveraged to help develop practice. As Thomas and Pring explain “...all professionals will collect evidence deliberately and tacitly in ways described eloquently by Schon (1991), and others, who emphasize the interconnectedness of professional knowledge” (2004, p.13). Thus evidence that is presented to practitioners may be in turn internalised into their normal everyday practice and become part of their professional knowledge, tacit knowledge of their subject, context and their beliefs and values.

Thomas and Pring state that “...evidence may take different forms, and be valued differently, in different places” (2004, p.1). For this study conceiving evidence in this way supports the use of a large range of evidence that can be used in the construction of online pathways. Hence as long as evidence is rigorous and trustworthy it should be considered for inclusion in the online pathways approach and should not be condemned by some methodological apartheid. Equally practitioners will still need to interpret the evidence presented so that they can use it within their contextualised settings.

2.3 Evidence informed/based practice

This section gives an overview of the debate surrounding the use of evidence-based practice in the UK and highlights what counts as evidence is still contested. The debate about the use of systematic reviews to generate evidence is also examined. This section highlights that presenting research evidence to teachers to support their work is not a process that can be easily simplified.

Evidence-based practice is the idea that within the field of education the practice of teachers should be based on evidence resulting from research. As Hammersley quoting Sharhar and others points out, there is already a certain rhetorical effect in the phrase evidence-based practice to discredit opposition to it: “...after all, who would argue that practice should not be based on evidence...” (1997, p.110 cited in Hammersley, 2001, p.1), and for Torrance “...evidence-based development of the public services and particularly education, is at the rhetorical level at least, irresistible...” (2004, p.187), and more recently Cooper *et al.* also explains that “...it is virtually impossible for a reasonable person to disagree with the idea that policy and practice should be based on the best available evidence” (2009, p.3). Finally Pring states that “...the means/end model of educational improvement, reflected in the wholesale adoption of evidence-based policy and practice is indeed seductive” (2007, p.323). However even with the rhetorical effect of the phrase 'evidence-based practice' there has been a long debate about its use in the UK.

The debate around evidence-based practice in the UK was ignited by a 1996 David Hargreaves' lecture, 'Teaching as a Research-based Profession' to the then Teacher Training Agency (TTA), now known as the Teaching Agency¹¹

¹¹ The Teaching Agency was established on 1st April 2012 and replaced the previous Training and Development Agency for Schools (TDA). The TDA was established as part of the Education Act 2005 and before that was known as the Teacher Training Agency (TTA) established by the Education Act of 1994.

(Hargreaves, 1996). Hargreaves' lecture critiqued educational research in the UK insisting that it should have an impact on policy-makers and practitioners. He also discussed that the ideas of evidence-based practice developed in the medical and health care fields could also have relevance in the field of education. Hargreaves' lecture was critiqued by Hammersley (1997) who used Hargreaves argument that "...the effectiveness of teaching in schools would be substantially improved if it were a research-based profession" (1997, p.142) and that for Hargreaves blame for this rests on "...researchers rather than on teachers" (1997, p.142). Hammersley also points out that medical research "...does not involve the distinctive problems associated with studying social phenomena" (1997, p.154). Hammersley also highlights that "...research can rarely provide sound information about the relative effectiveness of different techniques which is directly applicable" (1997, p.154).

The points Hammersley makes are defended by Hargreaves in his rejoinder to Hammersley (Hargreaves, 1997). Hargreaves states that "...the promotion of evidence-based teaching would stimulate a heated debate among teachers and researchers about the quality of research evidence and its place in shaping the decisions and judgements of teachers" (1997, p.415). A debate which he thinks would improve the professionalism of both teachers and researchers. Hargreaves points out that if the aim of educational research is to improve educational practice "...then practising teachers should be key judges of the quality and value of research outputs" (1997, p.416). However he is willing to admit that that they may lack the technical skills "...to pronounce on the technical quality of research..." but that they are able to judge "...the relevance of research to, and usefulness for, professional practice, teachers are indispensable" (1997, p.417).

Hammersley highlights that evidence-based practice has to be construed differently in different fields thus "...in medicine, most of the emphasis has been on the need for practitioners to make more use of research evidence in their work.

In education, by contrast, the stress has been on the inadequacy of the research evidence that is available, as regards both its rigour and its applicability” (2002, p.14). Indicating that Hargreaves' original lecture is an attack on educational researchers as much as it is a call to arms for teachers to use, and be more critical of, evidence on which to base their practice.

Hargreaves' criticisms of educational research lead to the development of a number of educational research initiatives¹² and to further debate about the nature of evidence-based practice in education.

2.3.1 What's in a name?

The term evidence-based practice has itself been debated. Hammersley states that it is only very recently that “...the term 'evidence-based practice' has appeared in the field of education” (2002, p.14). Whereas evidence-based practice is basing practice solely on the evidence that is available “...the less robust position prefers the term 'evidence-informed practice' and allows for the inclusion of a wider range of evidence, including the incorporation of action research undertaken by teachers...” (Thomas, 2004, p.18). Thus evidence-informed practice allows for the professional judgements of the practitioner to be considered. As Elliot states “...evidence-informed practice' is a less ambivalent expression. It more clearly indicates that relevant research informs rather than displaces the judgement of teachers” (2004, p.164).

Cordingley explains that “...for teachers, the distinction between *evidence-based* and *evidence-informed* is not trivial” (2004, p.79). This highlights that for teachers to base their practices purely on research evidence is not a simple task and that teachers will need to reflect on evidence from research before insinuating this into their existing practice (Cordingley, 2004, p.79). Cordingley summarises what evidence-informed practice means for teachers and why this is a more appropriate

¹² These include NERF, TLRP, and EPPI

term than evidence-based practice, succinctly with “...teaching always involves sophisticated professional judgements about what evidence means to this group of learners, with these learning objectives at this particular point in time” (Cordingley, 2004, p.79). Thus again the importance of a teacher's professional judgement is shown.

Chalmers, one of the founders of the Cochrane Collaboration¹³, an organisation dedicated to providing evidence on which to base practice, has stated that:

Those who are unfamiliar with the application of evidence-based policy and practice misinterpret these terms as implying a direct link between research evidence and practice. Those with practical experience of applying this approach are very clear that although good research is essential for improving policy and practice, it is insufficient. (Chalmers, 2005, p.229)

Therefore it can be seen that practitioners need to be aware that there cannot be a direct link between evidence and practice. As Chalmers states in earlier work “...judgements will always be needed about how to use evidence derived from evaluation research. As well as the research evidence, these judgements need to take account of needs, resources, priorities and preferences, and other factors” (Chalmers, 2003, p.36). This supports Cordingley's assertions that evidence can inform practitioners' practice but that practice should not be solely based on research evidence as if there is a direct link from research evidence to implementation in practice.

Another area of criticism for this approach is the lack of agreement about what is 'evidence' and therefore what is 'good evidence'. If practitioners are going to base their practice on evidence, then it would seem obvious that evidence needs to be rigorous and of a high quality. As Cooper *et al.* point out, because of the rhetorical effect of the term 'evidence-based practice' it means that it is difficult for critics to

¹³ <http://www.thecochranelibrary.com/>

challenge this assertion, and thus, for critics, their “real objections are not to the use of evidence itself, but to particular ways in which evidence is being defined or used” (2009, p.3). Although as Hammersley points out, there are “...dangers in the privileging of research evidence over evidence from other sources, especially professional experience” (2001, p.1). For Hammersley, within evidence-based practice there is a need for “...professional reflection and judgements about the validity and value of kinds of evidence” (2001, p.1). For him practitioners need to be more critical and reflective about what they regard as evidence and what, therefore, they should be basing their practice on. In this study the term evidence-informed practice was used.

McCormick, in his review of Continuing Professional Development (CPD), highlights the fact “...that publications, [...] were often drawing on data collected several years previously. This inevitable lag makes evidence-informed policy difficult to manage, especially in a political system that works to relatively short timescales” (2010, p.402). So even if it is agreed that evidence-informed practice is a good idea, then there is a delay between when the data is collected, analysed, interpreted, the findings written up, published and the relative short time scales of political systems. Hence in a sense all research using traditional methods is historical in its nature.

Hammersley points out that other critics have suggested that evidence-based medicine would be “...better referred to as 'literature-based medicine' (Horwitz, cited in Shuchman, 1996, p.1396)” (1997, p.151). Thus, in the case of research evidence, what is actually published in journals becomes the literature on which policy and practice is based. One of the problems with this is that “...there may be biases in the research literature, for example resulting from the tendency of journals to be less interested in publishing negative than positive findings” (Hammersley 1997, p.152). Therefore the evidence that is in research journals may already be biased because negative findings tend not to be published

(Hammersley, 1997; Ioannidis, 2005). It can be seen that this is still an issue in 2012, Ben Goldacre's book *Bad Pharma* (Goldacre, 2012) also highlights how the pharmaceutical industry withholds negative data and suppresses poor results¹⁴.

One of the problems of evidence-informed practice is the generation of research evidence that is specific enough and of a quality that it can be used to inform practice and policy. The use of systematic reviews¹⁵, a model deployed in the medical field, was one approach to achieving high quality research and these are discussed in the next section.

2.3.2 Systematic reviews

One of the big successes in supplying evidence-informed practice in the medical field has been the use of systematic reviews.

Systematic reviews are a [...] synthesis [of] the findings of many different research studies in a way which is explicit, transparent, replicable, accountable, and (potentially) updatable. (Oakley, 2003, p.21)

These were initially championed in the medical field by the Cochrane Collaboration (Sheldon & Chalmers, 1994).

In the late 1970s and early 1980s a group of health service researchers in Oxford prepared the ground for evidence-based medicine by beginning a programme of systematic reviews on the effectiveness of health care interventions. The Cochrane Collaboration (<http://www.cochrane.org>) is now an international network of researchers, academics, practitioners and users committed to the principles of managing knowledge in such a way that it is quality assured, accessible and cumulative. (Oakley, 2003, p.21)

¹⁴ Goldacre has since set up a website calling for all clinical trial data in the pharmaceutical industry to be reported, see <http://www.alltrials.net>

¹⁵ See the Cochrane Collaboration library at <http://www.thecochranelibrary.com/>

Systematic reviews conducted by the Cochrane Collaboration are mostly focused on the use of randomised experimental studies. These are regarded by many as the 'gold standard' of research (Torgerson and Torgerson, 2008, p.1). Many studies of this type are able to be reviewed in a systematic and replicable way to produce a review of the evidence for that topic. As Gough states "...randomised control trials are often seen as the strongest design to establish efficacy..." although "...quasi-experimental designs or non-controlled studies..." may also contain useful evidence (2004, p.55). These reviews are different from the more common in education narrative literature reviews which focus on the range and diversity of research, typically using a selective, opportunistic and discursive approach to interpreting literature (Badger *et al.*, 2000; Davies, 2000) which Oakley argues can result in both biased and misleading findings (Oakley, 2003).

The Cochrane methodology to develop systematic reviews is being adapted by the Campbell Collaboration¹⁶, a sibling organisation to Cochrane, with the aim of disseminating systematic reviews in the areas of education, crime and justice, and social welfare. In the UK the Evidence for Policy and Practice Information and Coordinating Centre at the Social Science Research Unit, the Institute of Education, University of London was funded by the Department for Education and Skills (DfES) and Teacher Development Agency for five years from 2000 to carry out systematic reviews in the UK (Oakley, 2003).

Although systematic review methodologies have been robustly developed there have been a number of criticisms (Hammersley, 2001a; 2001b; Elliot, 2001) levelled at the development of systematic reviews in education. Hammersley is concerned that systematic review methods could be adapted to "...favour some kinds of research against others" (2001a, p.546). This is what he refers to as a positivist model of research and for him there is a chance of "...valuable evidence being overlooked here and/or misleading evidence being privileged" (2001a,

¹⁶ <http://www.campbellcollaboration.org/>

p.546). Thus for Hammersley, a methodology privileging quantitative research and the dismissing of qualitative research means that much valuable evidence is being overlooked. Hammersley also states that a positivist model is also adopted in the task of producing reviews and implies that this is the “...only or best way of representing the literature, either for other researchers or for external 'users'” (2001a, p.546). Hammersley is additionally concerned that “...this instrumental view of the role of educational research may undermine effective practice because it privileges research evidence over evidence from other sources, including that arising from the experience of practitioners” (2001a, p.546). Hammersley also highlights that “...advocacy of systematic reviews, and of evidence-based practice, are closely associated with moves towards increased central control over educational research” (2001a, p.550). Elliot is in agreement with this and suggests that research synthesis will control professional practice (Elliot, 2001). One of the concerns is that evidence-based practice leads to a 'what works' agenda against which professionals may be judged or inspected. Of course this model may not take into account the specific context and nature of the dynamic situations that call for practitioners' professional judgements to be used.

Oakley responded to what she called ‘the anti-evidence movement’ among educational researchers such as Atkinson, (2000); Ball, (2001); Hammersley, (1997); Hargreaves, (1997); Hulme, (2002) whose criticism, she stated:

...incorrectly presupposes a rational process of evidence-informed policy and practice; is limited to certain kinds of quantitative studies; ignores the importance of theoretical development; exhibits a limited, and limiting, emphasis on ‘what works?’ questions; dismisses the ‘craft’ knowledge of teachers as unimportant, and mistakenly assumes that education shares with medicine a common epistemological and professional base. (Oakley, 2003, p.26)

MacLure later identifies that systematic reviews have “...been associated with the 'audit culture' and international trends towards control and accountability in

knowledge production and use” (2004, p.2). Other authors have emphasised how in neoliberal nation states there is a need to own and control the production of knowledge and therefore the ability to determine what counts as knowledge (Boden and Epstein, 2006, p.224; Nedeva and Boden, 2006, p.271). Other criticisms of the systematic review approach by MacLure are that “...it construes research knowledge as static, transparent and compliant with disciplinary boundaries...” and that “...evidence can be extracted intact from the texts in which it is embedded and 'synthesised' in a form that is impervious to ambiguities of context” (2004, p.2). These debates have been in the field of education where methods and methodological approaches are broader than just randomised control trials, which are used to a greater extent in health and healthcare.

In the medical field systematic reviews are used to review a large body of research work by comparing and synthesising studies with the same or very similar methodologies. In the field of education, random control trials and experiments are not used to the same degree. Whether this approach is good or bad is still a point of debate, but it does give rise to the problem that more methodologies are used in educational research and therefore are difficult to compare and synthesise when carrying out a systemic review. In the end, the number and types of study that are included in systematic review can have a large effect on the outcomes of the study and this may then become a problem when policy and practice are based on the review. As Thomas *et al.* state “...a systematic review is only as good as the studies it contains (and they can often be of variable quality and relevance)” (2013, p.17).

2.3.3 Rapid evidence assessments

Rapid Evidence Assessments (REA)¹⁷, were developed because of the limitations of systematic review methodologies in the social sciences. REAs are different from systematic reviews, in that they are rigorous reviews but over a shorter

¹⁷ Originally developed at the Home Office by Phil Davies.

timescales. REAs are used to meet policy-making deadlines. As Thomas *et al.* explain a “...comprehensive, transparent view of the research evidence can be quite time consuming; a large, complex review can take more than a year to complete” (2013, p.5). In many cases policy makers and practitioners will need evidence to support their decisions more quickly than that. Thus REAs have been promoted by some authors as a solution to this problem (Hailey *et al.*, 2000; Burton *et al.*, 2007; Khangura *et al.*, 2012).

This section has highlighted the historical debate that has been played out in the UK around the use of evidence-based practice and evidence-informed practice. This debate has extended to the use of methods such as REAs and systematic reviews that have been used synthesise research knowledge. Hence it can be seen that it is a not a simple process for teaching to be an evidence-informed profession. This discussion shows that the debate around evidence-informed practice has been on going since 1996 and thus it is important to find out how teachers are using evidence and what value they ascribe to evidence in their practices.

These debates also show that this area is a much contested field and a number of issues around the nature of evidence and professional knowledge need to be resolved before resources such as online pathways can be developed. These debates provide a background to the development of online pathways in this study and the further issue of how teaching can be an evidence-informed profession. The next section discusses how professional knowledge can be considered and some of the types of professional knowledge that have been categorised in the field of education.

2.4 Types of knowledge

This project explores the knowledge management strategies that can be used to support teachers in the use of evidence-informed practice or knowledge mobilisation (Levin, 2013). Before any discussion about how knowledge can be managed in a way that makes it useful for practitioners, the types of professional knowledge that are used by teachers, and that have been identified by researchers, are discussed. Whereas section 2.2 discussed the debate about the differences between knowledge and evidence, this section discusses types of knowledge. This is to inform how these types of knowledge can be mobilised within resources for teachers.

There are a number of types, or categories, of knowledge that researchers have tried to define in the field of education. This further complicates the issue of what is regarded as knowledge, what is evidence and what should be used by teachers when they are considering basing their practices on evidence. Knowledge cannot be assumed to be static and of one type, hence a range of types of knowledge are discussed below.

2.4.1 Content knowledge/pedagogic knowledge

Schulman (1986, 1987) puts forward a number of categories of knowledge that teachers use in their practice. These are content knowledge, pedagogical knowledge, and what he describes as pedagogic content knowledge. Firstly Schulman suggests that content knowledge “...refers to that amount and organisation of knowledge *per se* in the mind of the teacher...” (1986, p.9) thus

...to think properly about content knowledge requires going beyond knowledge of facts and or concepts of a domain. It requires understanding the structures of the subject matter. (1986, p.9)

Content knowledge is more than just knowing the facts of the subject, it is concerned with why the facts are as they are. Hence teachers need to “...not only understand *that* something is so; the teacher must *further* understand *why* it is so” (1986, p.9).

Secondly there is pedagogic knowledge. For Schulman this is the “...pedagogical knowledge of teaching – as distinct from subject matter [...]. This is the knowledge of generic principles of classroom organisation and management” (1986, p.14). Thus pedagogic knowledge is the knowledge a teacher uses to organise and manage their classroom so that it is a place conducive to good learning.

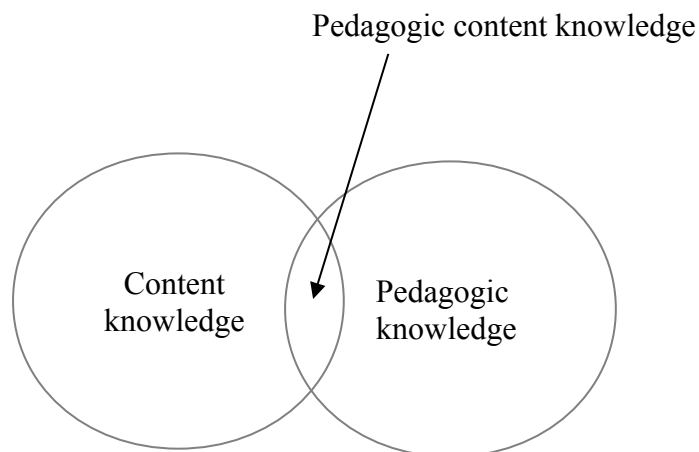


Figure 2.1: Content knowledge, pedagogic knowledge and pedagogic content knowledge (developed from Schulman, 1986)

Schulman's third type of knowledge is pedagogic content knowledge, see Figure 2.1 to see how this relates to the two previous types. This “...goes beyond knowledge of subject matter *per se* to the dimension of subject matter knowledge for teaching.” (1986, p.9). Schulman explains this as:

Since there is no single most powerful form of representation, the teacher must have at hand a veritable armamentarium of alternative forms of representation, some of which derive from research whereas others originate in the wisdom of practice. (1986, p.9)

The idea of alternative forms of representation is as true for the education of children as it is for the education of teachers and is important for the broader context of this study. Pedagogical content knowledge also covers areas of misunderstanding or misconceptions within a subject:

...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. If those preconceptions are misconceptions, which they so often are, teachers need to know of the strategies most likely to be fruitful in reorganising the understanding of learners, because those learners are unlikely to appear before them as blank states. (Shulman, 1986, p.9)

One of the difficulties here is working out what the knowledge and conceptions of the learner may be in these cases, so that it can be reorganised to deal with preconceptions or misconceptions. Schulman's work was further developed and extended by Koehler and Mishra (2005), Mishra and Koehler (2006) and Capel, Leask and Turner (2013).

2.4.2 Technological pedagogic content knowledge

The work of Koehler and Mishra (2005) and Mishra and Koehler (2006) extended the categories suggested by Schulman to “...describe teachers' understanding of the complex interplay between technology, content and pedagogy” (Koehler *et al.*, 2004). They introduced the idea of Technological Pedagogical Content Knowledge (TPCK) to understand effective teaching with technology.

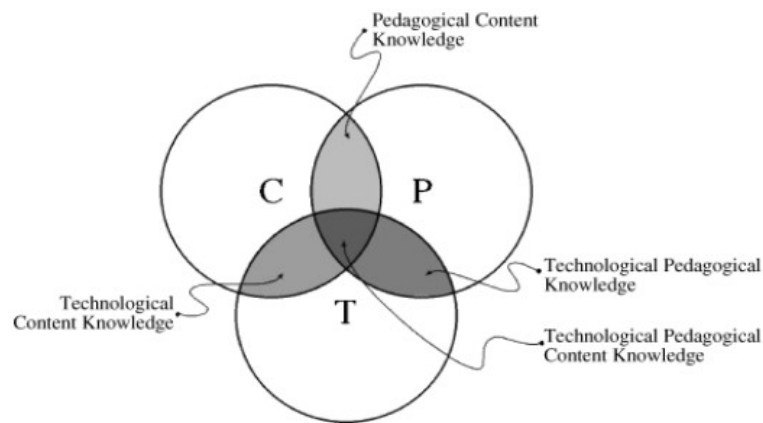


Figure 2.2 : Pedagogical technological content knowledge (from Mishra and Koehler, 2006, p.1025)

Figure 2.2 shows how the new category of technology is related to Schulman's original model. This addition therefore creates the further categories of Technological Content Knowledge and Technological Pedagogical Knowledge.

Mishra and Koehler suggest that Technology Knowledge is “...knowledge about standard technologies, such as books, chalk and blackboard, and more advanced technologies, such as the Internet and digital video. This involves the skills required to operate particular technologies.” (2006, p.1027). This then generates three new categories of knowledge, where Content Knowledge (C), Pedagogic Knowledge (P) and Technology Knowledge (T) overlap, see the shaded areas on Figure 2.2. These new categories allow a way for new technologies to be considered within the more traditional framework of content knowledge and pedagogic knowledge. These types of knowledge may need to be considered when designing online resources to improve knowledge mobilisation for teacher development and for teaching to be evidence-informed.

2.4.3 Forms of professional knowledge for teachers

Capel, Leask and Turner (2013) adapted the work of Schulman to consider a broader range of types of professional knowledge that need to be considered by practitioners, see Table 2.1 below.

Table 2.1: Forms of professional knowledge (Schulman, 1986 cited in Capel, Leask and Turner, 2013)

Forms of professional knowledge	Description
(Subject) Content knowledge.	The subject material that is to be taught. Schwab (1964) identifies two components of content knowledge: substantive: knowing what are the most important concepts and skills in the subject, and syntactic: knowing how the concepts and skills are structured and organised within a subject.
General pedagogical knowledge.	The broad principles and strategies of classroom management and organisation that apply irrespective of the subject.
Curriculum knowledge.	The materials and the programmes that serve as 'tools of the trade' for teachers.
Pedagogic content knowledge.	The knowledge of what makes for effective teaching and deep learning that is the basis for the selection, organisation and presentation of the content teachers want their students to acquire.
Knowledge of learners and their characteristics.	Knowledge of learners of a particular age range (empirical or social knowledge), and cognitive knowledge of learners, comprising of child development and knowledge of a particular group of learners.
Knowledge of educational contexts.	Including specific school, catchment area and the wider community, including national and international contexts of current and emergent issues for education e.g. globalization, citizenship, use of ICT to support learning.
Knowledge of educational ends (aims).	Purposes, values and philosophical and historical influences: both short and long term goals of education and of a subject.

This analysis highlights the importance for practitioners to have a knowledge of

the learners in their classes, including their abilities and their development. But this analysis also shows that knowledge of the school's context, its catchment and broader national and international issues in education also need to be considered. Equally practitioners need to consider the broader issues of purpose, value and the goals of education and how they reconcile these with their own beliefs and values about education. Hence how practitioners value research knowledge is an important consideration for this study.

2.4.4 Troublesome knowledge

Recent work by Meyer and Land (2003), on threshold concepts, gives a good review of a number of types of knowledge discussed by Perkins (1999). Perkins was interested in socio constructivism in the classroom and provided examples of the types of knowledge in his 1999 paper. Meyer and Land state that “...Perkins (1999) has defined troublesome knowledge as that which appears counter-intuitive, alien (emanating from another culture or discourse), or incoherent (discrete aspects are unproblematic but there is no organising principle)” or “knowledge that is 'alien', or counter-intuitive or even intellectually absurd on face value” (2003, p.2). They go on to explain, that for Perkins, knowledge may be troublesome for different reasons such as it being ritual, inert, conceptual difficult, alien or tacit.

Perkins (1999) starts with ritual knowledge, which he suggests has “...a routine and rather meaningless character [...] names and dates are often little more than ritual knowledge” (1999, p.8). However inert knowledge, suggests Perkins, “...sits in the mind’s attic, unpacked only when specifically called for by a quiz or a direct prompt but otherwise gathering dust”. Students can fail to relate this knowledge with their world, thus “...students learn concepts in science but make little connection to the world around them” (1999 p.8). For Perkins “...whereas inert knowledge needs more active use, ritual knowledge needs more

meaningfulness (of course, knowledge can be both inert and ritualized)” (1999 p.7).

Perkins states that conceptually difficult knowledge is encountered particularly in mathematics and science. Students have “...a mix of mis-impressions from everyday experience, reasonable but mistaken expectations, [...] the result is often a mix of misunderstandings and ritual knowledge: Students learn the ritual responses to definitional questions and quantitative problems, but their intuitive beliefs and interpretations resurface” (1999, p.9). This highlights that one of the problems for teachers is that they will not be starting with a 'blank canvas' as students arrive in their classrooms with misconceptions which may be difficult to identify. Perkins also suggests there is ‘foreign’ or ‘alien’ knowledge and characterizes this as that which “...comes from a perspective that conflicts with our own. Sometimes the learner does not even recognize the knowledge as foreign” (1999, p.9). These four types of knowledge and troublesome knowledge are summarised in Table 2.2.

Table 2.2: Types of troublesome knowledge (developed from Meyer and Land, 2003)

Type of knowledge	Summary
Ritual knowledge	Routine and meaningless in character.
Inert knowledge	Sit's in the mind's attic – students can fail to relate this knowledge with their world.
Conceptually Difficult knowledge	A mix of mis-impressions from everyday experience, reasonable but mistaken expectations – misconceptions.
Foreign or Alien knowledge	From a perspective that conflicts with our own. Sometimes the learner does not even recognize the knowledge as foreign.
Troublesome knowledge	“Perkins (1999) refers to as troublesome knowledge - knowledge that is 'alien', or counter-intuitive or even intellectually absurd on face value” (Meyer and Land, 2003, p.2).

Meyer and Land (2003) add a further idea that is relevant to the discussion, that of troublesome language, and they relate this to the idea of a shared repertoire within a discipline (Wenger, 1998). For Meyer and Land:

...language itself, as used within any academic discipline, can be another source of conceptual troublesomeness. Specific discourses have developed within disciplines to represent (and simultaneously privilege) particular understandings and ways of seeing and thinking. [...] The discursive practices of a given community may render previously 'familiar' concepts strange and subsequently conceptually difficult. (2003, p.11)

The concepts of troublesome language and alien knowledge highlight one of the problems for this study, that is the translation and representation of knowledge from the theoretical language of the academic researchers to the practical language of the teacher. Knowledge has to be literally translated from the language of the researcher to the language of the practitioner.

One concept that may be useful here is that of 'teachers' craft knowledge' which Galton defines as "...an effective pedagogy requires that educational theory needs to be integrated with teacher's craft knowledge, that is knowledge of what works in practice" (2000, p1). The challenge of supporting or providing representations of evidence, on which teachers can base their practice, is to decide if these categories of knowledge can be used effectively and which types of knowledge will provide the most leverage to support teachers in their practice. To produce a resource that is used by teachers, academic knowledge from researchers will need to be combined with teachers' practical craft knowledge to produce representations that resonate with teachers. The language of the resource will need to resonate with the user not the producer of research.

Although not discussed by Perkins, Meyer and Land add tacit knowledge into their discussion of troublesome knowledge. They explain this as "...that which

remains mainly personal and implicit (Polanyi, 1958) at a level of practical consciousness (Giddens, 1984)". Hence knowledge is not just of a single type or a single form but many types and forms of knowledge, including tacit knowledge, have been identified. The following section more fully explores the theme of tacit knowledge as well as explicit and implicit knowledge.

2.4.5 Tacit and explicit knowledge

The previous discussion highlights some of the types of knowledge that have been identified in the context of education, that may be used by teachers, and the complexity of teacher knowledge. Another epistemological dimension is the distinction between tacit knowledge and explicit knowledge. Much of the thinking around tacit knowledge is based on early work by Polanyi (1958, 1966) who stated neatly that "...we know more than we can tell" (Polanyi, 1966, p.4). A classic example of tacit knowledge is riding a bike. Most people can ride a bike but it is very difficult to explain exactly what you are doing while riding it so that another could ride by following your description. Nonaka and Takeuchi highlight the differences in tacit and explicit knowledge in their work on knowledge creating companies. For them:

...tacit knowledge is personal, context-specific, and therefore hard to formalise and communicate. Explicit or 'codified' knowledge, on the other hand, refers to knowledge that transmittable in formal systematic language. (Polanyi, 1966 cited in Nonaka and Takeuchi, 1995, p.59)

Nonaka and Takeuchi further explain that tacit knowledge can be segmented into two dimensions, one a technical dimension which encompasses "...informal hard-to-pin down skills or crafts captured in the term 'know how'...", and second, a cognitive dimension that consists of "...schemata, mental models, beliefs, and perceptions so ingrained we take them for granted" (1995, p.60). Tacit knowledge is very personal and difficult to communicate and share, it includes "...subjective insights, intuitions, and hunches..." also it is "...deeply rooted in an individual's

action and experiences, as well as in the ideals, values or emotions he or she embraces” (1995, p.8). Whereas explicit knowledge can be explained as “...words and numbers, and easily communicated and shared in the form of hard data, scientific formulae, codified procedures and universal principles” (1995, p.8). For this study it can be seen that explicit knowledge is the domain of the researcher producers whereas tacit knowledge is the domain of the researcher users with regard to how they apply that explicit knowledge in their classrooms. If the tacit knowledge of teachers could be captured, online resources for knowledge mobilisation could be greatly improved.

These important distinctions have been elucidated by others. For example Hildreth and Kimble state that tacit knowledge is “...understood without being openly expressed; it is unvoiced and unspoken...” (2002, p.4), and that this type of knowledge is in the mind, “...it is the kind of knowledge that cannot be articulated because it has become internalised in the unconscious mind” (2002, p.4). Whereas for them explicit knowledge is “...that which can be expressed clearly and leaves nothing implied...”, for example, “...knowledge that can be formally expressed and transmitted to others through manuals, specifications, regulations, rules or procedures” (Hildreth and Kimble, 2002, p.4). For Wenger, “...the contrast between explicit and tacit knowledge is quite useful because it is important to recognise the existence of aspects of knowledge that we cannot easily articulate; hence, being able to *tell* and being able to *do* are not equivalent” (1998, p.69). One of difficulties of tacit knowledge is being able to capture it and to then express it as explicit knowledge, see Nonaka and Takeuchi (1995) for classic work on how Japanese companies attempt to do this. This difficulty of expressing tacit knowledge has been noted by researchers in education. Cordingley suggests that teachers are unaware of their own tacit knowledge; “...teachers’ lack of awareness of their existing knowledge...” and they are “...frequently dismissing complex strategies and skills as ‘just common sense’” (Cordingley 2008, p.44). In Hargreaves’ work on the knowledge-creating school, one of his suggested strategies “...involves the changing of tacit knowledge of teachers into explicit

knowledge...” (Hargreaves, 2003 cited in McCormick *et al.*, 2011 p.11) as part of the knowledge-creation process of a school. Other researchers have suggested that the process of reflective inquiry by teachers can be seen as “...tacit knowledge constantly [being] converted into shared knowledge through interaction” (Stoll *et al.*, 2006, p.227).

Table 2.3 highlights the differences between these two types of knowledge (Nonaka and Takeuchi, 1995, p.60). Knowledge of experience tends to be tacit, physical and subjective, created in the 'here and now' in practical contexts. Knowledge of rationality tends to be explicit, metaphysical and objective. Thus explicit knowledge is about past in the 'there and then' (Nonaka and Takeuchi, 1995, p.60). Nonaka and Takeuchi use Bateson (1973) who describes the sharing of tacit knowledge between individuals as an 'analog' process, whereas the sequentially created explicit knowledge is, according to Bateson, a 'digital' process.

Table 2.3: Two types of knowledge (Nonaka and Takeuchi, 1995, p.61)

Tacit knowledge (Subjective)	Explicit knowledge (Objective)
Knowledge of experience (body)	Knowledge of rationality (mind)
Simultaneous knowledge (here and now)	Sequential knowledge (there and then)
Analog knowledge (practice)	Digital knowledge (theory)

Tacit knowledge provides a challenge for evidence-informed practice and knowledge mobilisation in that it remains mainly personal and implicit (Polanyi, 1958) and therefore cannot easily be captured and used as evidence to inform practice. In the context of education, it can be seen that experienced teachers will have a large amount of tacit knowledge about pupils, teaching and their contextual

settings, built up by many years of experience. One caveat is that tacit knowledge is a form of anecdotal evidence with a sample size of one.

A number of the types of knowledge that are available to the teacher have been discussed and some of the ways in which knowledge can be thought about. It is important for this study that knowledge is not thought of in one way and that multiple forms of representation are considered. The types of knowledge that can be presented to practitioners in online pathways and how they are represented will need to be considered as this will have an influence on the design of pathways. This relates directly to research question three.

The following section discusses some of the ways that knowledge can be managed to improve use and access by individuals and organisations. The section looks at the literature on knowledge management, developed in the business sector, to see if it can supply helpful insights.

2.5 Managing knowledge

The managing of knowledge in organisations has become an important subject in recent years, as Castells states, “...knowledge management and information processing are essential to the performance of organisations operating in the informational global economy” (2000, p.165). In business organisations knowledge is being recognised as one of the major assets of the organisation. In this study it was important to consider how knowledge can be captured and presented to practitioners so that knowledge mobilisation in education can be improved.

This section looks at some of the developments in the field of knowledge management in organisations and how the idea of knowledge management has begun to be discussed in the field of education. The following concepts are considered: knowledge management, knowledge transfer and mediation, knowledge mobilisation and knowledge adoption. These are some of the most popular areas in the literature and the most relevant to this study. The role of power and the interplay of knowledge and power is also considered. Youdell's reading of Foucault on power suggests that “...we should [...] take account of power that circulates in the everyday processes and practices of institutions, communities and persons – 'disciplinary power'...” not just in the “...usual conception of power as something that is held by the powerful and wielded over the powerless” (2011, p.25). She quotes Foucault for a fuller definition of power:

Power is everywhere; not because it embraces everything, but because it comes from everywhere... Power is not something that is acquired, seized, or shared, something that one holds on to or allows to slip away; power is exercised from innumerable points, in the interplay of nonegalitarian and mobile relations. (Foucault, 1990, p.93-94 cited in Youdell, 2011, p.25)

2.5.1 Knowledge management

Knowledge management in the business world is concerned with the capture and storage of knowledge. Knowledge that resides within a business, and the use and presentation of that knowledge back to their own employees. It has been recognised that organisations produce or create knowledge (Tiwana, 2000; Davenport and Prusak, 2000). The OECD have highlighted that knowledge management is seriously under-developed in the field of education (OECD, 2000; 2004; 2007). Nonaka and Takeuchi state that “...by organisational knowledge creation we mean that capability of a company as a whole to create new knowledge, disseminate it throughout the organisation and embody it in products, services and systems” (1995, p.viii). This was based on their classic work in Japanese companies. The idea of organisational knowledge management “... is a process of identifying, capturing and leveraging the collective knowledge in an organisation to help the organisation compete” (von Krogh, 1998). Although Sallis and Jones point out that “... the term 'knowledge management' is used to describe everything from the application of new technology to the broader endeavour of harnessing the intellectual capital of an organisation” (2002, p.3). Knowledge management is a relatively new discipline and therefore what it is and how it can be implemented may still be debatable.

One of the major drivers for this is to avoid 're-inventing the wheel' by allowing members of the organisation to be aware of the knowledge that is already resident within their organisation. Thus knowledge management aims to capture what an organisation knows. As a CEO of Hewlett-Packard said “...if HP knew what HP knows, we would be three times as profitable” (Davenport and Prusak, 2000, p.xxi). Sallis and Jones put this more succinctly as “...learning to know what we know” (2002, p.3). Hence organisations are keen to capture and document, or make explicit, what they know, or in essence what their employees know. All too often it is very easy for their employees to walk out of the door with their

knowledge. Davenport and Prusak explain with this example:

Experienced aerospace engineers encouraged to leave during downsizing periods took valuable knowledge out the door with them and in some cases had to be rehired so that essential work could continue. (Davenport and Prusak, 1998, p.xix)

Thus the concept of knowledge management recognises that knowledge is a corporate asset and needs to be treated as one (Davenport and Prusak, 1998, p.12). The act of capturing the knowledge, or the codification of organisational knowledge, puts knowledge into a form that others in the organisation can use for future projects (Davenport and Prusak, 1998, p.68). The codification of knowledge that is already within an organisation is seen as one of the ways in which a company can innovate and develop (Nonaka and Takeuchi, 1995).

Researchers have highlighted that the knowledge management approaches adopted by organisations allowed them to 'capture' knowledge that could be easily codified and technology was used to do this:

Expert systems were created to 'capture' the knowledge of experts. The 'capture' approach continued with an emphasis on 'capturing knowledge' in databases, manuals, books and reports, and then sharing it in a hard form. The emphasis was placed on managing so called 'knowledge assets' that were tangible, and could be structured and codified, such as patents, trademarks and documents. (Hildreth and Kimble, 2002, p.2)

One of the issues with this kind of approach is that it failed to recognise the other types of knowledge within an organisation, "...broadly 'what people know' – which cannot be articulated, abstracted, codified, captured or sorted..." (Hildreth and Kimble, 2002, p.2) or what is termed tacit knowledge, as discussed in section 2.4 above. This remains one of the challenges of the field; making tacit knowledge explicit so that it can be leveraged by all in a company.

In knowledge management the object is to capture, store and then utilise the knowledge that is already within an organisation. In knowledge transfer the object is to transfer knowledge from one group of people to another. If this is within the same organisation then there is a much better chance of achieving this, as at least the employees in the organisation should speak the same vocabulary although this may not always be the case. But this may be more difficult across disciplinary boundaries, and organisations, where researchers and practitioners may not have the same shared repertoire or vocabulary.

Within the field of education there have been attempts to capture and share the knowledge of education. For example the TDA set up and funded the Teacher Training Resource Bank¹⁸ (Leask and White, 2004) and initially funded the Education Evidence Portal now run by the CfBT Education Trust. Other initiatives have included the TLRP's Dspace repository which is an example of a digital repository that was used to capture and share the knowledge of a large research programme (Procter, 2007). Similar digital repositories are used by university education departments to capture the knowledge that they generate. The then DCSF funded Teachers TV which used a different medium *i.e.* not text based, to capture and share knowledge with practitioners. What these various initiatives highlight is the difficulty and lack of a coordination in capturing and sharing knowledge across the broad field of education and that no one organisation has the will or capacity to attempt this. The following section looks at knowledge transfer and knowledge translation.

2.5.2 Knowledge transfer, knowledge translation

The number of terms used for the act of strengthening the link between research and practice show that there is little shared conception of what it is. For example brokering, exchange, management, mobilisation, translation, transfer, utilisation,

¹⁸ This website was closed down and archived in the National Archives in 2010

knowledge to action have all been used¹⁹. The term knowledge translation has been widely used in health and health care research and is concerned with how researchers and practitioners communicate their work (Freeman, 2009, p.429; Greenhalgh and Wieringa, 2011). The World Health Organisation suggested that the translation of knowledge into actions was one of the key contributions of research into health systems (WHO, 2004, p.33). The World Health Organisation defined knowledge translation as “...the synthesis, exchange and application of knowledge by relevant stakeholders to accelerate the benefits of global and local innovation in strengthening health systems and advancing people's health” (2005, p.2). In the field of education the term knowledge transfer is used extensively by the ESRC as part of their way of maximising the impact of their research (ESRC, 2009, p.23). Rather than capturing and storing the knowledge of an organisation, knowledge translation is concerned with how researchers and practitioners communicate their knowledge to others.

Argote and Ingram define knowledge transfer in organizations as “...the process through which one unit (e.g., group, department, or division) is affected by the experience of another” (2000, p.151). They explain this further with:

Although knowledge transfer in organizations involves transfer at the individual level, the problem of knowledge transfer in organizations transcends the individual level to include transfer at higher levels of analysis, such as the group, product line, department, or division. (Argote & Ingram, 2000, p.151)

Freeman's work highlights some of the difficulties of knowledge translation. Freeman explains that translation is like a boundary object (Star, 1989; Star and Griesemer, 1989).

¹⁹ See http://www.oise.utoronto.ca/rspe/KM_Products/Terminology/index.html for a full explanation of these terms. Accessed 12th March 2013.

It is not an object, of course, but a practice and vocabulary within which the nature of research, policy and practice and the relationship between them is being rethought. It is the means by which an array of actors, including international organisations both public and private, governments, sponsors, researchers, policy makers and practitioners, have come to communicate about a problem even in the absence of any fully shared conception of it. (Freeman, 2009, p.441)

Freeman explains one of the difficulties of knowledge translation is that there may not be a fully shared conception of what it is, between all the actors involved in the process. Even within this analysis Freeman states that these "...debates about translation are themselves instances of it" (2009, p.441). Therefore papers, articles discussions about translation are in a sense instances of knowledge translation, from one group of actors to another. The use of a number of terms for the act of knowledge transfer again shows that there is little shared conception of what it is. Davenport and Prusak state that "...a major factor in the success of any knowledge transfer project is the common language of the participants" (1998, p.98). In education the lack of common language between the researchers and the teachers is a problem for knowledge translation (Eraut, 2004). Eraut (2004) explains that there is a distinction between the context of the evidence generators and the context of the evidence users and that this is important:

The process of evidence generation, remains situated within the context, practices and thinking patterns of its creators; while the process of evidence use is situated within the context, practices and thinking patterns of its users. Even when the agent is the same, their pattern of thinking may differ according to their role at the time. (Eraut, 2004, p.91)

Hence this separation may be bridged and usually is by the use of published materials (Eraut, 2004). These published materials could be seen as boundary objects (Star, 1989; Star and Griesemer, 1989), traversing between the evidence generators and the evidence users. The resources generated by this project could be conceptualised as boundary objects and these resources will try to bridge the gap between knowledge generators and practitioners although as highlighted by

Eraut (2004) this is difficult.

Notwithstanding the problems involved, there have been calls for more use of knowledge transfer by educational researchers in the UK (Foley and Hargeaves, 2003; Pollard, 2008; Pollard and Oancea, 2010). Levin highlights that “...the translation or mediation function that links research production to its use is critical and has not been sufficiently studied” (2013, p.21). Thus how knowledge is translated from the world of the research and knowledge production, to the world of the teacher and their use of knowledge in their practice needs more consideration. The work of Brown (2012a, 2012b) on evidence based policy-making discussed later in this section, also gives a number of insights into how this can be achieved.

Davenport and Prusak, (1998, p.97) suggest some of the inhibitors or frictions that can occur in the process of knowledge transfer and some possible solutions in the business field, see Table 2.4. Davenport and Prusak state that there are “...many cultural factors that inhibit knowledge transfer...” they call them “...the inhibitors 'frictions' because they slow or prevent transfer and are likely to erode some of the knowledge as it tries to move through the organisation” (1998, p.96). It is possible that these frictions are also relevant in the field of education as much as they are in the business field.

Table 2.4: The culture of knowledge transfer (Davenport and Prusak, 1998, p.97)

Friction	Possible Solution
Lack of trust	Builds relationships and trust through face-to-face meetings
Different cultures, vocabularies, frame of reference	Create common ground through, education, discussion, publications, teaming, job rotation
Lack of time and meeting places; narrow ideas of productive work	Establish time and places for knowledge transfers: fairs, talk rooms, conference reports
Status and rewards go to knowledge owners	Evaluate performance and provide incentives based on sharing
Lack of absorptive capacity in recipients	Educate employees for flexibility; provide time for learning; hire for openness to ideas
Belief that knowledge is prerogative of particular groups, not-invented-here syndrome	Encourage nonhierarchical approach to knowledge; quality of ideas more important than status of source
Intolerance for mistakes or need for help	Accept and reward creative errors and collaboration; no loss of status from not knowing everything

Problems such as the lack of time and lack of trust between researchers and practitioners have also been mentioned in the education literature (Hammersley, 2001). Equally that there are different cultures, vocabularies and shared repertoires between groups has also been highlighted (Eraut, 2004; Wenger, 1998). These frictions show that translating knowledge from the contexts and practices of the generators to the contexts and practices of the users is not unproblematic. In this study processes will need to be developed so that knowledge can be translated from one context into another so that the translations constructed are practical and useful to the users.

There have also been a number of critiques of the idea of knowledge translation and these are now considered. Davenport and Prusak state that “...merely making knowledge available is not transfer...” thus for them “...access is necessary but by no means sufficient to ensure that knowledge will be used” (1998, p.101). This point has been made by other researchers who have recognised that “...simply providing knowledge appears to be quite ineffective” (Nutley, Percy-Smith & Solesbury, 2003; Adams, 2009). Practitioners do not just need access to research knowledge, although at one level this would be helpful, they also need to engage with research knowledge .

Levin suggests that many people find out about research findings in many others ways, *i.e.* they are not just presented with research knowledge but find out about it primarily from third parties; “...they hear about them at professional development events or through their professional networks, read about them in professional journals, study them in graduate programs, learn about them at conferences, or are exhorted to use them by entrepreneurs who are promoting particular programs or policies” (2013, p.21). In many ways practitioners are bombarded with new research knowledge (Wiliam, 2007). The job of the practitioner is to engage with research so that they can have a critical opinion of all of the research knowledge available to them. This avalanche of knowledge has also been facilitated by practitioners engagement with the internet. This is another problem for teachers of 'sorting the wheat from the chaff' and the lack of a solid evidence base for education.

Overall this section has shown how knowledge translation is different than knowledge management. In knowledge management the knowledge in an organisation is captured and used by other employees either in different departments or in the future, thus the knowledge that is within a company is regarded as an asset of that company. But knowledge translation is the act of translating knowledge from the forms of knowledge that researchers produce to

forms of knowledge that teachers can use.

Where research knowledge is generated by an entirely different group of people, researchers, than the people expected to utilise that research knowledge, in this case practitioners, it can be seen that the barriers to the use of that knowledge may be great. The online pathways approach used in this study aims to reduce the barriers between the movement of research knowledge from producers to users. Thus the online pathways approach aims to create a common space between the two communities, where it becomes a boundary object able to move between these two communities and able to engage practitioners in both of them.

2.5.3 Knowledge mobilisation

Recent work in the field of education by Levin and his research team in Canada has led to the use of the term 'knowledge mobilisation' (KMb). They regard KMb as an “...attempt to integrate research evidence into policy and practice...” (Levin *et al.*, 2010, p.3) and try to sum up the efforts in different disciplines as “...regardless of the term, the underlying spirit of these movements in health, criminal justice, education and the private sector is the same – attempting to harness the benefits of research for organisational change and system improvement” (Cooper and Levin, 2010, p.351).

In later work Levin uses knowledge mobilisation “...to refer to efforts to understand and strengthen the relationship between research and practice” (2013, p.2). As he notes he is aware of the raft of other terms that are available including ‘dissemination’, ‘knowledge exchange’, ‘knowledge transfer’ and ‘knowledge translation’ but uses mobilisation “...because it indicates that this work requires specific effort, over time, working with others, and involves much more than telling people about research findings” (2013, p.2). For Levin knowledge

mobilisation is a collaborative effort, that takes time. Furthermore “ ...‘mobilization’ captures the interactive, social and gradual nature of the connection between research and practice and makes it clear that this is not a one-way process” (2013, p.2). Thus for Levin, knowledge mobilisation is a collaborative, and social task, that requires a specific effort to do and cannot be achieved without specific effort to do it. It also needs to be a two way process between the researchers and the practitioners.

Others researchers have already recognised that the one way process of “...simply providing knowledge appears to be quite ineffective” (Nutley, Percy-Smith & Solesbury, 2003; Adams, 2009) when trying to change the practices of an individual or organisation. For Levin knowledge mobilisation “...refers to the multiple ways in which stronger connections can be made between research, policy and practice” (2011, p.15). Levin talks about strengthening the link between research and practice. The way he frames his argument suggests he thinks that this is a good thing. That practice should be based on research is a good argument, because if it is not based on research, the question is what should it be based on? Not anecdotal evidence and hearsay; “...who would want a policy or practice *not* to be based on evidence?” (Hammersley, 2005, p.86) (emphasis in original). However, as Levin states, there are a number of problems with “...the idea of basing practice on research knowledge [which] hides some serious problems, both conceptual and methodological” (2013, p.6). Levin suggests that conceptually there are differing ideas as to “...what is to count as ‘research’ and what is to count as ‘use’ [...] noting that there is no consensus on either of these key terms” (2013, p.6)²⁰.

²⁰ See Nutley *et al.* (2007) for a further explanation of these terms

Thus there are different ideas as to what counts as research, these include:

- appropriate methodologies
- the quantity of evidence required to come to any conclusion
- the role of local or practitioner research vis-a-vis expert knowledge
- degree to which any research can be separated from the situation and views of the persons doing the work

(Levin, 2013, p.6)

Levin suggests that the “...disputes over methodologies, [...] can take on an ideological cast so that a preference for quantitative or qualitative research becomes a political position rather than a methodological one” (Levin, 2013, p.6). This has been debated in the literature with regard to systematic reviews, (see section 3.2.1 above) as to which methods of research produce the best research on which to base practice. One complication with this is that different methods are designed to answer different questions. One method will never be enough to answer all the questions that can be developed, thus there are both conceptual and methodological problems in the use of research evidence that need to be confronted. For this study it will be important to consider which knowledge should be used to construct online pathways and how knowledge can be synthesised across a number of studies.

Walter *et al.* cited in Levin (2013, p.6) shows that “...a key distinction can, however, usefully be made between ‘conceptual’ use, which brings about changes in knowledge, awareness, understanding and perceptions; and ‘instrumental’, or direct use, which results in actual changes in policy or practice” (2005, p.340). Hence is knowledge 'conceptual' and can therefore be used to change the awareness, understanding, and perception of a practitioner, allowing them to be more critical, and more reflective of their own practices. Practitioners can then use

this 'conceptual' knowledge to inform or change their current practice. Alternatively is knowledge 'instrumental' and therefore has a direct effect on practice, so that practitioners use knowledge without questioning or being critically reflective. Other researchers have called these the 'enlightenment' and 'engineering' models of knowledge (Hammersley, 2002, p.38).

Levin's review shows that there are conceptual and methodological issues that need to be considered when promoting the use of research knowledge on which to base practice. There are also conceptual and instrumental distinctions for how that knowledge is used which need to be considered. But as he states:

...a degree of skepticism does not invalidate the idea that research evidence should be more important in education practice; rather, it draws attention to important questions about what evidence is to count, and how evidence is to inform practice. One can support the greater use of research evidence, for example, while still holding the view that tacit professional knowledge is also important. (Levin, 2013, p.8)

This final point highlights that even if it is difficult to base practice on evidence it is worth trying but researchers need to be questioning what evidence is and how it should be used. Equally the experience, judgement and tacit professional knowledge of the practitioner is still important in this process. As Levin states "...professionals are always making judgments about which research to apply, in what way, under what circumstances" (Levin, 2013, p.8). This discussion highlights that knowledge that is generated from research still needs to be interpreted by practitioners so that it can be used with their pupils in their context. This judgement of the professional cannot be overlooked. One test for the online pathways resources developed in this study is to provide access to research knowledge so that practitioners can improved their practice, but this knowledge does not over-rule their judgement about how they apply it to their own contextualised settings. The following section considers more what counts as evidence for policy making and who decides what evidence should be or what

counts as evidence.

2.5.4 Knowledge adoption

In Brown's recent work on the use of knowledge by policy-makers (2012a) he identifies a number of models of what he calls 'knowledge adoption' (KA) to depict "...the process, in all its complexity, of policy makers digesting, accepting, and then 'taking on board' research findings, noting their relevance, benefits or future potential" (Brown, 2012a, p.91). These models are developed from a systematic review of 228 research papers (Brown, 2011), see Table 2.5.

There are "...a number of models currently in existence which seek to explain the process of KA" (Brown, 2012a, p.92). These models move beyond the ideas of knowledge management and knowledge transfer and show some of the ways in which knowledge adoption have been tried. What these models highlight is that there is no one theory of KA which can be used to influence policy-makers or practitioners in the use of research knowledge. As Brown states these models "...omit to differentiate between instrumental and conceptual uses of knowledge" (2012a, p.92).

Table 2.5: Models of knowledge adoption for policy makers (Brown, 2012a)

Model	Method	References
Demand pull.	One-way transfers or pushes of knowledge from researchers to policy-makers.	Weiss, 1979; Yin and Moore, 1988; Rich, 1991)
Producer push.	Active efforts on the part of the researcher to inform decision-making.	Lavis, Robertson, Woodside, McLeod & Abelson, 2003.
Enlightenment.	Percolation of evidence into the policy-making domain causing policy-makers to think differently.	Weiss, 1998.
Two communities.	A cultural gap exists between policy-makers and practitioners, and academic. A lack of understanding exists between these 'two communities', leading to low levels of communication.	Amara, Ouimet & Landry, 2004.
Interaction/ communication and feedback.	Research findings are interpreted therefore a dynamic, two way process is needed.	Dunn, 1980; Yin and Moore, 1988; Nyden and Wiewel, 1992; Oh, 1997; Nutley, Davies, & Walter, 2002; Amara <i>et al.</i> , 2004.
Linkage and exchange.	Research findings are interpreted therefore a dynamic, two way process is needed.	Lavis, Lomas, Hamid & Sewankambo, 2006.
Organisational interests.	The size of organisations, their structures, the nature of their responsibilities and their needs may affect the propensity of professionals working within them to adopt and utilise or under-utilise research.	Amara <i>et al.</i> , 2004.
Engineering.	Effective adoption of research depends on the characteristics of the research findings.	Amara <i>et al.</i> , 2004.

2.5.5 Power and knowledge

Brown's work highlights how research is used by policy makers and the ways in which researchers can influence policy with their work, thus "...they [researchers] will need to ensure that their research studies, topics, and narratives are compatible with the current dominant political ideology and/or ideas that are currently privileged, or risk their work being excluded from the policy development process" (Brown, 2012b, p.59). This has also been highlighted by Ungerleider (2012). Brown explains how research studies developed by academics need to be aligned to the "...current dominant political agenda and/or ideas" if they are to be privileged, if not their work will be excluded. This shows that power resides in the relationship, what Foucault has called a 'regime of truth' (1980).

Hence Brown's work shows how power has an influence as to what should be or should not be, regarded as knowledge. He states "Foucault (1980) observes that the dissemination of discourse as part of the 'will to knowledge' represents a form of control over what may be seen or perceived as true" (Brown, 2012b, p.61). Foucault's idea of discourse is one of the ways that power has control over what knowledge is perceived to be true or an accepted form of truth.

Foucault's definition of discourse has been very well summarised by Lessa as "...systems of thoughts composed of ideas, attitudes, courses of action, beliefs and practices that systematically construct the subjects and the worlds of which they speak" (2006, p.285). For Foucault "...it is in discourse that power and knowledge are joined together" (1990, p.100). Youdell further explains that "...discourses are shifting systems of knowledge with varied and potential porous statuses ranging from what is taken as self-evident and valorized – a 'regime of truth' – through to what is unspeakable or ridiculed – 'disavowed' or 'subjugated' knowledge" (Foucault, 1990, p.93-4) cited in (Youdell, 2011, p.25). Thus discourses "...have the potential to produce and regulate the world in their own terms as if they were

true” (Youdell, 2011, p.25). Youdell uses the notion of discourse as a “...lens for understanding how education comes to be understood [...] for understanding the way that particular knowledges are propagated and circulate in education policy as well as in the daily activities of educational institutions and for conceiving of how these discourses are unsettled as subjugated discourses are constantly deployed in practice” (2011, p.26).

Brown and Youdell's work show that power can have control over what knowledge is to be propagated and circulated and what knowledge may be subjugated. Power has control over the discourse and therefore what knowledge is perceived to be true. Hence with power over the discourse, one is able to set the research agenda, the practices and methods that may be favoured to gather that research, the types of questions that can be asked, the types of data that should be privileged and thus the types of knowledge that are likely to be found and how that knowledge should be interpreted and used (see Boden, 2006)²¹. The discourse “...systematically construct[s] the subjects and the worlds of which they speak” (Lessa, 2006, p.285). As Youdell states “...distinct from the more common postulation that knowledge is the key to power that exists outside of objective knowledge, Foucault's formulation signals the way that productive power constitutes particular regimes of knowledge at the same time these regimes of knowledge are deployed in the exercise of productive power” (2011, p.26).

Brown's work highlights that there are differences in the ways in which policy-makers and practitioners use knowledge. In one case it is to deal with a policy decision of the moment, by a policy maker who may not be an expert in that field. In the other case, for the practitioner, an expert, it is to change practices, internalise knowledge, build new knowledge and challenge the thinking, values and beliefs of their current practices. Thus there is a difference between accepting a new piece of knowledge and making a policy decision based on that knowledge

²¹ See Boden's work on neoliberalism and the control of the means of production of knowledge.

and then moving onto the next policy decision and considering different evidence for different decisions. As opposed to changing practices that are based on experience and tacit knowledge which is built up over a number of years and challenging the current practices, beliefs and professional values behind their use. New knowledge has to be internalised by the practitioner into their professional knowledge base, and thus change the practices, processes and routines in the light of this new knowledge.

One thing that Brown does not consider is how new knowledge fits in with old knowledge and experience, in his work on policy makers. The next section considers this. Also Brown's work does not consider any models of learning so if a practitioner was presented with new evidence that needs to be internalised into part of their professional knowledge repertoire, they need to learn how to use this new knowledge and build new practices based on it, individually, collaboratively and sometimes as an entire organisation.

2.6 Teacher's use of research knowledge

Following on from the UK critiques of educational research in the 1990s and debates surrounding the use of evidence-informed practice in education, the use of systematic reviews and how they may effect the research agenda, plus the types of knowledge that are available to practitioners and how that knowledge can be managed, this section looks more specifically at practitioners' use of research as a basis for their practice and some of the issues that have been identified. Should research be viewed as a 'what works' mechanistic model of knowledge that addresses specific classroom problems, or viewed as instrumental, what could be called an engineering model (Hammersley, 2002, p.38)? Equally is research able to influence and inspire practitioners to look again at their practice in relation to knowledge and to be more reflective of their own current practice, thus a more conceptual use of knowledge, what has be called an enlightenment model (Hammersley, 2002, p.38). The barriers teachers may have for not using research are considered, followed by some of the reasons for this and some strategies to facilitate teachers using more research in their practice.

2.6.1 Barriers to teacher's use of research

There are a number of barriers to practitioner's use of research that have been identified by researchers in the literature (Bransford *et al.*, 2009; Estabrooks *et al.*, 2003; Mitton *et al.*, 2007; Nutley *et al.*, 2007). These barriers have been well summed up by Levin *et al.* and are in two categories. Firstly the problems with research. These are “...inaccessibility, inconsistent results, lack of synthesis across multiple studies, or failure to be clear about practice implications” (2010, p.5). Secondly there are problems with practitioner knowledge such as “...the knowledge and skills of individual practitioners, who may not know enough about research to be able to find current work, to assess the quality of the work, or to understand the meaning in practice of findings expressed in terms of, for example significance level or effect sizes” (2010, p.5). Thus there are problems with the

way research findings are presented to practitioners by researchers, as this may happen through third parties. Also a lack of research skills on the part of the practitioner may mean they are unable to assess, interpret, reflect and be critical of research evidence.

Hemsley-Brown and Sharp (2003) conducted a systemic review of the use of research to improve professional practice and a number of examples from classic studies are highlighted in this section. Castle (1988) found that “...the volume, lack of applicability and ambiguity of research material were barriers to the use of research by teachers”. It was also found that “...making information readily available; enabling teachers to devote time to reading research; use of outside consultants; providing evidence of the benefits of using research; ensuring that research had practical application; and promotion of a collegial atmosphere between researchers and teachers...” were all factors that facilitated the use of research (Castle (1988) cited in Hemsley-Brown and Sharp, 2003, p.454). Another study by Shkedi (1998) of 47 teachers suggested “...that very few teachers turned to research literature to expand professional knowledge, solve problems or to meet the requirements of their job...”, also they did not use research “...because they perceived it to be irrelevant, unhelpful and too theoretical”. Teachers claimed that reasons for not using research included they “...lacked time, did not trust the findings, and could not understand the language or make sense of the statistics” (Shkedi (1998) cited in Hemsley-Brown and Sharp, 2003, p.454).

Everton *et al.* state that “...teachers are more likely to value research if they are able to interpret findings in the context of their own situation,” (2002, p.374). It has also been argued that teachers will only consider research or find it credible if it matches their own personal experience (Zeuli, 1994). Zeuli (1994) also found that “...teachers believed research should exclusively identify strategies and techniques that could have a direct impact on their teaching,” and that teachers judged the merits of research on whether the findings could be translated into

strategies that worked in their classrooms. Zeuli argued that teachers believed that research could have an indirect impact on their teaching: they were concerned with the concepts and claims of research, and that “...teachers needed more sustained opportunities to link their understanding of research to their knowledge of teaching” (Zeuli, 1994 cited in Hemsley-Brown and Sharp, 2003, p.452).

Finally, Borg (2007) highlights two studies (Everton *et al.*, 2002; McNamara, 2002) which suggested that teachers “...acknowledged the potential impact of research on various aspects of teaching...” but in both studies teachers emphasised the “...need for published educational research to be both more accessible as well as more applicable to teachers' work,” (2007, p.732).

It can be seen that there are a large number, and broad range, of barriers that have been identified over time as to why teachers may not consider using or engaging with research. Table 2.6 below is a summary of these barriers and an attempt to categorise them.

The categories attempt to identify what creates the barrier in the link between the evidence generators and the evidence users. This framework will be used to critique the online pathways approach. Thus is the issue with the original research, with the translations that have been generated from original research, with the lack of knowledge of the practitioners or is it a problem of the organisation? It can be seen that any resource for knowledge mobilisation for teachers needs to try to mitigate as many of these issues as possible. Table 2.6 provides a framework against which knowledge mobilisation approaches and resources can be examined to see if it is appropriate for the purpose.

Table 2.6 Barriers to teachers use of research

Description	Category	Reference
Inaccessibility.	Problem with research.	Levin <i>et al.</i> (2010, p.5).
Inconsistent results.	Problem with research.	
Lack of synthesis across multiple studies.	Problem with translation.	
Failure to be clear about practice implication.	Problem with translation.	
Knowledge and skills of individual practitioners.	Practitioner knowledge.	
Unable to assess the quality of the work.	Practitioner knowledge.	
Unable understand the meaning in practice of findings expressed in terms of, for example significance level or effect sizes.	Practitioner knowledge.	
Lack of applicability.	Problem with translation.	Castle (1988) cited in Hemsley-Brown and Sharp, 2003 p.454.
Ambiguity of research material.	Problem with research.	
Irrelevant, unhelpful.	Problem with research.	Shkedi (1998) cited in Hemsley-Brown and Sharp, 2003, p.454.
Too theoretical.	Problem with research, problem with translation, practitioner knowledge.	
Lack of time.	Organisational problem.	
Did not trust the findings.	Practitioner knowledge.	
Unable to understand the language.	Practitioner knowledge.	
Unable to make sense of statistics.	Practitioner knowledge.	
Teachers believed research should exclusively identify strategies and techniques that could have a direct impact on their teaching.	Practitioner knowledge.	Zeuli, (1994) cited in Hemsley-Brown and Sharp, 2003,p.452.

2.6.2 Teachers, colleagues, and research

A number of authors state that teachers use their own experiences, tacit knowledge and the knowledge of their colleagues before using research evidence that may be presented to them. For example, Levin *et al.* highlight that “...many

studies in all fields report that both managers and professionals tend to rely more on their own experience and the views of colleagues than they do on research evidence” (2010, p.5), also see (Dobbins *et al.*, 2007; Maynard, 2007). Cordingley *et al.*, (2004) note that “...personal recommendations from colleagues affected what research was even considered by teachers, let alone whether it was accepted” (cited in Levin *et al.*, 2010, p.5).

This phenomenon has also been observed in Social Network Analysis (SNA) studies on diffusion processes, including doctors prescribing drugs (Valente, 1995). Everton *et al.* in their study on education research and teachers, do not support the view of Cordingley *et al.* (2004) and state that “...other teachers (34%) were less frequently cited as a source of information on research” (2002, p.377). Everton *et al.* further suggest that this leads to “...support to the commonly held belief that staff room conversation is generally social rather than professional” (2002, p.377).

Equally this study uses an online approach, hence teachers' use of technology to access online research knowledge may need to be considered. A number of studies have highlighted that there are many factors influencing teachers' individual use of Information and Communication Technology (ICT) (Baek *et al.*, 2008; Norton *et al.*, 2000). Teachers' organisational factors can also have an influence on their use of technology (Hermans *et al.*, 2008; Higgins and Spitulnik, 2008; Lim and Chai, 2008). Ertmer *et al.* (2006) show that *intrinsic* factors such as, beliefs, confidence and commitment had a stronger influence on teachers' use of technology than *extrinsic* factors such as access to technology, supportive school culture and time. These issues have also been highlighted in Sub-Saharan Africa (Hennessy, Harrison and Wamakote, 2010). Thus the design of online pathways needs to enable teachers' use of research, not create yet another barrier to the use of research.

2.6.3 Organisational culture

Levin *et al.* highlight that organisational practices “...have an important role in affecting the way that people in organisations think and work...” thus it is not just for the individual to change their practices, they suggest that it can be possible to change practices by “...creating organisation support and incentives that give greater prominence to the consideration of research findings and their implication” (Levin *et al.*, 2010, p.7). Other researchers have also raised the point that the “...main barriers to knowledge use in the public sector are not at the level of individual resistance but lie in an institutionalised culture that does not foster learning” (Louis (1996) cited in Hemsley-Brown and Sharp, 2003, p.459). As well as considering how the individual teacher learns, the culture of the organisation in which they work also has to promote and support teacher learning. Belkhodja *et al.* (2007) have identified that the “...research backgrounds of managers as important influences on research take-up, noting how elements are connected to organisational culture and learning” (cited in Levin *et al.*, 2010, p.7). The research backgrounds of the managers of organisations has an influence on how research is used in an organisation and how it is connected the culture of the organisation.

2.6.4 Research experience

Experience of research has been highlighted as leading to a greater proclivity to the use of research and understanding of research, (Saha *et al.*, 1995; Biddle & Saha, 2000). Ratcliffe *et al.* (2004) found that unless educators already had some experience of research they had limited understanding of both the nature of, and the process that may be involved, in research. This has implications on the current debate in England as to how teachers should be trained, whether through university based routes or through school based routes.

Hemsley-Brown and Sharp identified two papers, based on a study of Australian and American headteachers, that showed that the headteachers acknowledged that

they were users of research and that they were able to learn from research, (Saha *et al.*, 1995; Biddle & Saha, 2000). These authors suggest that the headteachers' research knowledge was broad and that "...postgraduate training contributed towards raising a principal's regard for educational research knowledge even though he or she might consider such research to be problematic" (Hemsley-Brown and Sharp, 2003, p.452).

Everton *et al.* (2000) suggested that if research knowledge was to have some kind of influence on classroom practice, then teachers would need to be given more opportunities to conduct and appraise research, and develop skills in these areas. Hammersley has previously asked whether "...teachers are the best judges, given that according to him [Hargreaves, 1996] they have little knowledge of the findings of educational research" (1997, p.149). One solution to giving teachers more experience of research would be to provide them with opportunities and support to engage in postgraduate courses. In Finland all teachers are qualified to Masters level (Aho *et al.*, 2006, p.11) and this may be one of the contributing factors to Finland's high results in international comparison tests such as PISA (OECD, 2010b). In the UK, teachers were given support for engaging in postgraduate Masters courses initially funded from 2007 (DCSF, 2007, p.12) but this was stopped by the new coalition government in 2010. The Secretary of State for Education wrote to the Training and Development Agency for Schools, in a letter dated 6th December 2010, stating that:

The quality of teaching and teachers' professional development are of utmost importance, and I am committed to developing a strong culture of professional development where more teachers acquire postgraduate qualifications like Masters and Doctorates and where teachers are supported to progress further academically and deepen their subject knowledge. However, I also believe that teachers should decide for themselves which Masters level course is the right one for them and that a single Masters degree prescribed by Whitehall is not the right approach. (Gove, 2010b, p.1)

The training of teachers to Masters level would be one way of improving the critical understanding of teachers, allowing them to apply theory to inform practice, (Denby, Price and Swift, 2012, p.110). Although this has been made more difficult by the current government policy outlined above (Gove, 2010b). This section relates to research questions one and two; what research practices do practitioners use and what value they ascribe to them. It also relates to questions four and five; how research knowledge can be presented to practitioners in meaningful ways and what processes do practitioners adopt to use that knowledge in their practice. How teachers learn and theories of learning and how these need to be considered to improve use of evidence are discussed in more depth in the following section.

2.7 Teacher learning

A number of researchers have suggested that teachers' continuing professional development needs to be conceptualised in terms of teacher learning (Cordingley, 2004; McCormick, 2010). As Cordingley states “...evidence-informed practice is, at its heart, a learning process for practitioners which is underpinned by the same pedagogical principles that operate in classroom practice” (2004, p.83). Hence for practitioners, continuing professional development needs to be considerate of how people, in this case teachers, learn. For this study how people learn needs to be considered in the design of a resource that tries to help teachers bridge the gap between theory and practice in their own context-specific settings.

2.7.1 Theories of learning

As McCormick has stated “...seeing [Continuing Professional Development processes] in terms of learning would be a major contribution but, as in all things, a range of perhaps competing theories would make a healthier field” (2010, p.407). Although he continues, “...it would be unhealthy [...] to focus on one theory of learning in relation to teachers” (2010, p.407). This section will review some of the main theories of learning. The names of the main theories of learning vary between the US and the UK and European perspectives, “...in US literature (Greeno *et al.*, 1996; Bredo, 1997; Pellegrino *et al.*, 2001) the three perspectives are often labelled 'behaviorist', 'cognitive' and 'situated', but within the UK [...] the labels 'behaviourist', 'constructivist', and 'socio-cultural' or 'activist' are sometimes preferred...” (James, 2006, p.53), and thus for this discussion the UK labels will be adopted.

2.7.2 Behaviourist theories of learning

One of the earliest theories of learning was behaviourism. James states that “...behaviourist theories emerged strongly in the 1930's and are most popularly

associated with the work of Pavlov, Watson, Skinner and Thorndike” (2006, p.54). In this theory learning is viewed as the conditioned response of an individual to external stimuli, “...rewards and punishments, or at least the withholding of rewards, are powerful ways of forming or extinguishing habits. Praise may be part of such a reward system” (James, 2006, p.54). For behaviourist thinkers learning is seen as the accumulation of skills, the formation of habits, the learner's responses to instructions and the training of learners with extrinsic rewards and punishments.

Although behaviourism may seem dated, and have little consideration for the needs of learners, it can still be seen within the education systems of today. From the media accusations of teachers 'teaching to the test' through to how learning is broken down into small tightly specified components, for example, within the UK's National Vocational Qualifications (NVQ). See Wolf (2011) for a critical review of current vocational education and Hyland (1994) for an early critique of aspects of the NVQ system. How knowledge is presented to learners is an important consideration for this study.

2.7.3 Constructivism, constructivist theories of learning

Constructivist theorists include Piaget, the linguist Chomsky, the computer scientist Simon, and the later work of Bruner, (see Bruner, 1996). In these theories learning “...requires the active engagement of learners and is determined by what goes on in people's heads.” (James, 2006, p.55). As Pollard states “this theory suggests that people learn through an interaction between thinking and experience and through the sequential development of more complex cognitive structures” (2005, p.145). This theory varies from behaviourism in that there is the idea of the active, rather than the passive, learner.

These theorists are “...interesting in 'mind' as a function of 'brain'...” and “...how people construct meaning and make sense of the world” (James, 2006, p.55). One

of the important focuses is on learners' understanding and the use of strategies such as 'problem solving' which "...is seen as the context for knowledge construction" (James, 2006, p.55).

Constructivist ideas can be seen in the education system of the UK through the use of practices such as mental models, classroom dialogue, and open-ended assignments. In these practices the teachers provide learners with opportunities to use concepts and strategies in new situations with the emphasis being on the learners following their own interests. The online pathways approach (see Appendix B) seems to apply constructivist principles, thus teachers will be able to construct meaning and make sense of the research knowledge so that they are able to use it in their own contextual settings.

2.7.4 Socio-cultural theories of learning

Socio-cultural theories of learning also include situated learning and activity theory. One of the most influential theorists has been Vygotsky (1978). His thinking has influenced theorists such as Bruner (1996) and Engestrom (1999). James states that "...other key theorists who regard individual learning as 'situated' in the social environment include Rogoff (1990) and Lave and Wenger (Lave and Wenger, 1991; Wenger, 1998) who draw on anthropological work to characterise learning as 'cognitive apprenticeship' in 'communities of practice'" (2006, p.56). In this theory the notion of the learner moving from novice to expert within a community of practice is central.

In socio-cultural theories, learning is explained as occurring in the interaction between the learner and the social environment. What is important is the idea that learning is mediated through the use of cultural artefacts; these may be physical artefacts such as tools and books but may also be symbolic artefacts such as language. James states "...since language, which is central to our capacity to think, is developed in relationships between people, social relationships are necessary

for, and precede learning (Vygotsky, 1978)” (James, 2006, p.57). In the online pathways approach the pathway becomes an artefact through which learning can be mediated.

2.7.5 Metaphors of learning

Sfard (1998) offers another way of considering learning by “...digging out the metaphors that underlie both our spontaneous everyday conceptions and scientific theorising” (1998, p.4). Sfard proposes looking at the underlying metaphors of learning so that “...by concentrating on the basic metaphors rather than on particular theories of learning I hope to get into a position to elicit some fundamental assumptions underlying both our theorising and our practice as students and teachers” (1998, p.4). Sfard therefore proposes that the two metaphors of learning are the acquisition metaphor (AM) and the participation metaphor (PM). Table 2.7 gives an overview of the differences between the AM and PM positions and how these map onto terms such as learning, student and teacher.

For Sfard the acquisition metaphor “...concepts are understood as basic units of knowledge that can be accumulated, gradually refined and combined to form even richer cognitive structures” (1998, p.5). In this metaphor, phrases such as 'knowledge acquisitions' and 'concept development' are used to “...makes us think about the human mind as a container to be filled with certain materials and about the learner as becoming an owner of these materials” (1998, p.5). Freire has called this the 'banking model' of education in which “...the scope of action allowed to students extends only as far as receiving, filing and storing the deposits” (1970, p.58). In the acquisition metaphor, knowledge is seen as an 'object' or a 'commodity' that one can possess.

Table 2.7: Metaphorical mappings for Acquisition Metaphor and Participation Metaphor (Sfard, 1998, p.7)

Acquisition Metaphor		Participation Metaphor
Individual, enrichment.	Goal of learning.	Community building.
Acquisition of something.	Learning.	Becoming a participant.
Recipient (consumer) (re -) constructor.	Student.	Peripheral participant, apprentice.
Provider, facilitator, mediator.	Teacher.	Expert participant, preserver of practice / discourse.
Property, possession, commodity (individual, public).	Knowledge, concept.	Aspect of practice / discourse / activity.
Having, possessing.	Knowing.	Belonging, participating, communicating.

In the participation metaphor, knowledge is seen as a practice or an activity in which the individual has to participate. Sfard states that in the PM “...learning a subject is now conceived of as a process of becoming a member of a certain community” (1998, p.6). Thus learning is seen as participation in activity and a central process as McCormick *et al.* state “...meaning is created through participating in social activity” (2011, p.43) and they follow this with:

Rather than seeing learning as a process of transfer of knowledge from the knowledgeable to the less knowledgeable, we have engagement in culturally authentic activity. (McCormick *et al.*, 2011, p.43)

The use of the two metaphors of learning allows a consideration of how the online pathways approach could be used by individuals trying to gain more knowledge of a topic, or by groups of teachers participating in using the knowledge that is presented in the resource through a collaborative activity.

2.7.6 Knowledge creation metaphor

More recently researchers have proposed a third metaphor of learning, the knowledge creation metaphor, to take account of the requirements of what they call 'innovative knowledge communities' (Paavola *et al.*, 2004) or a "...conception of learning adequate for a knowledge society" (Paavola and Hakkerainen, 2005, p.535). These researchers analysed the work of Nonaka and Takeuchi (1995), Engeström (1999) and Bereiter (2002) and argue that the AM and PM metaphors are insufficient to account for the requirements of these communities or a knowledge based society. Paavola *et al.* state that "...the knowledge-creation model strongly emphasises that aspect of collective knowledge creation for developing shared objects of activity..." (2004, p.558) and further "...the central aspect of collaborative knowledge advancement is to expand and transform ideas, practices and material and conceptual artefacts" (2004, p.568). Thus for them:

Learning is not conceptualized through processes occurring in individuals' minds, or through processes of participation in social practices. Learning is understood as a collaborative effort directed toward developing some mediated artefacts, broadly defined as including knowledge, ideas, practices, and material or conceptual artefacts. (2004, p.569)

In later work they have called the knowledge creation process, the 'triological' approach, with the process of knowledge acquisition by individual learners being the 'monological' approach, and participation in social interactions being the 'dialogical' approach (Paavola and Hakkerainen, 2005). They call it the 'triological' approach because the emphasis is on "...the way people collaboratively develop mediating artefacts..." (2005, p.539) rather than being about individuals or communities. Thus interaction is through objects of activity and not between people or people and their environment. Paavola and Hakkerainen state that "...triologue means that by using various mediating artefacts (signs, concepts, tools) and mediating processes (such as practices, or the interaction between tacit and explicit knowledge) people are developing common objects of activity (such

as conceptual artefacts, practices, products, *etc.*)” (2005, p.545). Figure 2.3 below shows how these three metaphors of learning relate to each other.

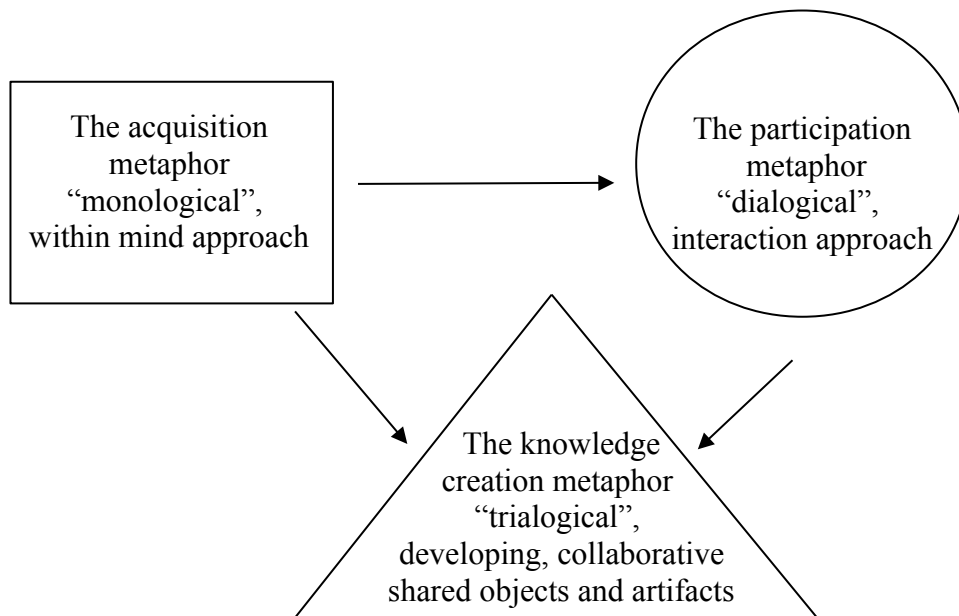


Figure 2.3: Three metaphors of learning (Paavola and Hakkarainen, 2005, p.539)

Table 2.8 shows an attempt by the researcher to map the knowledge creation metaphor onto Sfard's original metaphorical mappings of the AM and PM. This gives some idea of how these three metaphors can be compared across the six categories in Sfard's original work.

Table 2.8: The knowledge creation metaphor mapped on Sfard's Acquisition Metaphor and Participation Metaphor mapping (1998)

	Acquisition Metaphor (AM)	Participation Metaphor (PM)	Knowledge Creation Metaphor
Goal of learning.	Individual, enrichment.	Community building.	New knowledge, knowledge creation.
Learning.	Acquisition of something.	Becoming a participant.	Creating social structures and collaborative processes that support knowledge advancement (2005, p.539).
Student.	Recipient (consumer) (re -) constructor.	Peripheral participant, apprentice.	individual embedded in a community, student autonomy and self-regulation rather than external regulation (2005, p.551) – prospective builder or creator of knowledge (2005, p.554).
Teacher.	Provider, facilitator, mediator.	Expert participant, preserver of practice / discourse.	Questioner, critique, facilitator of “creative chaos” (2005, p.551).
Knowledge, concept.	Property, possession, commodity (individual, public).	Aspect of practice / discourse / activity.	Knowledge embedded in mediating artefacts and skills and practices is emphasised (2005, p.547).
Knowing.	Having, possessing.	Belonging, participating, communicating.	Knowledge creation is a social process (2004, p.564).

Developed from Sfard, (1998, p.7); Paavola, Lipponen and Hakkarainen (2004); Paavola and Hakkerainen (2005)

This idea of people collaborating by using mediating artefacts and mediating processes to develop artefacts and practices may be a useful way to consider both

teacher's professional development and how research knowledge, generated by researchers, can be translated for teacher's professional development. Thus the use of researchers explicit knowledge generated from their research, and teacher's tacit knowledge generated from their practice will produce translations that will be research based but also informed by the tacit knowledge of a professional practitioner. In Hargreaves' work on the knowledge-creating school one of his suggested strategies "...involves the changing of tacit knowledge of teachers into explicit knowledge" (Hargreaves, 2003 cited in McCormick *et al.*, 2011 p.11).

The knowledge creation metaphor provides a way to consider how teachers working together, creating knowledge from their own research enquiries, will be able to construct their own online pathways, as a way of improving knowledge mobilisation for other teachers. Hence in a 'knowledge creating school' (Hargreaves, 1999), teachers will use the knowledge creation metaphor as a template for generating their own online pathways about the research enquires in which they have been engaged.

This section has shown the importance of considering how teachers learn and how the knowledge metaphor of learning could be conceived as a way for teachers to develop online pathways. Teachers continuing professional development is considered in the next section.

2.8 Continuing professional development

Continuing Professional Development (CPD) for teachers, sometimes called In Service Training (INSET), is discussed in this section. Teacher's Continuing Professional Development (CPD) is concerned with the ongoing development of teachers throughout their professional careers. Teachers need to continue to develop professionally so that they can be up to date with their content knowledge and their pedagogic knowledge and thus not only have to rely on the knowledge that they gained in their initial teacher training courses. Opfer and Pedder state that “...teachers’ continuing professional development has become a major focus within the school reform and school improvement literatures because of the belief that student learning and success are due, in large part, to the effectiveness of teachers (OECD, 2009)” (2011, p.3). Thus if the learning outcomes of pupils is to be improved then as Opfer and Pedder suggest “...then one pathway for doing so is the provision of more effective professional learning activities for teachers in schools; where ‘effective’ activities result in positive change for teachers and their pupils” (2011, p.3).

McCormick suggests that for him “...there is a problem with the conceptualisation of teacher learning, which for me is at the root of CPD” (2010, p.400). As McCormick goes on to state “...unfortunately there is no simple overarching theory that would enable us easily to understand the process of creating and sharing teacher knowledge” (2010, p.402). This lack of a theory of the process of creating and sharing teacher knowledge highlights one of the difficulties for knowledge mobilisation. As pointed out in previous sections it is difficult to transfer knowledge created by researchers to teachers but equally it is difficult to know how teachers are creating and sharing knowledge. For McCormick there are two options, firstly more research into what is happening in school-based CPD and secondly, CPD needs to be theorised more with regard to CPD processes (2010, p.407). Thus considering knowledge mobilisation may be useful for how to

develop a coherent theory of teacher learning, including teachers' values and beliefs, and continuing professional development processes. All of these will need to be taken into consideration if knowledge mobilisation is to be improved in the field of education.

2.8.1 Forms of continuing professional development

Opfer and Pedder in their comprehensive review of CPD, state that the forms of CPD that are most associated with effectiveness and impact include:

- enquiry (Arthur *et al.*, 2006; MacBeath *et al.*, 2007);
- collaboration (Warwick *et al.*, 2004; Cordingley *et al.*, 2005a, 2005b; Arthur *et al.*, 2006; Makopoulou and Armour 2006; McNicholl and Noone 2007);
- coaching and mentoring (Harrison *et al.*, 2005; Hobson *et al.*, 2007; CUREE 2008);
- observation (Boyle *et al.*, 2004; Cordingley *et al.*, 2005b; Pedder *et al.*, 2005; Dymoke and Harrison 2006; Hodgkinson 2006); and
- networks (Hakkarainen *et al.*, 2004; Veugelers and O'Hair 2005; McGregor *et al.*, 2006; McCormick *et al.*, 2007; CUREE 2008).

(Opfer and Pedder, 2010, p.455)

These forms of CPD have been associated with having a positive influence on teachers' practices. It can be seen from this list all except one of these forms, enquiry, are collaborative endeavours. Thus the social aspect of teachers' learning and CPD is highlighted. To some extent it could be argued that enquiry may be a collaborative enterprise when conducted in groups of teachers, or as a

collaborative construction of new knowledge between the teacher and their supervisor. As McCormick *et al.* state in other work “...some of these activities are central to the collaboration that forms the strongest strand in professional development and learning” (2010 p.3). This idea of teachers working in collaboration has been shown to be effective in terms of student outcomes by Cordingley *et al.* (2005a; 2005b)

Along with forms of CPD, Ofper and Pedder highlight that organisational conditions are also important to fostering high quality CPD thus, “...Pedder (2006) and Pedder and MacBeath (2008) identified clarity of direction, school-wide systems of support for CPD, promotion of networking, and social capital resources of trust and mutual support” (2011, p.5). Thus forms of CPD and organisational conditions can be taken into account when providing high quality CPD. CPD needs to be collaborative and to be supported by the organisation, in this case schools.

For this study it may be important to consider how the resource can be used in conjunction with continuing professional development programmes in schools. It cannot be assumed that the online resource such as this will only be used by individuals and thus how the resource can be used in collaborative ways have to be considered. This relates directly to research question five looking at how teachers will use the resource.

2.9 Summary

This literature review covered a range of themes that are directly relevant to this study. Initially the historical context in which the study was located was covered, this was then followed by a number of themes, a summary of which is discussed below.

The debates around what evidence is, how it should be generated and how it can be used were discussed. It was shown that debates in each of these topics are still highly contested and that there is no simple link between why and how evidence is generated and how it should be used by professionals. These debates also show that new resources need to be developed to attempt to tackle these areas.

The types of professional knowledge that have been previously theorised by researchers in education and that are used by practitioners were discussed. This area was particularly important for this study as it gave insights into how knowledge could be represented to practitioners: different types of knowledge need to be represented in different ways.

Knowledge management is mainly used in business to capture the knowledge of organisations so that it can be reused by that organisation. In the so called knowledge society, where more work is solely knowledge based, this is even more important for firms. Therefore knowledge needs to be captured, stored, mapped and then made retrievable, to produce an overall knowledge base for a firm. What can the field of education learn from the knowledge management field? How can knowledge be captured, stored, mapped and made easily retrievable across the diverse range of educational institutions? Further to this theme is how knowledge is adopted into practice. This is an important idea for education, although the focus of Brown's (2011) study may have been knowledge adoption by policy

makers, the model of how knowledge is represented to groups of people and the models that are used are important.

Teachers use of research was also discussed and many of the barriers to the uptake of research by teachers and the teaching profession were considered. Once it is known what the barriers are then the challenge is to design resources, systems, practices and processes that move past these problems and allow teachers to engage with research in a way that lets them be reflective of their own practices. Again teachers' professional judgement will always have to be considered, thus it is in the dynamic situations of classroom practice, that the skill, judgement and knowledge of the teacher will come into play.

Theories of learning were discussed, and need to be considered when designing resources for teachers' professional development. Thus how teachers learn and use new knowledge so that they can develop their practices either individually or collaboratively as curriculum groups, departments or year groups. Equally the metaphors of learning were discussed, and this provides another lens into teachers' professional development. These metaphors allow the discussion to move beyond acquisition and participation and allow knowledge creation to be considered as a metaphor of learning.

Teachers' CPD was considered as this may be the way in which an online pathways resource is used. It may be used by individuals struggling with thinking about changing their practices, or by collaborative groups of teachers in CPD situations. These issues will need to be considered in the design and development of the resource.

All of these areas and topics are useful in thinking about how online resources can be designed, developed and deployed to support knowledge mobilisation in the

field of education with a specific drive to support teachers in the development of their practice and hence improve the learning outcomes of their pupils.

This review shows that teachers use of evidence to inform their practice is not a simple process of knowledge moving from evidence generator to evidence user. A number of barriers can affect this process. The following chapter discusses the methods used in this study to explore this issue, highlighting the research practices currently used by practitioners and the value they ascribe to these practices. The methods used to explore teacher opinions of the online pathways approach are also discussed.

3.0 Methodology

The aim of this chapter is to consider the methodology and the methods that have been used in this study and to explain the underlying rationale for these choices. How these chosen methods were operationalised in the course of the study to gather the data needed is also discussed.

The focus of this study is practitioners' use of research and developing an approach to provide them with research-based knowledge which they can apply to their practice. The choice of research design was shaped by the need to gather data on practitioners' current use of research, underlying explanations of how and why they use research, their views, and opinions on how an approach can be developed to support them in their work. The rationale for this design and the methods employed is described, based on a coherent understanding of the ontological, epistemological and axiological assumptions. The design of the research tools and their deployment in pilots is discussed. At the end of the chapter matters of ethics, reliability, validity, bias and any limitations of this study are considered.

3.1 Research perspectives and design

A researcher's perspectives are informed by their view of, and their understanding of, the world. In this study it was important to consider the underlying assumptions of the researcher.

Hitchcock and Hughes summarise this:

...our ontological assumptions (about the nature of reality and the nature of things) give rise to epistemological assumptions (ways of researching and enquiring into the nature of reality and the nature of things): these in turn give rise to methodological considerations and these in turn give rise to issues of instrumentation and data collection. (1995, p.21 cited in Cohen *et al.*, 2011, p.3)

The following sections explain the ontological and epistemological positions adopted in this study and how they influence the instruments that were selected to collect the data and answer the research questions.

3.1.1 Ontological position

Ontology is the study of being, existence or reality. “It is concerned with 'what is', with the nature of existence, with the structure of reality” (Crotty, 1998, p.10). It is important to consider the nature of reality if one is to do research into social phenomena. There are a number of ways of looking at the world, or a number of different conceptions of social reality.

Crotty states that “...in the Middle Ages, the great ontological debate was between the realists and the nominalists and concerned extramental reality, or irreality, of universals” (1998, p.11). Universals in metaphysics are the characteristic or

qualities of a thing. The question is do these universals, or these properties of a thing exist? Cohen *et al.* explain this as “...social reality external to individuals – imposing itself on their consciousness from without – or is it the product of individual consciousness”? They sum this up with “...is reality of an objective nature, or the result of individual cognition” (2000, p.6)? These two main positions are known as realism and nominalism respectively.

Nominalism is the view “...that objects of thought are merely words and that there is no independently accessible thing constituting the meaning of a word” (Cohen, *et al.*, 2000, p.6). Whereas realism “...contends that objects have an independent existence and are not dependent for it on the knower” (Cohen, *et al.*, 2000, p.6). Crotty further contends that “...realism (an ontological notion asserting that realities exist outside of the mind) is often taken to imply objectivism (an epistemological notion asserting that meaning exists in objects independently of any consciousness)” (1998, p.10). This shows that it is important to know the difference between ontological concepts (the study of being) and epistemological concepts (the study of knowledge and understanding). Crotty moves on from realists and nominalists and states that “...in more recent centuries, the major ontological debate has been between the realists and the idealists” (1998, p.11). Idealists assert that reality is fundamentally mental, or mentally constructed.

This project explores how social actors, education practitioners in this case, use and interact with the world. Thus the ontological position of nominalism is a more useful set of assumptions on which to base this study, as education is not an object that has an independent existence, education is something that has been constructed.

3.1.2 Scientific and naturalistic epistemologies

In contrast to ontology, epistemology is "...the nature of knowledge, its possibility, scope and general basis" (Hamlyn, 1995, p.242). In this section the different epistemological approaches to research are discussed. For Maynard, "...epistemology is concerned with providing a philosophical grounding for deciding what kinds of knowledge are possible and how can we ensure that they are both adequate and legitimate" (1994, p.10). Thus the nature of knowledge, how a person thinks about knowledge and what they think knowledge is, has an influence on how they are likely to generate or produce new knowledge in their research and the methods and approaches that they may use. One of the central issues for the researcher "...is the question of whether the social world can and should be studied according to the same principles, procedures, and ethos as the natural sciences" (Bryman, 2001, p.11). So should the social world of actors and their actions be treated in the same way as the natural world, and should the same methods and procedures be used to investigate it in the same way?

Cohen *et al.* (2000) refer to these approaches as being scientific, positivist and naturalistic, anti-positivist. For them a scientific, or positivist, approach to this research would mean taking "...science's mechanistic and reductionist view of nature which by definition, excludes notions of choice, freedom, individuality and moral responsibility" (Cohen *et al.*, 2000, p.17). A naturalistic, or anti-positivist, view would be "...that the social world can only be understood from the standpoint of the individuals who are part of the ongoing action being investigated..." and that "...individuals' behaviour can only be understood by the researcher sharing their frame of reference: understanding of individuals' interpretations of the world around them" (Cohen *et al.*, 2000, p.20). This idea is captured by Beck (1979):

While social sciences do not reveal ultimate truth, they do help us to make sense of our world. What the social sciences offer is explanation, clarification and demystification of social forms which man has created around himself. (1979, cited in Cohen *et al.*, 2000, p.20)

Bryman states that the “...two contrasting epistemological positions are those contained within the approaches known as 'positivism' and 'interpretivism’” (2001, p.12). The positivist approach “...advocates the application of the methods of the natural sciences to the study of social reality...” whereas the interpretive or anti-positivism approach is based on “...the view that a strategy is required that respects the differences between people and the objects of the natural science and therefore requires the social scientist to grasp the subjective meaning of social action” (2001, pp.12-13). These approaches, or paradigms, positivism, and interpretivism or anti-positivism, are explained in more detail in the following sections.

Axiology also needs to be considered within a research study. Axiology is the philosophical study of value, or the values and beliefs that we hold, and thus what is deemed valuable to us (Cohen *et al.*, 2011, p.3). In practice this means that the researcher's own values and beliefs have to be considered when one is carrying out a research study. This highlights what we consider to be of value both in how we conduct our research and in our research findings. In the field of education, one may need to consider what the nature and purpose of education is and the nature of individual experience within a system of education. For this study the views and opinions of individual participants are considered of high value, as the design of educational resources for teacher development can be expected to be improved with the participation of practitioners in the development process. Therefore practitioners are regarded as participants throughout this study.

3.1.3 Paradigms of inquiry

Once a position on the nature of existence or reality has been adopted by the researcher, the nature of what is to be considered as knowledge within that reality has to be examined. The researcher's own values and beliefs have to be confronted, and the researcher needs to decide which model or framework they will use to understand reality and how they will use that model or framework to generate new knowledge.

These models or frameworks have been called research paradigms by some researchers. As Baist states “...paradigms are models, perspective or conceptual frameworks that help us to organise our thoughts, beliefs views and practices into a logical whole” (2010, p.14). Mukherji and Albion complement this with, “...paradigms reflect our underpinning assumptions about the nature of knowledge and the best ways of understanding the world around us...” (2010, p.7), and for Cohen *et al.* “...a paradigm is a way of looking at or researching phenomena, a world view, a view of what counts as accepted or correct scientific knowledge or a way of working” (2011, p.5). Kuhn, in his classic work on scientific revolution, explains that “...a paradigm is an accepted model or pattern...” (1962, p.23) for a group of researchers. The three major paradigms of educational research are explained below.

Positivism is a philosophy of science, although Carr and Kemmis point out it is “...not a systemically elaborated doctrine...” rather it is a general philosophical outlook that emerged “...as the most powerful intellectual force in western thought in the second half of the nineteenth century” (1986, p.61). It can be traced back to Auguste Comte (1798-1857), a French writer who introduced the term 'positivist philosophy'. Comte's position leads to a general doctrine of positivism that “...all genuine knowledge is based on sense experience and can only be advanced by means of observation and experiment” (Cohen *et al.*, 2011, p.7). This position

tries to oppose the metaphysical or theological claims that non-sensorily apprehended experience can form valid knowledge, and thus tries to “...liberate thought from dogmatic certainties” (Carr and Kemmis, 1986, p.61).

For positivists there is a presumption that there is “...an objective reality 'out there' waiting to be discovered and that this reality exists independently of whether or not [...] the social researcher has yet discovered its existence” (Denscombe, 2002, p.15). The positivists' role is to make measurements in this reality. They, the positivists, “...are investigating [...] a stable and logical reality, and the purpose of investigation is to determine this and measure it” (Gray, 2009, p.131). Gray further explains that our “...human perception is not a reliable way of determining what this reality is - the researcher needs formal, systematic, 'truth-seeking'...” (2009, p.131) methods and data collection methods. For the positivist these tools are the part of the natural science model of research.

Denscombe states that “...positivism is an approach to social research that seeks to apply the natural science model of research to investigations of social phenomena and explanations of the social world” (2002, p.14). The natural science model of research is generally accepted as characterisations, hypotheses, predictions and experiments. Table 3.1 explains these terms

Table 3.1: Elements of the scientific method (developed from Godfrey-Smith, 2003, p.236)

Characterisations	Observations of the subject of inquiry
Hypotheses.	Theoretical or suggested explanations of the observations that have been made of the subject.
Predictions.	Predictions based on reasoning from the hypotheses.
Experiments.	Carry out tests, if test results contradict the prediction, the hypotheses should be questioned.

Therefore the question is: can the elements of the scientific method be applied to answer questions about social phenomena. Cohen *et al.* state that “...where positivism is less successful, however, is in its application to the study of human behaviour where the immense complexity of human nature and the elusive and intangible quality of social phenomena contrast strikingly with the order and regularity of the natural world” (2011, p.7). The argument against positivism and for interpretivism is that there is no objective reality as such, that can be measured, and therefore the attempts to measure it using a positivist approach will not be successful. For positivists there is an objective reality that can be measured and therefore the elements of the scientific method can be applied to the study of these social phenomena. The methods that are used to do this are generally called quantitative methods. Denscombe states “...the aim is to use tools and techniques that simply measure what exists and which do not impinge on the thing being measured” (2002, p.15). These would include hypothesis testing, surveys, experiments, random control trials, and questionnaires.

For some researchers positivism is 'dead' (Byrne, 1998, p.37) and therefore what is termed post-positivism may be the heir to the positivist tradition. Post-positivists are aware of the criticisms made of positivism and attempt to address them. Riechardt and Rallis state that post-positivists accept that “...the theories, hypotheses, background, knowledge and values of the researcher can influence what is observed” (1994, cited in Robson, 2002, p.27). For Cohen *et al.* post-positivists are arguing for the “continuing existence of an objective reality” but they also adopt “...a pluralist view of multiple, coexisting realities rather than a single reality” (Cohen *et al.*, 2011, p.27). A more in-depth philosophical analysis of post-positivism is beyond the scope of this dissertation.

Anti-positivism, or the opposite of positivism, is also known as a naturalistic approach, constructivism or interpretivism. Denscombe states that “...interpretivism has come to provide an umbrella term for a range of approaches

that reject some of the basic premises of positivism” (2002, p.18). In this view, social reality is something that is constructed and interpreted by people rather than a reality that exists objectively. Thus reality is a social creation, constructed in the minds of the people in it. It only exists through the way people believe in it, relate to it and interpret it (Denscombe, 2002). In the 'interpretive' tradition of social enquiry, there is an ambition “...to replace the scientific notions of explanation, prediction and control with the interpretive notions of understanding, meaning and action” (Carr and Kemmis, 1986, p.83).

Interpretivist researchers do not take for granted, or believe, that there is an external reality waiting to be discovered. Instead they accept that what is “...real arises from the different perceptions of different people, interacting with complex social and physical environments...” (Lambert, 2012, p.19) and therefore “...social reality can only be understood by understanding the subjective meanings of individuals...” (Carr and Kemmis, 1986, p.86). As Cohen *et al.* state “...social science is seen as a subjective rather than objective undertaking as a means of dealing with the direct experience of people in specific contexts” (Cohen *et al.*, 2011, p.15).

Cohen *et al.* (2011, p.17) list a number of features that would distinguish an interpretive approach to enquiry:

- people are deliberate and creative in their actions, they act intentionally and make meanings in and through their activities (Blumer, 1969)
- people actively construct their social worlds – they are not passive 'dolls' of positivism (Becker, 1970; Garfinkel, 1967)
- situations are fluid and changing, events and behaviour evolve over time and are richly affected by context
- a view that the social world should be studied in its natural state, without

the intervention of, or manipulation by, the researcher (Hammersley and Atkinson, 1983)

- there are multiple interpretations of, and perspectives on, single events and situations
- reality is multilayered and complex
- many events are not reducible to simplistic interpretations, hence 'thick descriptors' (Geertz, 1973) representing the complexity of situations are preferable to simplistic ones
- need to examine situations through the eyes of the participants rather than the researcher

This list highlights that interpretivists are interested in the way people make sense of the world and how they create their social world. Interpretivist researchers accept that they are part of the social world that they are investigating, and therefore cannot have a truly objective viewpoint. Therefore explanations that the researchers produce are inevitably influenced by the researchers' own conceptions and expectations of the social world and interpretivist researchers accept that there a number of alternative versions of reality and truth (Denscombe, 2002). The methods and approaches that are used in this paradigm are generally qualitative in nature, and would include methods such as interviews, group discussion, observation, reflective field notes and approaches such as case study, and ethnography.

Critical theory, some times called “...critical educational research...” (Cohen *et al.*, 2011, p.31) or critical approaches (Everitt and Hardicker, 1996) is an emerging paradigm used in educational research. Critical theory regards the two previous “...paradigms of positivism and interpretitism as presenting incomplete accounts of social behaviour by their neglect of the political and ideological contexts of

much educational research” (Cohen *et al.*, 2011, p.31). This paradigm is influenced by the early work of Habermas (1972) and to some extent his predecessors at the Frankfurt School, who were interested in neo-Marxist interdisciplinary social theory.

Critical theory is not just about giving an account of society and behaviour, but to transform and create a society based on equality and democracy. This is not just about understanding situations and phenomena but how they can be changed for the better. Hence critical theory seeks to emancipate the disempowered, redress inequalities and address the “...decline in the capacity of individuals to reflect upon their own situations and change them through their own actions” (Carr and Kemmis, 1986, p.130). Cohen *et al.* state that a “...critical theorist would argue that the positivist and interpretive paradigms are essentially technicist, seeking to understand and render more efficient an existing situation, rather than to question or transform it” (2011, p.32). This study aims to understand and work towards creating a better situation, and will not question the real world situation *per se*, which although useful, would be beyond the scope of this study. Thus this study is not based on the critical theory paradigm.

Table 3.2 attempts to provide a side-by-side overview of these three major paradigms of inquiry that are used in education. The table highlights the differences between the paradigms, but also gives some idea of when different paradigms may be adopted to answer different questions.

Table 3.2: Comparison of the three main paradigms of inquiry (developed from Grix (2001, p.34) and Cohen *et al.*, (2011, p.46))

Positivism	Anti-positivism	Critical Theory
Macro issues.	Micro issues.	Understanding, interrogating, critiquing, transforming actions and interests.
Large samples.	Individuals.	Groups and individuals.
Statistical.	Non-statistical.	Ideology critique, action research, critical ethnography.
Quantitative.	Qualitative.	Ideology critique, participatory.
Large scale research.	Small scale research.	Small scale research.
Theory testing.	Theory generation.	Ideology critique.
Identify general patterns and relationships.	Interpret events of historical and cultural significance.	Interrogating, critiquing and changing the taken for granted.
Generalising from the specific.	Interpreting the specific.	Collectivity.

Mixing methods allows both quantitative and qualitative methods to be used in the same study. However there is a debate emerging regarding whether mixing methods creates its own paradigm. For Layder “...traditionally a gulf is seen to exist between qualitative and quantitative research, with each belonging to distinctively different paradigms...” (1988, cited in Brannen, 1992, p.3) and as Brannen states “...the combining of different methods within a single piece of research raises the question of movement between paradigms at the levels of epistemology and theory ” (1992, p.3). Quantitative and qualitative methods are seen by some to be from two separate and distinct paradigms of inquiry. By combining them it is argued that the researcher is moving from one paradigm to the other, or through the process of mixing them, creating a new paradigm. Cohen *et al.* propose that “...it is perhaps too early to judge whether mixed methods research really constitutes a new paradigm” (2011, p.26).

Brannen states that “...in practice it is unusual, for example, for epistemology or theory to be the sole determinant of method...” (1992, p.3) so although different methods have different epistemological bases, in a practical setting researchers may need to be more pragmatic in their selection of methods. Using a “...pragmatism that yields real answers to real questions, that is useful in the real world” (Cohen, *et al.*, 2011, p.26). Robson claims pragmatism is a philosophical position with “a respectable, mainly American, history going back to the work of Peirce, Williams James and Dewey (Cherryholmes, 1992; Howe, 1988)” (2002, p.43). Thus pragmatism may be the philosophical underpinning for the mixed methods approach although it may be too early to judge. As a researcher may wish to use the methods that are most appropriate to provide data to answer the research questions, without having to justify whether they are a quantitative or qualitative researcher. A mixed methods paradigm based on pragmatism may provide a way for researchers with a broad skill set to justify their approach (Morgan, 2007; Johnson and Onwuegbuzie, 2006). It should be noted that this approach has been questioned by Biesta who maintains that pragmatism cannot be understood as a philosophical position (Biesta, 2010b).

In his work '*The Structure of Scientific Revolutions*' (1962), Kuhn questioned whether objective truth actually existed through considering the concepts of 'normal science', 'revolutionary science' and 'paradigm'. For Kuhn 'normal science' is the day-to-day activities of scientists and central to this is the concept of the paradigm, the theoretical assumptions of that scientific community and the exemplars, or problems that have been solved by them. Thus for Kuhn a paradigm is an entire scientific outlook. When problems and anomalies accumulate with the old paradigm, a period of scientific revolution begins where alternatives are proposed to the existing paradigm and a new paradigm is established. So a scientific revolution is the move from the existing paradigm to a new paradigm and Kuhn, in his book, uses a series of examples to illustrate this.

Kuhn suggests that truth itself is therefore relative to a paradigm. As Okasha states “...Kuhn questioned whether the concept of objective truth actually makes sense at all. The idea that there is a fixed set of facts about the world, independent of any particular paradigm was of dubious coherence he believed. Kuhn suggested a radical alternative: the facts about the world are paradigm-relative, and thus change when paradigms change” (2002, p.84). Therefore what counts as data, or facts, for researchers will depend on which paradigm the researcher accepts or is operating in.

Kuhn also argued that “...the ideal of theory-neutrality is an illusion – data are invariably contaminated by theoretical assumptions” (Okasha, 2020, p.88). Theoretical assumptions contaminate data even before it is collected. The methods and instruments that are used to collect data are already contaminated with these assumptions. For Kuhn the very idea of objective truth is called into question, as Okasha states of his work, “...to be objectively true, our theories or beliefs must correspond to the facts, but the idea of such correspondence makes little sense if the facts themselves are infected by our theories” (2002, p.88). Kuhn's work highlights that researchers need to be aware of the theoretical assumptions of the paradigm that they are working in and that they cannot assume that the data they collect is not effected by the theoretical assumptions of that paradigm. So for researchers, although there may be little they can do to combat this and move towards a more objective truth, Kuhn instills a determination to be aware of what may be a lack of object truth in our work. Therefore if quantitative or qualitative methods are used, researchers need to be aware of the paradigm in which they are working and the implications that has for the truth claims that can be made. The next section explains which methods are used in this study. The rationale of which methods were selected and why they were selected is discussed. The overall research design, and the rationale behind it, is also explained.

3.1.4 Research design

A central aspect of this study is concerned with developing and testing of an online pathways approach so that research knowledge can be easily accessed by practitioners. It was important to know both the use practitioners make of research knowledge, and also the value practitioners place on the use of that knowledge. The study also explores the mediating processes that practitioners employ in order to make use of research knowledge presented in online pathways. Therefore these three areas of interest; what research practices and knowledge do teachers use and value, is the online pathways approach suitable for practitioners, and what are the mediating processes practitioners go through to actually make use of research knowledge presented in online pathways, become the three areas for data collection.

Firstly, data needs to be collected to give some idea of what the current practices of teachers are with regard to access to, and use of, both research knowledge and research practices in schools, *i.e.* how research knowledge is used, whether it is discussed, whether it is used for planning, and how often these activities are taking place? It was also important to reveal the support that teachers get from their schools and Local Authority (L.A.) through the processes, structures and systems that are in place.

Secondly, this study explores the specific opinions and views of practitioners with regard to the online pathways approach. The study also explores the areas of practice for which they see this approach being useful. A third line of enquiry centres on the mediating processes employed by practitioners, either individually or in groups, to use research knowledge to inform their current practices in the classroom. In essence, how would practitioners use the knowledge presented in online pathways in their classroom practices?

In this study these three research questions were considered separately but they are complementary. Thus the conclusions of the study are drawn from the data gathered in answering each of these questions. A number of different methods were employed to gather data in these three areas. The research questions address real world problems that cannot be approached by the use of a single method of data collection.

Previous Masters level training in a broad range of methods has allowed the researcher to consider the best methods to collect the data to answer these questions. This resulted in a mixed methods approach being adopted for this study.

3.1.5 A mixed methods approach

The research designs and methods chosen by researchers in their studies usually follow on from the ontological and epistemological assumptions adopted by the researcher, although “...the connection between research strategy, on the one hand, and epistemological and ontological commitments, on the other it is not deterministic [...] there is a tendency for quantitative and qualitative research to be associated with the epistemological and ontological positions but the connections are not perfect” (Bryman 2004, p.442). One problem with this approach is that the researcher may only be aware of, or open to, or have a belief in, certain designs and methods and will therefore apply these to all problems regardless of the nature of the problem. This has sometimes been called the law of the instrument, or Maslow's hammer, first highlighted by Kaplan (1964) and summed up succinctly by Maslow, “...it is tempting, if the only tool you have is a hammer, to treat everything as if it is a nail” (1966, p.15). Thus researchers need to be aware that if they want to ask interesting questions they must be open to using all methods that are available and not be constrained by techniques that are already available (Maslow, 1964, p.15).

Researchers adopting entrenched positions resulted in the so-called paradigm war (see Gage, 1989 for an historical overview) that raged during the 1980s. Pring states that these were only possible “...where people do not engage philosophically with the logical nature of the questions” (Pring, 2007, p.327). Thus the nature of problems should be considered before designs and methods are selected. Pring further states that “...pages of research textbooks and methodological chapters in research theses - quantitative versus qualitative, positivist versus interpretive - simply do not stand up to scrutiny. Just as there are logically different kinds of truth-claim, so there are logically different kinds of evidence for those claims” (2007, p.327). Pring postulates that Dewey “...would deny the 'epistemological' and 'ontological' apartheid which too often divides the qualitative and quantitative researchers” (2004, p.45).

From one of these methodological chapters Bryman (2004) summarises both the ontological assumptions and epistemological assumptions of the two main research paradigms and how they relate to theory, see Table 3.3.

Table 3.3: The differences between quantitative and qualitative research strategies (Bryman, 2004, p.20)

Orientation	Quantitative	Qualitative
Principle orientation to the role of theory in research.	Deductive; testing theory.	Inductive; generation of theory.
Epistemological orientation.	Natural science model, in particular positivism.	Interpretivism.
Ontological orientation.	Objectivism.	Constructionism.

Table 3.3 shows the underlying positivist and interpretative natures of quantitative and qualitative approaches. Quantitative studies are in the positivist tradition of the

natural science or 'standard' science and are used for theory testing, whereas qualitative studies are in the interpretative tradition, generally used in the social sciences and are used for theory generation. Grix (2001) reiterates the differences between the two paradigms in the Table 3.4.

Table 3.4: Quantitative and qualitative paradigms (Grix, 2001, p.34)

Quantitative	Qualitative
Usually tackles macro issues.	Tends to analyse micro issues.
Employs a deductive research strategy.	Employs an inductive research strategy.
Is argued to be rooted in the positivist tradition.	Is said to be rooted in the interpretative tradition.
Is said to be theory-testing and predictive.	Is said to be theory-generating .
Aims to identify general patterns and relationships.	Aims to interpret events of historical and cultural significance.

Grix's analysis is that quantitative approaches tend to tackle the macro issues in society whereas qualitative approaches may be more suited to the micro issues in society. Quantitative approaches allow for the numerical answers to questions that are set to a representative sample of a large population, although these types of approaches may not be able to give insights as to why a sample gave the answer it did. For more insight into the reasons for a sample's answers qualitative approaches would need to be used. Thus a competition between approaches is not helpful and using different approaches to answer different questions or different parts of the same question maybe a more helpful option.

Although this study is concerned with the perceptions, actions and practices of teachers and is therefore based on more of an interpretivist than positivist tradition, a pragmatic approach to the use of methods has been adopted. Real world, applied, problems require designs and methods that are fit for purpose rather than ones that align to any one epistemological view point. Something Patton calls a “...paradigm of choices...” which “...rejects methodological orthodoxy in favour of methodological appropriateness as a primary criterion for judging methodological quality” (Patton, 1990, p.39). Patton goes on to suggest that both approaches have their strengths and weaknesses and are not mutually exclusive strategies for research, “...both qualitative and quantitative data can be collected in the same study” (1990, p.14).

Other authors have expressed the same sentiment in a number of ways. Hammersley suggests that “...the process of inquiry in sciences is the same whatever method is used, and the retreat into paradigms effectively stultifies that debate and hampers progress” (1992, p.182 cited in Silverman, 2000, p.11) and King *et al.* state “...in reality, this division is to some extent artificial, and the best research usually employs both methods” (1994, p.5). Robson highlights some more practical considerations, including that the use of a single research method may give a “...pretty clear-cut result [that] may delude the investigators into believing that they have found the 'right' answer ” (Robson, 2002, p.370). He suggests that one of the benefits of multiple methods is a reduction in inappropriate certainty. Another benefit for Robson is that one method can be used to augment the results of other methods used, “...the interpretation of statistical analyses may be enhance by qualitative narrative account” (2002, p.371).

Once a mixed method approach has been adopted there are a number of ways that methods can be mixed together. Researchers have proposed a number of strategies and approaches in which different methods can be applied in the same study. Miles and Huberman (1994, p.41) outline four types of design for integrating both

similar suggestions for the ways of mixing methods, in particular see Cresswell (2003) and Patton (2002).

For this study a quantitative survey was followed by interviews, focus groups and a further round of quantitative data collection, thus producing a design that had some resemblance to design four in the Figure 3.1 above.

Later work by Mason (2006), takes a different approach to the mixing of methods. She suggests six strategies for mixing methods together and explains these through the 'logic' of mixing methods. Table 3.5 below shows the 'logics' that she has developed.

This study does not fit into any one of these logics but parallels can be seen between a number of them. This study used the parallel logic so that one approach is not subsumed into the broader strategy of another, and so each strategy has its own logic of design and data collection and analysis. But corroborate logic was also used so that the data and methods would corroborate each other. As Mason states this was a form of triangulation. Although in Mason's opinion both of these logics have limited value, the combination of methods will inform each other, inform the research questions and provide a way that data can be used for triangulation.

Table 3.5: The 'logics' of mixing methods (developed Mason, 2006)

Logic	Explanation	Verdict
Rhetorical logic.	From what ever starting point, the researcher uses the other form of data to embellish their analysis.	Easy to do, low risk.
Parallel logic.	Here one approach is not subsumed with the broad strategy of another. Instead each part of the study or each mini study, has its own logic of design, data generation, analysis and explanation and these run in parallel.	Fairly easy to do, medium risk, but limited benefits, although some interesting potential for exploiting the multiple methods used, especially at a later stage.
Integrative logic.	Here levels or layers of data fit together and are the result of theories or model of integration. Researchers need to be aware that other theories are possible and that research team members can hold differing views beneath a veneer of consensual integrative logic.	Difficult to do, benefits dubious if not done effectively, but can work well if there is a clear and consensual model for integrating data.
Corroborative logic.	Different forms of data and methods are used to corroborate what they are measuring and sometimes to corroborate each other, a version of triangulation.	Difficult, limited benefits, because different methods and approaches rarely corroborate each other straightforwardly.
Multi-dimensional logic.	Different methods and approaches have distinctive strengths and potential which can help understand multi-dimensionality and social complexity.	Very difficult to do, but with significant promise for enhancing social science explanation.
No intrinsic logic.	Mixing methods and data can become possible by accident when existing data sets become available. Opportunistic mixing of methods and approaches is of course not a strategy, and has no intrinsic logic.	Can be difficult to find a logic and put into practice, but can offer good opportunities.

Cohen *et al.* define triangulation as “...the use of two or more methods of data collection in the study of some aspect of human behaviour...”, this is in contrast to the “...more vulnerable single-method approach that characterises so much of research in the social sciences” (2011, p.195). Bryman suggests that the logic of triangulation is that “...the findings from one type of study can be checked against the findings deriving from the other type. The results of a qualitative investigation might be checked against a quantitative study. The aim is generally to enhance the validity of the findings” (Bryman, 1992, p.60). Robson reinforces the use of triangulation in that it “...can help to counter all of the threat to validity” (2002, p.175).

Hence a mixed methods approach allows the researcher more flexibility in gathering data, allows use of all the methods available, and does not rely on entrenched positions to answer the real world questions of this study.

In this study an initial questionnaire was used to gather data on practitioners' current use of research knowledge and research practices and the value that they ascribe to those practices. This questionnaire enabled a large sample to be gathered. The questionnaire was followed up with a number of interviews to provide more depth of understanding and to further illuminate the data obtained in the initial questionnaire. Focus groups and a novel online questionnaire approach were then used to provide data on what practitioners thought of the online pathways approach developed in this study and how they would use it in their practice. Although the use of methods is distinct, all data across all instruments was used to answer the research questions.

3.1.6 Reliability and validity

The terms reliability, validity and bias are all concerned with the quality and rigour of a research study and all need to be addressed. For a good research study reliability and validity of the study should be high, and the bias of a study should

be low. Each of these concepts and the specific ways that this study addresses them are considered in this section.

Reliability is the ability of the research process to provide the same results over a number of occasions, and the results of the research not to vary due to the person undertaking the research (Denscombe, 2002). Reliability is related to the research methods that are used for data collection and the implication that they should be “...consistent and not distort the findings” (Denscombe, 2002, p.100).

As Cohen *et al.* state “...reliability is essentially a synonym for dependability, consistency and replicability over time, over instruments and over groups of respondents” (2011, p.199). For research to be reliable it must be able to be replicated, so if the research was to be carried out again, on a similar group of respondents, in a similar context, similar results would need to be found (Cohen *et al.*, 2011). Reliability is important in research as it shows that differences in results that are observed, are due to what is being measured, and not being effected by deficiencies in the research instrument. This is reiterated by Robson as “...the consistency or stability of a measure; for example if it were to be repeated would the same results be obtained” (2002, p.93). In this study pilots of the instruments were carried out to improve reliability. The pilot phase was used to check that the instruments were measuring what they should be measuring, and that any differences were in the things being measured, and not as a result of any inconsistencies in the research process.

All research, be it quantitative, qualitative or mixed-methods, needs to have validity. If this is not the case, then it is invalid and worthless (Cohen *et al.*, 2011, p.179). Whereas early versions of the concept were concerned with whether an instrument measured what it intended to measure, now many different kinds of validity have been suggested, see Table 3.6. As Hammersley states “...one finds a clear set of definitions but a confusing diversity of ideas” (1987, p.73).

Table 3.6 highlights that there are many different versions of validity, all of which have a place in the context of a research study. What is important for a researcher is to be aware of which types of validity may need to be addressed in the context of their own study.

Table 3.6: Types of validity (developed from Cohen *et al.*, 2011)

Type	Explanations
Catalytic.	Embraces the paradigm of critical theory - strives to ensure that research leads to action, echoing the paradigm of participatory research.
Consequential.	The ways in which research data are used (the consequences of the research) are in keeping with the capability or intentions of the research.
Construct.	Concerns the extent to which a particular measure or instrument for data collection conforms to the theoretical context in which it is located.
Content.	The instrument must show that it fairly and comprehensively covers the domain or items that it purports to cover.
Criterion-related.	Two forms predictive and concurrent - predictive is achieved if the data acquired at the first round of research correlate highly with data acquired at a future data, concurrent validity is when data gathered from one instrument correlates highly with data gathered from using another instrument.
Convergent and discriminant.	Both facets of construct validity - convergent is when factors that should be related to each other are found, by indicators, actually to be related to each other, discriminant (divergent) difference is found where it should be found.
Cross-cultural.	Important to ensure that appropriate models of cross-cultural features and phenomena are developed - i.e. can an instrument developed and tested in one country be used in another culture or country.

Table 3.6: Types of validity (continued)

Type	Explanations
Cultural.	An appreciation of the cultures, participants and circumstances being studied.
Ecological.	It examines and addresses the specific characteristics of a particular situation, for example how policies are implemented in practice (Brock-Utne, 1996).
External.	The degrees to which the results can be generalised to the wider population, cases, settings, times or situations.
Internal.	The findings must describe accurately the phenomena being researched.
Interpretive.	The ability of the research to catch the meaning, interpretations, terms, and intentions of situations and events.
Theoretical.	Is the extent to which the research explains phenomena, akin to construct validity.

Cohen *et al.* highlight that “...researchers need to locate discussions of validity within the research paradigm that is being used” (2011, p.180). Discussions of validity need to take into account which research paradigms are being used in the study. Although they are quick to point out that this “...is not to suggest, however, that research should be paradigm-bound, that is a recipe for stagnation and conservatism” (2011, p.180). Thus researchers should be aware of the research paradigm in which they are operating and the implications for validity that this has. This is a mixed methods study and so the researcher needs to be aware of validity for the quantitative and qualitative research methods that have been used.

The two main forms of validity that will be explained in more detail are internal and external validity, as these are the most relevant to the quantitative and qualitative parts of this research. The internal validity of the study is dependent on

the instruments that have been used, *i.e.* do the instruments used in the study measure what they are supposed to measure and how can their validity be increased. The use of pilots and schedules can increase the internal validity of a study.

The piloting and testing of the questionnaire designs in this study, was an attempt to reduce the unreliability of the instruments and their reactivity to respondents (Vulliamy *et al.*, 1990). In the case of the interview, the ways in which the interview schedule was developed greatly increased the validity of the data. The use of the schedule meant that each respondent was asked the same questions and individual answers could be compared and contrasted across the sample. The richness of the responses given by the interviewees highlights that the questions were timely and of a non-trivial nature.

External validity is the degree to which the findings of a study can be generalised to the population from the sample (Cohen *et al.*, 2011, p.186), thus there are a number of different issues for the qualitative and quantitative parts of the study. In the quantitative part of the study it was useful to know that the sample was representative of the main population, both in terms of the size of the sample obtained and its overall representativeness. In this study the questionnaires were self-completed and there were difficulties in encouraging people to complete the question. One result of this was that different methods of questionnaire delivery were tried to increase the sample size.

For the qualitative parts of the study, researchers refer to the issue of generalising to the wider population as comparability and transferability (Lincoln and Guba, 1985; Eisenhart and Howe, 1992, p.647). It is important in qualitative research to provide in-depth and detailed accounts and descriptions so that others can decide the extent to which findings may be generalisable to another situation (Schofield, 1996, p.2). Lincoln and Guba reinforce Schofield's point noting that researchers

should provide sufficient rich detail so that users can decide whether transferability is possible (1985, p.316). This study explores the views and opinions of a range of educational professionals in schools and therefore whether the findings from this part of the research are comparable and transferable will depend on the quality of the accounts that are produced from the data.

Triangulation, briefly mentioned in the previous section, is originally a navigation term. It is a technique in which two points of reference seen by the observer are used to locate a third point, usually where the observer is. In terms of research it involves researching human behaviour from more than one position. This more generally translates to using two or more methods of data collection to study an aspect of human behaviour, although other types of triangulation are available see Table 3.7 below.

Table 3.7: Types of triangulation, (adapted from Denzin, 1970)

Type of triangulation	Explanation
Time.	Considers the factors of change and process by cross-sectional or longitudinal designs.
Space.	Tries to overcome studies conducted in the same subculture or country, by using cross-cultural techniques.
Combined levels.	Uses multiple levels of analysis, such as the individual, group, organisation.
Theoretical.	Uses competing or alternative theories.
Investigator.	Uses more than one observer.
Methodological.	Uses either the same method on different occasions or different methods on the same object of study.

Triangulation is a powerful way of demonstrating concurrent validity, particularly in qualitative research (Campbell and Fiske, 1959). Methodological triangulation is the one used most frequently (Cohen *et al.*, 2011, p.197) and the one used in this study. This type of triangulation has a number of advantages that can increase the validity of the study. First, a single method can provide a limited view of what is being studied, hence a method can act as a 'filter' through which something is studied, they are never atheoretical or neutral in representing the world being studied (Kuhn, 1962; Smith 1975). However the use of one method may bias a study. Secondly, the use of mixed-methods allows the researcher to move beyond a limited number of methods to use those that are appropriate to gather the data needed to answer the research questions, rather than being limited by a 'method-boundedness' of a field (Cohen *et al.*, 2011, p.196).

There have been a number of critics of triangulation. Silverman (1985) has suggested that triangulation is positivist and that it is presumed to be better than a single data source or method. Other researchers have stated that methodological triangulation does not necessarily increase validity or reduce bias (Fielding and Fielding, 1986), and that methodological triangulation is epistemologically incoherent and empirically empty (Lincoln and Guba, 1985). These critiques show that the researcher needs to demonstrate why they have mixed the methods they have chosen and not just to assume it is sufficient in itself.

3.1.7 Ethical considerations

Ethics is a system of moral principles by which "...individuals can judge their actions as right or wrong, good or bad" (Denscombe, 2002, p.175). It combines the duties and responsibilities of individuals with a broader system of moral principles and rules of conduct for research. For Reynolds "...ethics refers to rules of conduct; typically to conformity, to a code or set of principles" (1979, cited in Robson, 2002, p.65). For educational researchers working in the UK context, the British Educational Research Association (BERA) provides the publication,

'Ethical Guidelines for Educational Research ' (BERA, 2011). This sets out a number of guidelines that need to be considered when carrying out research into the field of education. These include responsibilities to the participants, to sponsors, to the community of educational researchers and to educational professionals, policy makers and the public in general. BERA also provide an up-to-date paper on ethics and educational research by leading academics in the field (Hammersley and Trainou, 2012). This paper outlines five more general principles that need to be considered before carrying out a research study. See Table 3.8.

Table 3.8: Common ethical principles (adapted from Hammersley and Trainou, 2012, p.2)

Principle	Description
Minimising harm.	Is the research strategy likely to cause harm, how serious is it and can it be justified or excused? Consequences could be for the people being studied, the researchers and for people in the future.
Respecting autonomy.	Does the research process show respect for people, and are people allowed to make decisions for themselves notably whether to participate?
Protecting privacy.	What should and should not be made public. Can and should settings and informants be anonymised in research reports.
Offering reciprocity.	Researchers depend upon being allowed access to data, people cooperating by giving up time in order to be interviewed or fill in a questionnaire. What should researchers offer them in return.
Treating people equitably.	Individual and groups who come into contact with the researcher should be treated equally, no-one is unjustly favoured or discriminated against.

Although the principles, outlined above, and the guidelines that are developed from them, may seem obvious there are many examples of studies that highlight the need to have ethical guidelines in research, see for example, the Tuskegee Syphilis Experiment (1932-1972), and the Stanford Prison Experiment (Zimbardo, 1973).

For this study, based on the ideas above, a Code of Practice (Appendix C) and a Informed Consent Form (Appendix D) were developed. The Code of Practice was presented to participants before they took part and informed them of the efforts made by the researcher with regard to privacy, confidentiality and anonymity of their data and their right to withdraw their data from the study. An Informed Consent Form was also developed which, as Hammersley and Trainou state, is “...a common strategy used by researchers to gain informed consent via a consent form which lays out what will be involved in the research, and the rights and responsibilities each side has” (2012, p.7). Again the Informed Consent Form covered consent, withdrawal, anonymity, privacy and confidentiality, and was signed by both the researcher and participants at the start of research interactions.

3.2 Data collection

In this section the rationale for the data collection methods that were used in this study are considered. Methods were chosen following consideration as to how appropriate they would be to the question being posed. This approach allowed for different methods to be considered, rather than being constrained by “...methodological orthodoxy” (Patton, 1990, p.39).

3.2.1 Questionnaires

The questionnaire for this study was designed and deployed to provide knowledge of practitioners' current use of research knowledge in their practices, and also the value that they ascribe to those practices. Questionnaires are one of the most widely used and most useful instruments for collecting survey data (Wilson and McLean, 1994; Cohen *et al.*, 2011). They provide a structured way to collect numerical data, although they can also be used to gather qualitative data. They are able to be administered without the presence of the researcher, they can be administered online and they can be comparatively straightforward to analyse. Questionnaires allow a large amount of routine data to be collected from a large number of respondents who may be geographically distributed across a number of locations (Anderson, 2000, p170; Robson, 2002).

There are many types of design of questionnaires that have been developed but the typical features include:

- the use of fixed, quantitative design;
- the collection of a small amount of data in a standardised form from a relatively large number of individuals;

- the selection of the representative samples of individuals from known populations.

(Robson, 2002, p.230)

The designs of questionnaires can be structured, semi-structured and unstructured. As Cohen *et al.* state “...the larger the size of the sample, the more structured, close and numerical the questionnaire [...] the smaller the size of the sample, the less structured, more open and word-based the questionnaire may be” (2011, p.381). The more numerical the questionnaire the easier it will be to analyse a large data set with tools such as SPSS. The more unstructured the questionnaire the more difficulty there is in analysing the data. One of the considerations when designing a questionnaire is whether the questionnaire items should be based on mainly open or closed type questions (Cohen, *et al.*, 2000). Open questions gives the opportunity for the respondent to provide more detailed answers. However, closed questions produce quantitative data that is easier to deal with and more applicable in providing statistical results. Highly structured, closed questions are useful in that they “...enable comparisons to be made across groups in the sample” (Oppenheim, 1992, p.115).

Questionnaires can be administered in three main ways: self-completion, where the respondents fill in the answers by themselves, face-to face, where an interviewer asks the questions to the respondent and also completes the questionnaire, and telephone interview, where the interviewer contacts the respondent by phone, asks questions and completes the questionnaire (Robson, 2002, p.236). For the purposes of this study the questionnaire was self-completed in order that a large sample could be gathered at minimal cost both financial and in terms of time.

Initial questionnaire development

The object of the initial questionnaire, in this study, was to find out which research practices teachers and their schools use and what value practitioners ascribe to those research practices. The questionnaire items were adapted from, and extend the work of, Levin²² *et al.* (2010). Their work shows the importance of asking about practices rather than attitudes when questioning practitioners about research practices; they suggest this avoids positive response bias in self reporting questionnaires.

The questionnaire designed for this study used a dual Likert (1932) scale format that was developed by Pedder *et al.* (2010). They, in turn, developed their instruments from the work of the Improving School Effectiveness Project (Robertson, *et al.*, 2001; MacBeath and Mortimore, 2001). The questionnaire format allowed research participants' two responses for each questionnaire item, see Figure 3.2 below (see Appendix E for full questionnaire). Firstly, their perception of the extent to which a research practice is being carried out by teachers themselves, or is happening in their school. Secondly, their value of that practice, irrespective of whether they, or their school, are carrying out that practice at this time. This allowed comparisons between how much a practice is used and how much that practice is valued by practitioners. The questionnaire was designed to be completed by both primary and secondary teachers regardless of their specialism.

²² Levin's team is one of the few research groups in the world which focus on knowledge mobilisation, which is the underlying theme of this thesis.

About you				You and research	About your values			
How often is this true for you now?				Question	How important do you think the practice is for enhancing the use of research?			
Never true	Rarely true	Often true	Mostly true		Not at all important	Of limited importance	Important	Crucial
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	1. You engage in research focused discussion with colleagues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

Figure 3.2: Example of a dual scale questionnaire

The questionnaire was divided into four sections, each with a number of items, see Table 3.9 below for the theme of each section:

Table 3.9: Questionnaire sections, items and themes

Section	Items	Theme
Section A.	11	The teacher and research practices.
Section B.	18	The teacher's school and research practices.
Section C.	11	The teacher's Local Authority (LA) and its research practices.
Section D.	7	Background information: gender, school name (optional), years of teaching experience, years at current school, educational phase, post and highest level of education.

The items in sections A, B, and C extend the items used by Levin *et al.* (2010) in their work on the impact and use of research in secondary education in Canada. Section D provided background data that was used to highlight any difference between groups in the main data by cross tabulating against gender, school phase, post, highest level of education and number of years teaching. Section B and C had an extra category on the practice side of 'don't know'. This was added because although teachers would know about the extent to which they were carrying out a

research practice, they may not be aware how much a practice was being carried out in their school or in their Local Authority.

Initial questionnaire pilots

A number of researchers have highlighted the importance of running pilots as a stage in the design of a questionnaire (Oppenheim, 1992; Morrison, 1993; Wilson and McLean, 1994). The running of pilots allows the researcher to check the wording of the questionnaire in practice and implementing the feedback increases the reliability and validity of the instrument (Cohen *et al.*, 2011, p.402). The questionnaire was designed for professional practitioners and hence teachers who were studying part-time postgraduate courses were chosen for the pilot sample. Two university courses were chosen based on the good relationship the researcher had with the course tutors, thus reducing the number of access issues, and the fact these courses had practitioners from a range of educational backgrounds and this was deemed more useful than a subject specific group of practitioners. The pilot was given to three classes of part-time postgraduate students in education. Overall twenty questionnaires were completed by the participants. One questionnaire was incomplete and could not be used, giving nineteen responses in total. Although a small sample this was enough to highlight the initial problems with the instrument. Robson suggests that for an initial pilot “...you should aim for at least twenty” (2002, p.254) respondents.

There a number of adjustments were made as a result of the initial pilot. Firstly, the time to complete the questionnaire was between 16 and 21 minutes, and this was deemed to be too long. Secondly, there was a very poor completion rate for section C, 'your Local Authority and research'. Either respondents failed to complete this section or answered 'don't know' for all items. On average 1.36 items were missed out from the practices side, and 4.27 items were missed out from the values side. Of the respondents who did complete section C, an average

23.1 per cent responded in the category 'don't know'. From this it can be seen that teachers have very little knowledge of the research practices of their Local Authority, or that they are the wrong sample of people to ask about LA research practices. These two factors, the time to complete and the poor responses in section C, contributed to the decision to remove section C from the next version of the questionnaire.

Analysis of the questionnaire also highlighted there was problem with its length. When each item was entered into the SPSS statistical analysis package, it had two pieces of data; the practice number and the values number. The 47 item questionnaire expanded to 87 pieces of data for each respondent. This was another factor that led to the decision to remove section C. By disregarding section C, the instrument still provided the data it was designed for and it highlighted the high number of value-practice gaps between the extent a practice is used, and the value ascribed to that practice by teachers. Two other broader points were learned from the first pilot. Firstly, respondents who took the questionnaire away to complete were unlikely to return it. Secondly, the questionnaire also needed to be in a format that could be emailed to respondents or alternatively uploaded to a website, as a number of respondents asked if they could complete it online.

After a redrafting of the questionnaire it was piloted for a second time. This time the questionnaire was administered to 56 part-time postgraduate students in education, during one of their evening sessions, by the researcher. The researcher was given five minutes to introduce the work of the study and the purpose of the questionnaire. Of the 56 students in attendance, 22 completed a paper version during the session and another 18 provided their email addresses so they could complete the questionnaire at home, of these 7 returned the questionnaire. The questionnaire was also emailed to a further 21 year two students on another postgraduate course in education, of which only one completed the questionnaire. This produced 30 responses for the second pilot overall. The poor response rate to

the emailed version of the questionnaire may indicate that postgraduate students would now expect a questionnaire to be online rather than through an email with an attachment. The process of opening an email, then opening the attached document, completing the questionnaire, saving the document and emailing it back, may be too much of a barrier for students.

One consequence of using teachers who were postgraduate students, the majority of whom were working in the school sector, was a skew in the results. Within the second pilot sample 80 per cent of respondents were engaged in research related reading, and 86.7 per cent of respondents were studying for a Masters degree. Further feedback on the second pilot questionnaire was gained when a lecturer approached the researcher to use the questionnaire in her seminar on questionnaire design with a Masters class. The seminar discussed and critiqued the questionnaire. The seminar was recorded and the lecturer gave the researcher copies of the recordings. The recorded seminar only highlighted two formatting issues.

The questionnaire again returned the data that was expected. For the analysis, each questionnaire now generated a more manageable 65 items of data. The length of time to complete the questionnaire was cut down to a more reasonable 11 minutes. Through discussions section C question 7 was changed slightly from indicating “Highest level of education” to indicating “Highest level of education (please tick all that you have to date)”, thus showing a participant's educational progress rather than just a snapshot of their educational level now.

Initial questionnaire main sample

The changes highlighted by the second pilot were made and the questionnaire then deployed to the main sample. Three approaches for the deployment of the

questionnaire were used. These were paper based, email with the questionnaire in an attached document, and online²³. The online version was developed using a combination of HTML²⁴ pages and the PERL²⁵ scripting language. The online version was divided into a number of sections to avoid the negative impact from page scrolling (Toepoel *et al.*, 2009). The paper based version (see Appendix E) was given to primary and secondary teachers at a mathematics conference and to a number of colleagues who distributed it in their schools. The questionnaire was also emailed to a number of colleagues. Overall these approaches returned 54 completed questionnaires.

The link to the online questionnaire was posted to the Times Education Supplement (TES) teachers online forum. This returned 102 questionnaires. Of the three approaches, the online questionnaire provided the most responses followed by the paper based version. The version that was emailed as an attached document provided the lowest number of responses. This was also seen in the second pilot and one of the reasons an online version was developed. Although in total 156 responses were received, the use of multiple ways of delivering the questionnaire meant it was difficult to try to calculate an overall response rate for the questionnaire.

The questionnaire was designed so that it could be completed by school staff of any phase, any role and of any subject specialism. This allowed for comparison between groups such as primary and secondary, teacher and department heads, and by highest level of education. As mentioned earlier, two pilots were completed before the main data gathering and these were both completed with postgraduate students (Procter, 2012). The pilots highlighted that the questionnaire was initially too long with too many items. The questionnaire was completed by 156 respondents and these data were loaded into SPSS for analysis.

²³ <http://www.richprocter.co.uk/questionnaire/>

²⁴ Hyper Text Markup Language

²⁵ Practical Extraction and Reporting Language

Although a response rate could not be meaningfully calculated, due to the number of approaches that had been used in deploying the questionnaire, a margin of error based on the size of the sample and size of the population could be calculated. The teacher population in England in 2010 was 448,100 (DfE, 2011) thus with a sample size of $n=156$, the margin of error is 7.84 per cent at 95 per cent confidence. Hence the results of this questionnaire will only be 7.84 per cent different than if the whole teacher population was surveyed. The results of the questionnaire are analysed in section 4.0 below.

3.2.2 Interviews

An interview schedule was developed to provide a greater depth of understanding to the findings that were generated from the initial questionnaire. This allowed participants a chance to provide a range of views, meanings, beliefs and opinions on teachers' use of research practices and their value of them, and how these fitted with their day to day practices and the day to day practices of their schools. Overall interviews offer a way of investigating "...underlying motives in a way that postal and other self-administered questionnaires cannot" (Robson, 2002, p.272).

The interview²⁶ had been conceptualised by Kitwood (1977) as information transfer and collection; as a transaction which will have bias which has to be controlled for; and as an encounter. The interview can be seen as more than just an information transfer and collection process. Authors have argued that the process is not a neutral exchange with one person asking questions and one giving answers (Atkinson and Siverman, 1997; Fontana, 2002; Hertz, 1997; Holstein and Gubrium, 1995; Scheurich, 1995) but that it is an active process that leads to the construction of the interview (Holstein and Gubrium, 1995). This mutually

²⁶This section builds on the extensive review of interviews and interviewing that was carried out for an earlier thesis (Procter, 2009).

created construction, by interviewer and interviewee, and contextually bound story, is the interview (Fontana and Frey, 2005). The interviewer is contextually located and carries unavoidable conscious and unconscious desires and motives (Scheurich, 1995). The "...conventional, positivist view of interviewing vastly underestimates the complexity, uniqueness, and indeterminateness of each one-to-one human interaction" (Scheurich, 1995, p.241). Robson also counters any positivist criticism with "...the interview is in no sense a soft option as a data gathering technique" (2002, p.273).

Any interview may be prone to both bias and subjectivity on the part of the interviewer (Cohen *et al.*, 2000; Robson, 2002). Kvale suggests that in interviewing there may be as many different interpretations of qualitative data as there are researchers (1996, p.181). The validity of the interview process will always be difficult as Maxwell states, "...for interviews, [...] reactivity – more correctly, what Hammersley and Atkinson (1995) called "reflexivity", the fact that the researcher is part of the world he or she studies – is a powerful and inescapable influence; what the informant says is always influenced by the interviewer and the interview situation" (2005, p.109). Hence it was important for the researcher to be aware of, and to minimise, the influence of themselves within the interview. To attempt to eliminate some of these issues, or reduce their influence for this research, an interview schedule was developed which would try to cope with any "...lack of standardisation that [...] invariably raises concerns about reliability" (Robson, 2002, p.273).

Interview schedule design

A semi-structured interview, as opposed to a fully structured or unstructured interview (Robson, 2002), was used as this approach allows the interviewer to "...follow up ideas, probe responses and ask for clarification or further elaboration" (Arksey and Knight, 1999, p.7). An interview schedule was designed

but the order of the questions was not rigid so that it could be “...modified based upon the researcher's perception of what seems most appropriate” (Robson, 2002, p.270). This allowed flexibility in the delivery of the interview questions. The schedule was developed through a series of drafts and a pilot as outlined below.

The initial set of questions were developed over the course of the initial literature review. A large selection of questions were conceived that could be asked to participants in different roles and in different types of schools. The three main themes of the interview were teachers, their schools and research. Participants were also asked their opinions on a demonstration of the online pathways approach, both the overall aim of delivering research knowledge to teachers and also, more specifically, about the initial design.

A second draft of the initial set of questions was developed into an ordered schedule which was then piloted. The interview was piloted with a primary practitioner who had over ten years of teaching experience. It was initially conceived that the two themes of the interview could be covered in one hour long interview. The pilot interview was stopped after an hour with only the theme of the teacher and research having been covered. Thus the second theme of the interview was scheduled to be covered on another occasion. The second interview, with the same participant, was this time covering the online pathways approach. The online pathways approach was demonstrated and a series of questions asked, again this interview lasted an hour.

These initial pilot interviews revealed a number of issues. Firstly, the length of the interviews were far too long, highlighting that it would not be possible to cover both themes in one hour long interview. Two one hour interviews, with each participant, would be needed if all areas were to be covered. This was making, as Robson states, “...unreasonable demands on busy interviewees, and could have the effect of reducing the number of persons willing to participate” (2002, p273).

Teachers are busy people and already have many demands on their time, both in and out, of the school environment. Asking for potential participants for two one hour interviews would reduce the number of people willing to participate.

Secondly, there was an amount of repetition in the nature of the questions, with some areas being covered more than once. This was resolved in the next draft of the interview schedule. A number of questions were conflated to increase their clarity, and reduce any frustration on the part of the participant due to repetition of a topic area.

Thirdly, the pilot highlighted the difficulties of demonstrating live online web based approaches. This included ensuring good access to the internet at the interview location. Another difficulty was whether the researcher should guide the participant through the details of the online pathways approach or leave them to explore it themselves and then respond to questions. Further, what was the best way to display the site, as two people gathered around one small laptop screen did not offer a good solution, and setting up projectors in the participant's office was an imposition on their work space. Equally participants were unlikely to explore the website for themselves when there was an expert sat next to them. It became obvious that the researcher was influencing the actions and responses of the participant. Neither of these options provided the participants with a comfortable space in which to consider questions about the online pathway approach.

Overall the first interview provided a good range of data that clarified some of the issues raised from the initial questionnaire and so it was worth retaining. The second pilot interview, covering the online pathways approach, raised a number of issues as explained above. The difficulties of demonstrating the site highlighted that the interview approach was not useful in providing data about the pathways approach. Another solution was needed to provide data about this part of the study. Although this caused a problem it did allow the researcher to become

familiar with a range of methods.

The final draft was a further development from the first pilot about teachers, their schools and research (Appendix F). Feedback on the research project was received from both the MPhil to PhD upgrade seminar and from a presentation of the first part of this research at the British Educational Research Association conference at the University of Manchester in September 2012. Research colleagues at BERA were interested in what teachers' conceptions of research and evidence were and what teachers may think of these two concepts. This led directly to a number of questions on this topic being adopted. The feedback from these two events and the data from the pilot of the second draft, contributed to this final draft. This draft was used for the interviews see Appendix F.

Interview sample

The initial questionnaire had asked for respondents to provide their contact details if they were interested in helping further with the research study, and so this group of people was approached initially to be interviewed. The respondents from the initial questionnaire were a range of teachers from across subjects, roles and school phases. These respondents provided a broad range of potential interviewees, rather than any particular sub group of teachers. Overall 29 respondents to the initial questionnaire provided their contact details.

Each of these 29 respondents were emailed to see if they would be willing to be interviewed for the study, and eight responded to say they were happy to be interviewed. By checking the background information that they provided on the initial questionnaire it could be seen that this gave interviewees with range of school roles, but no headteachers. A number of headteachers from primary, middle and secondary schools, with an interest in research, were further asked to be

involved in the study by email, of which two responded to say they were happy to be interviewed. This gave a good range of participants by gender, school role, school phase and experience. Of these ten, one failed to show for interview, so nine were interviewed. Of these nine people, six were female and three were male. Six of the interviewees worked in secondary school, two in primary and one in the pre-school sector. The roles they had were; nursery teacher (1), primary teacher (1), secondary teachers (2), heads of department (2), senior management team member (1), primary headteacher (1) and a secondary headteacher (1). Face-to face interviews were conducted and recorded in a range of locations, including in a school office (3), at home (2), in a pub (1) and at the university library (1). One interview was conducted on the phone and one was conducted on Skype, again these were recorded.

One concern with the sample was the high level of teachers either with Masters degrees (one interviewee had two) or studying for Masters degrees. This highlighted the point made by Levin *et al.* (2010, p.6) that people with a greater level of education are more likely to be receptive to, or interested, in research. Thus teachers involved in Masters level qualifications are more likely to be interested in other people's research and more likely to offer their time for research interviews. This will need to be considered in the analysis of the interview data.

Transcripts

Interviews were digitally recorded and the interview data were fully transcribed. The interviews were transcribed by the author to gather an initial overview of the qualitative data. Kvale states that interview transcripts “...are artificial constructions from an oral to a written mode of communication...” (1996, p163) and some part of the interview interaction may be lost in moving from one mode to the other. Cohen *et al.* highlight that “...transcription represents the translation

from one set of rule systems (oral and interpersonal) to another very remote rule system written language...” (2000, p281) and that there is a loss of data from the original encounter. This problem was recognised but as they go on to state, “...the issue becomes whether and to what extent, and how a transcription is useful for the research” (2000, p282). In this study the transcribed interviews were just one of the data sources and the overall analysis was only partly reliant on them. The act of transcription was a process that gave a good overview of all the interviews and the transcribed data was in a form that could be more easily engaged with during analysis.

3.2.3 Focus groups

As mentioned above, there were a number of problems with using interviews to gather data about the pathways approach, including; the length of the interview, the time commitment needed from the participant, technical difficulties, and the amount the researcher was driving the process, therefore not allowing the respondent to engage with the resource in their own pace or in their own way, without the presence of an expert. It was decided that another approach for data collection would be tried.

Focus groups have been used for many years in market research and their use has been growing in business, politics, and more slowly, in education (Cohen *et al.*, 2011; Robson, 2002). Focus groups are a form of group interview (see Watts and Ebbutt, 1987), although the interaction is in the form of questions and answers between the interviewer and the group. In focus groups the “...reliance is on the interaction within the group who discuss a topic supplied by the researcher” (Morgan, 1988, p.9) thus reveals a collective rather than individual view.

In focus groups “...the participants interact with each other rather than with the

interviewer, such that the views of the participants can emerge” (Cohen *et al.*, 2011, p.436). The interviewer needs to adopt the role of moderator or facilitator, and to regulate the conversation to help the group run effectively (Robson, 2002, p.287). This is an active role, making sure members of the group do not dominate and all members of the group are able to have a voice. Table 3.10 below highlights some of the advantages and disadvantages of focus groups and some of the issues that need to be taken into account when facilitating focus groups.

Table 3.10: Advantages and disadvantages of focus groups (adapted from Robson, 2002, p.284)

Advantages	Disadvantages
Highly efficient – the amount and range of data are increased by collecting from several people.	Number of questions covered is limited.
Natural quality controls – participants tend to provide checks and balances on each other.	Facilitating the group process require considerable expertise.
Group dynamics help in focussing on the most important topics.	Process needs to be well managed – bias may be caused by domination of the group by one or two people.
Participants tend to enjoy the experience.	Power struggle may detract from the interview.
Relatively inexpensive.	Confidentiality can be a problem between participants when interact in a group situation.
Participants are empowered and able to make comments in their own words.	The results cannot be generalised as they cannot be representative of the wider population.
Contributions can be encouraged from people who are reluctant to be interviewed on their own.	The immediate nature of the interaction may lead a researcher to place greater faith in the findings than is actually warranted.
People who cannot read and write are not discriminated against.	
Facilitation can help in the discussion of taboo subjects.	

Focus groups can be used “...to triangulate with more traditional forms of interviewing, questionnaire, observation *etc.*” (Cohen *et al.*, 2011, p.436). In this study the data from the focus group was analysed with knowledge of other data sets, and therefore it was possible to triangulate the data generated by focus groups. Some criticisms of the approach are that focus groups “...may yield less information than a survey...” and the “...number of people involved tends to be small” (Cohen *et al.*, 2011, p.437).

In this study the focus group provided a way of presenting the online pathways approach directly to a number of practitioners, and asking for their views, suggestions and opinions (see Appendix G for focus group schedule). A number of schools and NQTs and teacher trainers were approached to be involved in a focus group, out of which one focus group was brought together with a number of NQTs and their trainers. The focus group was held in a school, with three NQTs and two trainers after their formal weekly NQT training session. Although the intention was not to involve the two trainers, their input and comments during the focus group were highly valued and they provided useful insights from the trainers' perspective rather than just the trainees' perspective. The focus group was recorded and transcribed. Overall the focus group provided a large amount of data about the approach but it required a large time commitment from the participants. In this focus group all the participants knew each other well through their course, this meant that the session was amicable and without any major disagreements, although disagreements may have produced more interesting data.

Although the focus group provided data about the approach, there were a number of problems with using the focus group. There was difficulty gaining access to enough people, as this had to be done through 'gatekeepers', as Denscombe explains:

Gatekeepers are people who grant access permission and allow access. In formal settings, they exercise institutional authority to permit or deny access. (2002, p.71)

When one person agrees to be interviewed they normally do it in a private capacity and in many cases without the knowledge of the organisation they work for. In setting up a focus group it is more difficult to gather a number of people in one location at a set time, especially if they are from a number of organisations. Teachers are busy people, thus organising a focus group through a school seemed one way of doing this but this was problematic due to a lack of personal contacts in schools and with gatekeepers not allowing access to them. Having the 'expert' in the room may have an effect on responses. The fact that the researcher demonstrated the online pathways approach, and explained its underlying philosophy, may have shown the resource in a more positive light than if the participants had been able to interact with the resource themselves. Although difficult to run and to gain access, the data generated through this method was valuable for the study and was used with the data from other methods.

3.2.4 Online pathways questionnaire

Although the focus group approach generated some good data it was felt that a further round of data collection from a larger sample would elicit a broader range of responses. As Cohen *et al.* state, focus groups “...may yield less information than a survey” and the “number of people involved tends to be small” (2011, p.437). Equally the focus group approach highlighted the difficulties of gathering a number of practitioners in a single place for a period of time without any inducements. Although a number of NQTs were able to participate, it was difficult to gather experienced practitioners from across a range of roles within a school. It was felt that it was important for people to be able to interact with the online pathways approach by themselves, at their own pace, being able to explore it 'warts and all' and without an 'expert' to demonstrate the resource at the best it

could be shown. Thus a novel approach was developed to collect a broad range of responses from broader sample of practitioners.

Early on in the study an opportunity arose to demonstrate the approach to a group of NQTs on an educational training visit. The resource was demonstrated, by using a laptop and projector, to the group of 70 NQTs and a self reporting questionnaire with both quantitative and qualitative questions was handed out (Appendix H). The respondents were given time to complete the questionnaire and twenty two completed questionnaires were received. This data collection episode provided a range of both qualitative and quantitative data about the online pathways approach and was an excellent way to pilot the questionnaire. Again there was a worry that the resource had been demonstrated by an 'expert', who was able to explain the underlying context and philosophy of the resource and respondents were unable to engage with the resource, at their own pace and in their own time.

Thus after this successful pilot it was decided that the questionnaire could be put online with a link to the online pathway resource (Appendix I). This online approach to data gathering would allow respondents to engage with the resource in their own time, and at their location, using their own chosen technology, *e.g.* desktop computer, laptop, tablet or phone. Respondents would not be demonstrated to by an 'expert' other, and therefore could interact with the resource at their own pace, allowing them time to reflect on their answers to the questionnaire, rather than having the pressure of an 'expert' other in the same room. Although a novel approach to gathering data about an online resource, and different from more traditional methods of gathering data about online resources, such as interview and focus groups, it was nevertheless useful for the researcher.

A questionnaire of eight quantitative questions was developed. This used a five point scale Likert (1932) with categories from 'strongly agreed' through to

'strongly disagreed', and also included seven qualitative questions. Bailey states that "...open-ended questions are useful if the possible answers are unknown or the questionnaire is exploratory" (1994, p.120). The exploratory nature of both the questionnaire method and the respondents views of the online pathways approach, meant that open-ended or qualitative questions were appropriate. As Robson explains "...there is nothing to stop you asking a wide range of largely open-ended questions in an attempt to explore some area, but it is likely to be an inefficient and ineffective procedure, taking a great deal of time to analyse" (2002, p.234). The process of eliciting a range of views of an online approach through an online questionnaire produced some valuable qualitative and quantitative data.

A section on background information was also included. These questions were the same ones that were used in the initial questionnaire in this study (see section 3.2.1). These included; gender, school name, years of teaching experience, years at current school, phase, post and highest level of education. The use of the same questions would allow comparisons by category groups across the two questionnaires. Although not a matched sample it was useful to compare across instruments.

Online pathways questionnaire sample

The questionnaire was promoted on the Times Educational Supplement²⁷ (TES) website forums for a month. Google analytics²⁸ was used to track the number of visitors to the questionnaire. In the month that the questionnaire was being promoted, there were 265 page views, 219 of which were unique visitors who spent an average of 4.11 minutes on the page. In this time 46 completed responses were gathered, giving a response rate of 21 per cent. This sample may not be a representative sample, and thus results of the questionnaire could not be

²⁷ <http://www.tes.co.uk>

²⁸ <http://www.google.com/analytics>

generalised to the population of teachers in the UK, but a response rate of 21 per cent shows that this method of collecting data, about an online approach, is not off putting to respondents. Although 46 responses is relatively small it is a questionnaire about a very specific approach, rather than a more general topic, and the number of responses is larger than what could be obtained from other methods suggested above.

A consideration is that use of the TES forums may add some bias. This is because the people already in an online forum may be more predisposed to complete an online questionnaire about an online resource. Hence they may be more inclined to take part than a sample of people that are not using an online forum. Equally an online forum may a good place to locate a sample of teachers willing to complete an online questionnaire about the online pathways approach.

3.3 Limitations of the study

Although this study was carefully prepared, thought through, and carried out with the best intentions, there may be a number of limitations which are, considered here.

Firstly, the response rate for the initial questionnaire was not able to be calculated, due to the multiple ways of delivering the questionnaire, although a number of studies have shown that a lower response rate does not mean lower survey accuracy (Visser *et al.*, 1996; Keeter *et al.*, 2006). Therefore a margin of error was calculated instead, which may give a better idea as to the accuracy of the results. Researchers need to be aware that collecting a sample from a broad population, using a number of different ways of presenting the questionnaire *i.e.* paper, email, web based, may present problems when trying to calculate response rate.

Secondly, positive response bias is an issue that needs to be considered in the initial questionnaire. As the work of Levin *et al.* (2010) shows, it is important to ask about practices rather than attitudes when questioning practitioners about research, as he suggests this avoids positive response bias in self reporting questionnaires. Robson more generally explains this as “...a social desirability response bias – people responding in a way that shows them in a good light” (2002, p.233). Thus research practices were asked about rather than attitudes, which may reduce the positive response bias, but some residue of wanting to be shown in a 'good light' may still be there.

Thirdly, nine interviews were conducted overall and, of course, more may have been better, but how many do you need? The answer seems to be “...it depends...” (Baker and Edwards, 2012, p.42). Enough interviews were carried out to illuminate further the data in the initial questionnaire and that was the purpose of

the interviews. A good range of interviewees with different roles in education were recruited. As other researchers have stated “...rather than asking the question 'how many qualitative interviews should I do', my advice would be to ask instead: why do you feel like these are not enough?” (Jenson cited in Baker and Edwards, 2012, p.39). Overall enough interviews were completed so that no new responses were obtained in the analysis and so that the initial questionnaire data could be explained.

Another issue was that although the use of focus groups would appear a good way of gathering data for this study, in fact the reality of gaining access, organising and running a focus group presented many difficulties. The problems of access, organising people, times, and locations should not be underestimated. These activities take a large amount of a researcher's time. Also in the case of an interview there is a relationship built between the researcher and the interviewee. In a focus group that one-to-one relationship with the interviewee cannot develop, the individual is one of many, and the bond of the researcher and the interviewee is not there.

Additionally, the use of TES forums may have added some bias in the online pathways questionnaire. This questionnaire was only operationalised in a web based format, thus if respondents do not like completing web based questionnaires there was no alternative. But the questionnaire was only promoted on the TES forums site, the logic being that if people are already engaged in an online environment they may be more open to completing an online questionnaire about an online resource. Although the number of responses was low, this may be explained by the fact that the questionnaire was based on a very specific online resource rather than a broad educational issue that would appeal to greater range of potential respondents. This approach did allow respondents to engage with the resource in their own time and way, and that was what was lacking from other methods that had been tried.

Overall two other issues with the study stood out, time and costs. Researchers need to be aware of the amount of time needed both in the preparation and piloting of their research instruments and in the time taken to gain access and organise meetings with people. Both of these activities take far more time than may be imagined when developing a research design on a Gantt chart (Gantt, 1903). Another issue is the cost of inducements to engage with a study. It can be very difficult to encourage potential respondents to complete questionnaires and attend focus group with just good will alone.

This study may be biased by the large number of teachers with Masters degrees or studying towards a Masters degree. The previous Labour government funded a large number of Master degrees for teachers. These teachers are now either finished or coming to the end of their studies. This may have affected the results, with the change of government in 2010 the funding was cut (Gove, 2010b). So this study comes at a time when, for a short period, there was a large number of teachers studying for Masters degrees in the profession and this may have an effect on this research. It seems unlikely that the profession will have this number of Masters qualified teachers in the future. With the change of government there was an increase in fees from about £3,000 a year to £9,000 a year. This will have an effect on the number of teachers interested in carrying out a Masters degree and thus engaging further with research for their own professional development.

3.4 Summary

This section has discussed how the methods of data collection presented were designed to gather the data needed, so that it can be analysed and interpreted, and thus the research questions can be answered. The methods selected have been underpinned by both the ontological and epistemological positions of this study.

Qualitative and quantitative methods have been used in such a way that the validity of the study has been increased and complementary data sets have been generated. The use of both qualitative and quantitative methods may be frowned upon in some quarters, but the use of these methods extends the skills of the researcher and provides a range of data sets with which to answer the research question, which can be seen as advantageous. Equally, judgements can be made about the methods' fitness for purpose within the study.

This section has explained in detail how this study was conceived and conducted; in the next section it will be explained how the data from these methods was analysed. Further sections will discuss and interpret these findings.

4.0 Data analysis and findings

This chapter first explains how the data, gathered through the use of the research methods discussed in the previous chapter, were analysed. Secondly, the findings are presented alongside the research method that was used and reflections on the use of that method. Thus the findings of the initial questionnaire are discussed followed by the findings of the interviews, the focus group and finally the online pathways questionnaire. The findings are there then triangulated and discussed overall in the following chapter. This allows the findings to be analysed in their own separate sections before a broader thematic discussion. The research questions for this study are restated below, as a reminder of the context of the study. The overall research question is :

In what ways might online pathways be used to enhance knowledge mobilisation and improve teaching as an evidence informed profession?

To answer this broad question there are a number of secondary questions that were considered:

Research Question 1 - What research practices are currently used by practitioners and schools?

Research Question 2 - What value do practitioners place on these current practices?

The first research question provides insight into the ways in which research

practices are currently used by practitioners and their schools. The second question explores the value practitioners ascribe to the use of these practices. Thus by finding out what practices teachers are currently engaged with, how much they value those practices, and what factors can be used to promote and support the use of research, this study will be able to gain some idea of the usefulness of the online pathway resource.

Research Question 3 - What are the processes that need to be undertaken to take research knowledge in reports and journals, and present it in online pathways?

This question looks at the specifics of how research knowledge can be transformed or mediated from what researchers produce, into something that practitioners can use. This can then be presented as online pathways that are more meaningful to practitioners.

Research Question 4 - What views do practitioners have of the online pathways approach as a way of presenting research knowledge?

The use of the online pathways approach has been successfully adopted in the medical field for supporting practitioners when diagnosing patients presenting symptoms with which they may not be familiar. It cannot be automatically assumed that practices developed in the medical field can be transferred into the field of education. This question will find out if the online pathways approach resonates with practitioners and provides them with access to research knowledge that could help them improve their practice.

Research Question 5 – What processes do practitioners adopt to take the knowledge presented in online pathways and use it their practice?

This question will highlight the practitioner's mediating processes that may be underlying the use of evidence informed practice and explore whether practitioners do this individually, in groups, or as an organisation.

From these five sub-questions it should be possible to give useful insights into teachers use and value of research practices, and what source of knowledge they use at the moment. These will contribute to answering the overall research question. The next section discusses how the data was analysed before a discussion of the research findings.

4.1 Methods of data analysis

Three different methods were used to gather data in order to answer the research questions. These were questionnaires, interviews and a focus group. This section explains how the data generated by these methods was analysed.

Data from the initial questionnaire was analysed in the Statistical Package for Social Sciences (SPSS). This allows the data to be manipulated in a number of ways and a wide range of statistical operations to be carried out. The majority of the data from the questionnaire was from a Likert scale. Initially SPSS was used so that individual item scores could be calculated and from this overall positive and negative scores for each item could be calculated. This allowed value and practice scores to be meaningfully compared and provided a way of highlighting the gaps between the values and practice scores for each item.

Cross tabulations were also calculated, although there were some issues with small subsample sizes within the sample. Cohen, *et al.* highlight that contingency tables need to “...contain more than five cases if confidence is to be placed in the results, it may not be feasible to calculate the chi-squared statistics if only a small sample is being used” (2011, p.654). Due to the smallness of the subsample sizes within categories, these results were deemed worth pursuing for illustration purposes. This analysis was used to see if there were differences between primary and secondary respondents or differences in groups of respondents by their achieved highest level of education.

Exploratory factor analysis was also carried out to see if there was an underlying structure to the data. Exploratory factor analysis, as Cohen *et al.* state, “is a process which enables the researcher to take a set of variables and reduce them to a smaller number of underlying factors which account for as many variables as

possible. It detects structures and commonalities in the relationships between variables” (2011, p.674). This analysis exposed an underlying factor structure to the data.

There are a number of data analysis techniques that have been suggested for analysing qualitative data. These include counting the frequency of themes, clustering themes into categories, and coding responses to reduce data into manageable segments (Brenner *et al.*, 1985; Miles and Huberman, 1994; Silverman, 2000; Kvale, 1996). As Cohen *et al.* state:

...data analysis is less a completely accurate representation (as in the numerical, positivist tradition) but more of a reflexive, reactive, interaction between the researcher and the decontextualised data that are already interpretations of a social encounter. (2011, p.427)

For the analysis of the interviews in this study rather than producing quantitative data from what is qualitative data, it was decided to code the interviews around a number of themes. Thus the focus of the analysis was on meaning rather than frequency counts. As the above quote states, this coding will always be an interpretation of the decontextualised data by the researcher. The themes were developed from the literature review and from the questions generated while presenting a paper at the British Educational Research Association conference in 2012. The questions used in the interview schedule were based on these themes. In the analysis of the transcripts new codes were added where new themes were identified.

The themes of the original interview questions were; conceptions of research, teachers' use of research evidence, basing practice on research evidence, current sources of new knowledge, and your school's encouragement of the use of research. For this study the transcripts of the interviews were read and re-read a number of times to allow for complete immersion in the data by the researcher.

These data were then read again and coded so that interviewee discourse extracts could be compared and contrasted under a code. Miles and Huberman (1994) highlight “...the importance they attach to coding of responses in interviews, partially as a way of reducing what is typically data overload from qualitative data” (cited in Cohen *et al.*, 2011, p.427). The coding of interviews provides extracts that can be compared and contrasted around themes but also is a method of data reduction. Hycer suggests that the researcher “...looks for themes common to most or all of the interviews as well as individual variation” (1985, cited in Cohen *et al.*, 2011, p.430). The themes can be compared and contrasted across the sample. A number of themes beyond those already identified emerged during the analysis of the interview data, these included money, time, postgraduate study, and professional judgement. Discussion around these themes is presented below.

The interview questions were focused on teachers' use of research. The aim of the interview data were to provide more depth of understanding and to further illuminate the value-practice gaps that were found in the quantitative data from the initial questionnaire. Although computer software programmes such as Atlas.ti²⁹ and TAMS³⁰ are available for qualitative data analysis, and these have been used by the researcher in the past, it was decided that this was unnecessary in this study.

The focus group and the second online questionnaire were specifically focussed on teachers' comments and opinions of the online pathways approach. The focus group generate qualitative data that was analysed by reading and coding the transcript around a number of themes. Again codes were added where themes were developed from the analysis. The first category of themes was how the approach fitted with current practices thus the themes were; would you use it, how would you use it, who should be authoring online pathways? The second category

²⁹ For Atlas.ti, see <http://www.atlasti.com>

³⁰ Text Analysis Markup System (TAMS) is an open source qualitative research tool, see <http://tamsys.sourceforge.net/>

of themes was based around the look, feel and design of the approach. Themes included; structure, search, content length, layout, colour, feedback, other online resources available. Emerging themes included access to knowledge and professional practice.

The second questionnaire generated both quantitative and qualitative data. The software SPSS was again used for the quantitative data and a thematic content analysis was carried out with the qualitative data. This analysis included themes developed from both the focus group and from the pilot NQT questionnaire. Again broad thematic categories included how the resource would fit in with practitioners current practices and the look, feel and design of the resource. This questionnaire had a small sample size for the quantitative data and thus the findings from this are of a more informative and exploratory nature rather than being able to be generalised across a population. Although the questionnaire did generate a large amount of qualitative data about the online pathways approach³¹.

The findings are reported in order of the research method used, so the initial questionnaire is reported first, followed by the interviews, focus group and then the second online questionnaire.

³¹ Following on from this research further development of the resource has taken place and this can be seen at <http://www.meshguides.org>

4.2 Findings of the initial questionnaire

4.2.1 Initial questionnaire analysis and findings

The data analysis below has previously been presented at the British Educational Research Conference (see Procter, 2012). The background information is reported initially to give some insight into the nature of the sample before the reporting of section A 'you and research' and section B 'your school and research'. The distribution of respondents (n=156) showed that 77.3 per cent were female and 22.7 per cent were male. This compares favourably with the Department for Education's latest school workforce census for England where 74.6 per cent of the head count of full and part-time regular teachers were female and 25.4 per cent were male (DfE, 2011, p.2).

The respondents reported that 54.6 per cent worked in secondary schools, 42.3 per cent worked in primary schools and 3.1 per cent worked in middle schools. The majority of respondents, 58.0 per cent, were class teachers, 22.9 per cent were heads of departments, 6.9 per cent were deputy heads and 2.3 per cent were headteachers.

The highest level of education category was reported as Postgraduate Certificate in Education (PGCE) at 28.2 per cent, 19.8 per cent were studying for a Masters degree (in progress), 16.2 per cent had completed a Masters degree, 14.5 per cent had a Bachelor of Education, 10.7 per cent had a Bachelors degree and 6.1 per cent had either completed a PhD or were in progress. The high level of Masters degrees in progress may be related to the fact that there was central government funding for teachers to study for Masters degrees starting in 2009. This was subsequently withdrawn in November 2010 (Gove, 2010b).

Section A: You and research

Section A is about the respondent and their use of research practices. For ease of analysis positive scores were grouped together to provide an overall percentage for each item. The scores for 'often true' and 'mostly true' were added on the practices scale and the scores for 'crucial' and 'important' were added on the values scale. This enables values and practices data to be more easily compared.

This type of analysis not only shows the gaps between teachers' practices and their values but also between their current practices and their aspirations (James and Pedder, 2006). Table 4.1 below shows the percentage of teachers that placed a high value on statements about research practices. The research practices are listed in descending order of percentage of teachers who valued them as either 'important' or 'crucial'. These data are also presented visually in Figure 4.1 below.

Eight out of the eleven items or 72.7 per cent were highly valued. Respondents scored them between 80.5 per cent and 52 per cent, as either 'important' or 'crucial' for enhancing the use of research. The two items 'you engage in research related reading' and 'you engage in research focussed discussion with colleagues' were the most highly valued statements at 80.5 per cent and 74.6 per cent respectively. These two items may be related and thus research that is read about by teachers is possibly then discussed between teachers, perhaps to clarify and reflect on their ideas as to how they may be able to use research in their practice. These results are consistent with the findings from Levin *et al.* who reported that educators had a "high level of receptivity to research" (2010, p.4). This has also been highlighted by other researchers (Biddle & Saha, 2002; Landrum *et al.*, 2002; Rickinson, 2005; Cordingley, 2008; Berhstock *et al.*, 2009).

Table 4.1: Top value scores for section A 'you and research'

No.	Description	Values % important/crucial	Practices % often/mostly
A2	You engage in research related reading.	80.5	70.3
A1	You engage in research focused discussion with colleagues.	74.6	39.7
A4	You engage in research related events.	68.7	45.4
A3	You engage in research related networking.	63.1	50.3
A8	You have attended research focused professional conferences in the last year.	59.4	36.4
A5	You engage in postgraduate studies.	59.2	47.7
A9	You have attended research focused college or university sponsored events in the last year.	55.3	24
A7	You have attended research focused LA events in the last year.	52	24.5
A6	You have received funds from school to carry out research.	46.7	11
A11	You have attended research focussed academic conferences.	44.9	22.7
A10	You have attended research focused outside organisation sponsored events in the last year.	36	15.5

Although research related events are highly valued by 68.7 per cent of teachers, this then breaks down into a range of events. Professional conferences, *i.e.* ones organised by professional associations are more highly valued at 59.2 per cent, than Local Authority events at 52 per cent, academic conferences at 44.9 per cent, and outside organisation sponsored events at 36 per cent. This highlights that teachers place more value on their professional conferences over other types of research and is consistent with the critique that research needs to be relevant and be accessible to practitioners (Levin *et al.*, 2010, p.4).

Engagement with postgraduate studies was highly valued by 59.2 per cent of teachers and had a practice score of 47.7 per cent. Thus just under 50 per cent of the sample are engaged in postgraduate studies and just under 60 per cent of these highly value this. This may be because of the two years of government funding for the Masters and Teaching and Learning course that teachers have been encouraged to study for. This funding was subsequently withdrawn by the Secretary of State for Education (Gove, 2010b).

Section A You and Research (n=156)

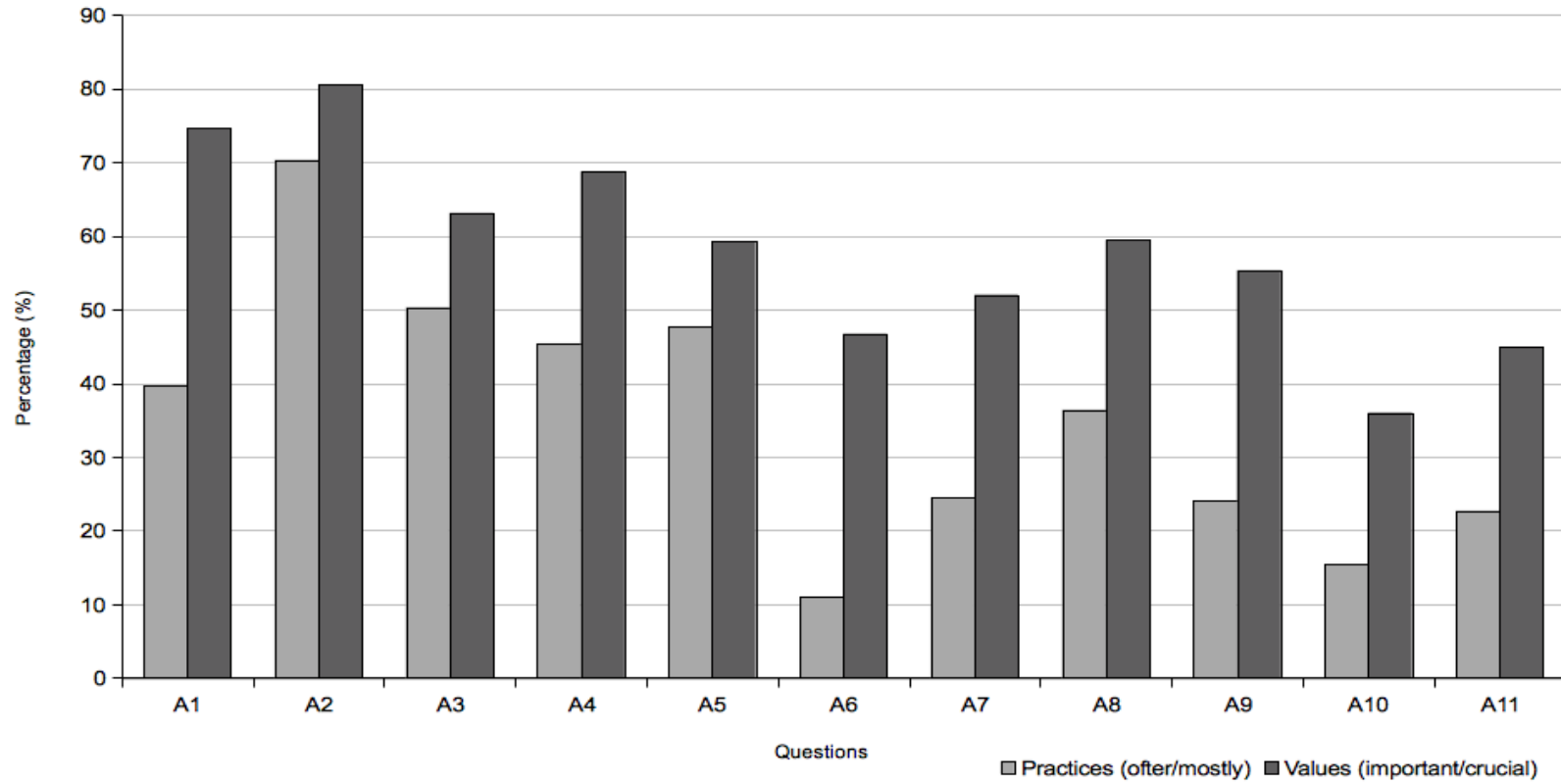


Figure 4.1: Section A you and research, practice and value scores (n=156)

Section A: Value-practice gaps

The findings in this section compare the value scores and the practice scores across the section A items. Comparisons were made between the percentage of teachers who indicated 'important' and 'crucial' on the value scale, and those who indicated 'often' and 'mostly' in the practice scale. In Table 4.2, practice scores were taken away from value scores to show if there were any value-practice gaps in these data. Items are listed in descending order of percentage of the value-practice gap score.

Table 4.2: Value-practice gaps for section A 'you and research'

No.	Description	Values % important/ crucial	Practices % often/ mostly	Values- practices gap %
A6	You have received funds from school to carry out research.	46.7	11	35.7
A1	You engage in research focused discussion with colleagues.	74.6	39.7	34.9
A9	You have attended research focused college or university sponsored events in the last year.	55.3	24	31.3
A7	You have attended research focused LA events in the last year.	52	24.5	27.5
A4	You engage in research related events.	68.7	45.4	23.3
A8	You have attended research focused professional conferences in the last year.	59.4	36.4	23
A11	You have attended research focussed academic conferences.	44.9	22.7	22.2
A10	You have attended research focused outside organisation sponsored events in the last year.	36	15.5	20.5
A3	You engage in research related networking.	63.1	50.3	12.8
A5	You engage in postgraduate studies.	59.2	47.7	11.5
A2	You engage in research related reading.	80.5	70.3	10.2

Table 4.2 shows that the largest value-practice gap is for the item 'you have received funds from schools to carry out research' which is 35.7 per cent. Although this is the largest gap between value and practice it can be seen that teachers place a low value score on this item of only 46.7 per cent and there is an even lower practice score of 11 per cent. This suggests teachers do not receive funds to carry out research but equally it seems that they do not value this either.

The second largest gap is for the item 'you engage in research focussed discussion with colleagues' at 34.9 per cent. Teachers place a high value score on this item of 74.6 per cent but the item has a poor practice score of 39.7 per cent. Again this re-enforces that teachers have a high receptivity to research but a “low level of active engagement with research in the sense of [...] discussing it” (Levin *et al.*, 2010, p.4).

The next six items have value-practice gaps from 31.3 per cent to 20.5 per cent and are related to research focused events. These results show that teachers have difficulty in spending time out of their classrooms to engage in events that have a research focus.

The smallest value-practice gaps were for the item 'you engage in research related reading', with a value score of 80.5 per cent and a practice score of 70.3 per cent. Although this result does not support Levin *et al.* who have found that teachers have a “low level of active engagement with research in the sense of spending time reading” (2010, p.4). This high level of practitioners engaging in research related reading may be due to the fact that 47.7 per cent of this sample was engaged in postgraduate studies.

Overall it can be seen that there is a consistent value-practice gap ranging from 35.7 per cent to 10.2 per cent across all eleven items in this section. Teachers

highly value research practices and research knowledge. Again this is consistent with the finding from Levin *et al.* who reported that educators had a “high level of receptivity to research” (2010, p.4).

Section B: Your school and research

Section B was about the respondent's school and its use of research practices. Again, for ease of analysis, positive scores were grouped together to provide an overall percentage for each item. The scores for 'often true' and 'mostly true' were added on the practices scale and the scores for 'crucial' and 'important' were added on the values scale. This enables values and practices data to be more easily compared. Table 4.3 below shows the percentage of teachers that placed a high value on statements about their schools' research practices. The research practices are listed in descending order of percentage of teachers who valued them as either important or crucial.

Fifteen out of the eighteen statements about the teachers' school and research were scored above 50 per cent. Respondents scored them between 73.6 per cent and 50.4 per cent, as either 'important' or 'crucial' for enhancing the use of research. The highest scored statement on the value scale, at 73.6 per cent, was 'your school provides staff with time to engage in research related activities'. This suggests that if teachers are expected to engage with research to improve their practice, they would like the time to be able to do this. Two more items were scored above 70 per cent. These were 'your school encourages research related professional development (postgraduate studies)' at 71.9 per cent, and 'research is discussed in professional development meetings' at 70.1 per cent. Again these statements may be highly scored because of the two years of government funding for the Masters and Teaching and Learning course that teachers have been encouraged to study for. The funding for the Masters in Teaching and Learning was subsequently cut by the Secretary of State for Education (Gove, 2010b). The cutting of funding

may result in teachers being less able to critically engage with research and reduce the opportunities for practitioner-based enquiry.

Table 4.3: Top value scores for section B 'your school and research'

No.	Description	Values % important/crucial	Practices % often/mostly
B15	Your school provides staff with time to engage in research related activities.	73.6	15.8
B11	Your school encourages research related professional development (post-graduate studies).	71.9	38.1
B6	In your school research is discussed in professional development meetings.	70.1	43.2
B5	In your school research is discussed in SMT meetings.	68.9	26.3
B16	Staff at your school incorporate/link data to reporting.	68.9	50
B1	In your school research is discussed in staff meetings.	66.7	30.5
B2	In your school research is discussed in departmental meetings.	65.5	26.6
B9	Your school encourages/facilitates action research.	63.3	33.8
B17	Staff regularly discuss research to plan their teaching.	62.6	14.9
B13	Your school provides opportunities for informal networking related to research.	60.6	21.2
B14	Your school circulates research articles.	58.8	18.4
B7	In your school research is discussed in informal networking events.	52.9	23.7
B10	Your school builds ongoing relationships with external researchers.	52	25.3
B8	Your school provides funds for research generation and utilization.	50.7	10.9
B12	Your school sponsors/coordinates research focused events (workshops, conferences).	50.4	19
B18	Your school has a member of staff with responsibility to bring new research into school.	49.2	5.9
B3	In your school research is discussed in pastoral meetings.	48.5	10.7
B4	In your school research is discussed in parent meetings.	34.3	9.3

Seven statements were scored at between 68.9 per cent and 60.6 per cent. Teachers seem to value research being discussed in meetings such as the Senior Management Team meeting at 68.9 per cent, staff meetings at 66.7 per cent, and departmental meetings at 65.5 per cent. They also value discussing research when planning for their teaching at 62.6 per cent. These four items show that teachers place a high value on the discussion of research in a range of different professional meetings. Teachers additionally value the use of data in their reporting at 68.9 per cent and that their school encourages/facilitates the use of action research at 63.3 per cent.

The lowest value statement was 'research is discussed in parent meetings', at 34.3 per cent. This statement had both a low value score but also a low practice score, suggesting teachers do not talk to parents about research but also see little value in doing so. These data are presented visually in Figure 4.2 below.

Section B Your School and Research (n=156)

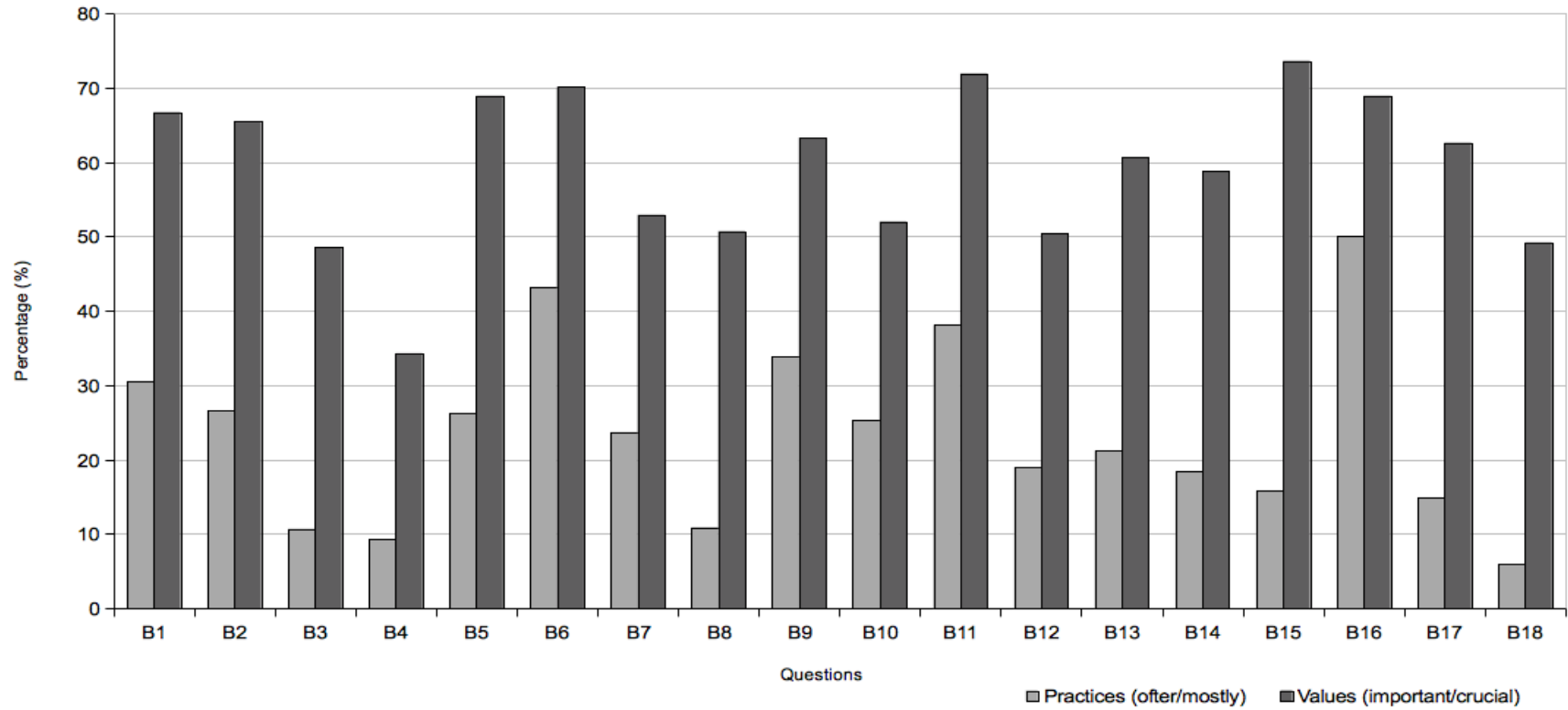


Figure 4.2: Section B your school and research, practice and value scores (n=156)

Section B: Value-practice gaps

Value scores and practice scores are compared for 'your school and research'. Table 4.4 below shows that practice scores are subtracted from value scores to reveal any value-practice gaps. The items are shown in the descending order of the percentage score of the gap between the value and the practice scores.

The largest value-practice gap score is for the statement 'your school provides staff with time to engage in research related activities' at 57.8 per cent. Thus teachers value time to engage with research related activities with a score of 73.6 per cent but their practice scores are only 15.8 per cent, producing the largest value-practice gap score. The second largest gap score is for the statement 'staff regularly discuss research to plan their teaching' at 47.7 per cent, again this has a high value score, of 62.2 per cent, but a poor practice score of only 14.9 per cent. This is a concern as it is important for teachers to discuss how they will teach a topic in their planning and base this planning on research evidence.

The two items 'your school has a member of staff with responsibility to bring new research into school' and 'your school circulates research articles' have value-practice gap score of 43.3 per cent and 40.4 per cent respectively. These items have practice scores of 5.9 per cent, the lowest in the whole questionnaire, and 18.4 per cent respectively. This may be one area where it would seem useful to assign these types of roles to a member of staff, as these types of research practices have low practice scores but are highly valued by teachers.

Table 4.4: Value-practice gaps for section B 'your school and research'

No.	Description	Values % important/ crucial	Practices % often/ mostly	Values- practices gap %
B15	Your school provides staff with time to engage in research related activities.	73.6	15.8	57.8
B17	Staff regularly discuss research to plan their teaching.	62.6	14.9	47.7
B18	Your school has a member of staff with responsibility to bring new research into school.	49.2	5.9	43.3
B15	In your school research is discussed in SMT meetings.	68.9	26.3	42.6
B14	Your school circulates research articles.	58.8	18.4	40.4
B8	Your school provides funds for research generation and utilization.	50.7	10.9	39.8
B13	Your school provides opportunities for informal networking related to research.	60.6	21.2	39.4
B2	In your school research is discussed in departmental meetings.	65.5	26.6	38.9
B3	In your school research is discussed in pastoral meetings.	48.5	10.7	37.8
B1	In your school research is discussed in staff meetings.	66.7	30.5	36.2
B11	Your school encourages research related professional development (post-graduate studies).	71.9	38.1	33.8
B12	Your school sponsors/coordinates research focused events (workshops, conferences).	50.4	19	31.4
B9	Your school encourages/facilitates action research.	63.3	33.8	29.5
B7	In your school research is discussed in informal networking events.	52.9	23.7	29.2
B6	In your school research is discussed in professional development meetings.	70.1	43.2	26.9
B10	Your school builds ongoing relationships with external researchers.	52	25.3	26.7
B4	In your school research is discussed in parent meetings.	34.3	9.3	25
B16	Staff at your school incorporate/link data to reporting.	68.9	50	18.9

The smallest two value-practice gap scores were for the items 'research is discussed in parent meetings' at 25 per cent and 'staff at your school incorporate/link data to reporting' with a score of 18.9 per cent. As mentioned in the previous section, discussing research with parents has both a low value score and a low practice score, whereas linking data to reporting has a high value score but also a high practice score with 50 per cent of teachers indicating that they practice this 'often' or 'mostly'.

Overall it can be seen that there are consistent value-practice gap scores ranging from 57.8 per cent to 18.9 per cent across all eighteen items in this section. Again this highlights teachers value of research practices and their aspirations to use them, but that they are constrained in their practice.

These findings show that there is a perceived lack of formalised structures to bring research into schools, to provide access to research in schools, and to provide staff with time to engage with, and discuss, research. This is in relation to both their own professional development and in the planning of their practices. These findings are consistent with the work of Cooper and Levin whose research in Canada found that “schools and districts tend to lack formalised research capacity, resources or time to engage with research” (2010, p.363). Levin *et al.* also state that:

Education organisation tend to have little organisational capacity to support knowledge mobilisation, lacking systems, role and procedures that would make research an important part of ongoing activity. (Levin *et al.*, 2010, p.4)

4.2.2 Initial questionnaire cross-tabulation

Cross tabulation is a statistical process that shows the interrelationship between two variables. Cohen *et al.* explain that “a cross tabulation is simply a presentation device, whereby one variable is presented in relation to another” (2011, p.623). Thus this process allows a number of variables to be considered at the same time across the range of questionnaire items.

Cross tabulation calculations were carried out for both Section A and Section B, and this generated a large amount of data for analysis. Therefore only findings that are of direct relevance to the study are reported. Value-practice gap scores are compared for both school phase and highest educational level.

Cohen *et al.* highlight that there can be a problem of “uneven subsample sizes” (2012, p.623). So for example, in this sample there are 71 primary teachers, 55 secondary teachers, and 4 middle school teachers and thus comparisons are not like with like. There are two main ways to deal with this. The first is to multiply the results by a factor in order to make the two subsamples the same in this case ($71/55 =$). The second way is to look at the data by the use of row percentages rather than total percentages. SPSS was used to generate these and thus the proportion of secondary teachers can be compared to the proportion of primary teachers. In this section percentages are presented throughout.

Primary and secondary differences

The majority of literature on teachers' use of evidence does not distinguish between practitioners in the primary and secondary sectors, although recent work has been carried out looking at the use of research in the secondary sector (Levin *et al.*, 2009; Witherow, 2011). The use of cross-tabulation allows this study to look at primary and secondary practitioner differences. The results of the cross-

tabulation produced some revealing findings that are discussed below. Table 4.5 below shows the value-practice gap scores for primary and secondary respondents in section A, 'you and research', of the questionnaire, ordered by primary value-practice gap scores.

Table 4.5: Section A cross tabulation of primary and secondary,

No.	Description	Values-practices gap %	
		Primary n=71	Secondary n=55
A1	You engage in research focused discussion with colleagues.	43.3	32
A6	You have received funds from school to carry out research.	33.7	31.1
A9	You have attended research focused college or university sponsored events in the last year.	33.5	16
A7	You have attended research focused LA events in the last year.	32.9	20.5
A10	You have attended research focused outside organisation sponsored events in the last year.	26.2	17.4
A11	You have attended research focussed academic conferences.	25.4	25.4
A4	You engage in research related events.	25.4	20.4
A8	You have attended research focused professional conferences in the last year.	24.6	16.6
A2	You engage in research related reading.	18	0
A3	You engage in research related networking.	16.7	6.3
A5	You engage in postgraduate studies.	15	5.5

The largest values-practice gap is 43.3 per cent for primary respondents compared to 32 per cent for secondary respondents. This is for the item 'you engage in research focused discussion with colleagues' and this large gap is due to the value primary respondents place on the item, 81.4 per cent as compared to secondary respondents at 59.3 per cent.

The smallest value-practice gap score is for 'you engage in postgraduate studies' at 15 per cent for primary respondents and 5.5 per cent for secondary respondents. A closer look at the figures shows that the value score for primary respondents is 75 per cent and 41.8 per cent for secondary respondents, whereas the practice scores are 60 per cent for primary and 36.3 per cent for secondary. Hence, in this sample, 60 per cent of primary respondents were engaged in postgraduate studies compared to 36.3 per cent for secondary respondents and overall primary respondents placed a higher value score on postgraduate study.

It can also be seen, in Table 4.5, that the overall value-practice gap scores of primary respondents are larger than secondary respondents. This is because their value scores are consistently higher than the secondary respondents. The primary respondents' mean value score was 66.1 per cent, whereas for secondary respondents it was 47.1 per cent. This may be due to the route that primary respondents' take into teaching. More undergo a three to four year degree with an educational research component, and therefore they may see more value in these research activities than secondary respondents who may have gone through the route of a degree followed by PGCE, which has less of an educational research component.

Table 4.6 below shows the primary and secondary value-practice gap scores for section B, 'your school and research', ordered by primary value-practice gap scores. The largest value-practice gap score for both primary and secondary respondents was for the item 'your school provides staff with time to engage in research related activities' at 52.8 per cent for primary and 63.1 per cent for secondary. A closer look at the figures reveals that the secondary score is high because the secondary practice score for this item is 5.5 per cent compared to 24.3 per cent for primary respondents. Thus in only 5.5 per cent of secondary respondents did their schools provide them with time to engage in research related activities compared with 24.3 per cent of primary respondents.

Table 4.6: Section B cross tabulation of primary and secondary

No.	Description	Values-practices gap %	
		Primary n=71	Secondary n=55
B15	Your school provides staff with time to engage in research related activities.	52.8	63.1
B17	Staff regularly discuss research to plan their teaching.	48.9	44.5
B18	Your school has a member of staff with responsibility to bring new research into school.	43	48.2
B14	Your school circulates research articles.	42.5	41.6
B8	Your school provides funds for research generation and utilization.	42.2	39.7
B13	Your school provides opportunities for informal networking related to research.	40.5	29
B12	Your school sponsors/coordinates research focused events (workshops, conferences).	38.8	26.2
B7	In your school research is discussed in informal networking events.	35.8	21.5
B2	In your school research is discussed in departmental meetings.	34.8	43.6
B1	In your school research is discussed in staff meetings.	33.9	34.6
B5	In your school research is discussed in SMT meetings.	33.2	54
B4	In your school research is discussed in parent meetings.	30.9	19.3
B3	In your school research is discussed in pastoral meetings.	30.8	33.4
B11	Your school encourages research related professional development (post-graduate studies).	30.7	35.7
B10	Your school builds ongoing relationships with external researchers.	29	30.9
B9	Your school encourages/facilities action research.	28.6	31
B6	In your school research is discussed in professional development meetings.	27	29
B16	Staff at your school incorporate/link data to reporting.	15.5	19.2

It can be seen that secondary value-practice gap scores are higher than primary

scores on ten out of the eighteen items. This is not because secondary respondents value these research activities more highly than primary colleagues, but because their practice scores are so low. For this section mean secondary value scores were 51.8 per cent compared to primary at 64.6 per cent, whereas mean practice scores were 16.0 per cent for secondary and 29.2 per cent for primary. These figures account for the secondary respondents' value-practice gap scores being greater than primary respondents. On average primary respondents engage in these research practices twice as much as secondary respondents, 29.2 per cent compared to 16.0 per cent respectively, however mean value scores differ by only 12.8 per cent. These findings may be related to greater collegiality within primary schools due to the smaller nature of these schools, or may be due to staff in primary schools having multiple roles, again due to the relatively small nature of primary schools. Overall these findings are not encouraging for colleagues working in secondary schools.

Highest educational level differences

Biddle and Saha (2002) in their comparative study of school principals in Australia and the USA, showed that principals with a higher level of education were more likely to have a higher regard for research. In this study cross-tabulation was carried out to see if there were differences in value and practice scores between group of respondents with differing levels of educational achievement. An initial review of the data showed small numbers in some categories presented a problem and that thirty one respondents did not provide these data. These data can be seen in Table 4.7 below.

Table 4.7: Number of cases in categories for highest educational level

Qualifications	Number of cases
Bachelors degree.	14
Bachelors of Education degree.	19
PGCE.	37
Masters degree (in progress).	26
Masters degree (completed).	21
PhD (in progress).	3
PhD (completed).	5

The categories were dominated by the PGCE category with other categories having a smaller numbers of cases. Therefore it was decided to combine a number of categories together to provide more meaningful data. Cohen *et al.* state that in cross-tabulation “combining categories can be useful in showing the general trends or tendencies in the data” (2011, p.624). Eight categories for the item highest educational level were combined into four new categories, BA and BEd, PCGE, Masters, and PhD. These categories were deployed to provide a more useful comparison, see Table 4.8.

Table 4.8: Number of cases in combined categories for highest educational level

Qualifications	Number of cases
Bachelors degree and Bachelors of Education degree.	33
PGCE.	37
Masters degree (in progress) and Masters degree (completed).	47
PhD (in progress) and PhD (completed).	8

Table 4.9 shows the combined category data for section A. Due to the large amount of data the table is ordered by item numbers.

Table 4.9 : Section A value-practice gap scores by highest educational level

No.	Description	BA and BEd n=33	PGCE n=37	Masters n=47	PhD n=8
A1	You engage in research focused discussion with colleagues.	32.6	46	42.5	0
A2	You engage in research related reading.	14.4	16.6	8.6	-12.5
A3	You engage in research related networking.	14.1	19.4	9.9	-12.5
A4	You engage in research related events.	23.6	27.8	21.8	9
A5	You engage in postgraduate studies.	20.2	17.4	6.5	0
A6	You have received funds from school to carry out research.	40.8	9.3	39.6	37.5
A7	You have attended research focused LA events in the last year.	32.5	16.2	35.8	17.9
A8	You have attended research focused professional conferences in the last year.	27.1	20.1	23.4	0
A9	You have attended research focused college or university sponsored events in the last year.	41	30.7	20.4	-25
A10	You have attended research focused outside organisation sponsored events in the last year.	22.3	19.6	28.2	-14.3
A11	You have attended research focussed academic conferences.	19.5	28	31	-5.4

Table 4.9 above shows a number of striking negative scores in the category PhD (completed and in progress). The largest negative value-practice gap score is -25 per cent for the item 'you have attended research focused college or university sponsored events in the last year'. To produce a negative score respondents must have a practice score, in this case 75 per cent, that is greater than the corresponding value score, in this case 50 per cent, thus producing a value-practice score of -25 per cent. This shows that respondents with PhDs are attending these types of events more than they value them. Due the large amount of data in the above table, Figure 4.3 below is presented to show the same results.

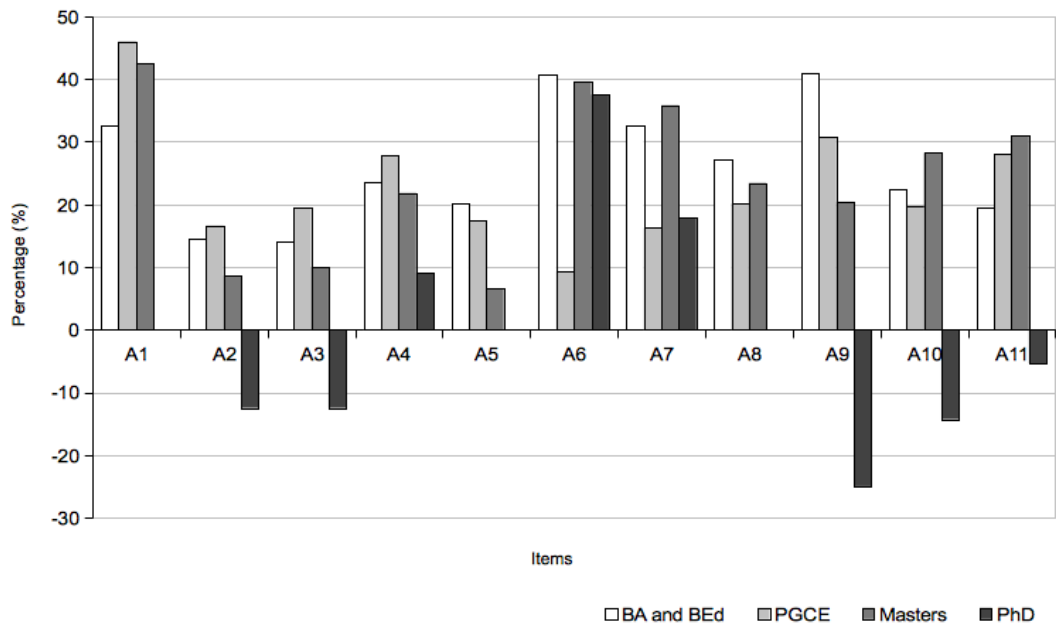


Figure 4.3: Section A value-practice gap scores by highest educational level

Figure 4.3 highlights the five items that have negative value-practice gap scores for respondents in the category PhD. For each of these items the respondents' practice score for a research activity is more than their value score for that activity. These negative scores may be due to the nature of being encouraged to become more critical and more questioning during the course of a PhD programme, or that respondents who have studied for a PhD are more likely to have an interest in, and hence are more likely to be engaged in, these research activities in their current roles. Therefore mean practice scores were calculated for each category to see if this was the case. These scores are shown in Figure 4.4 below.

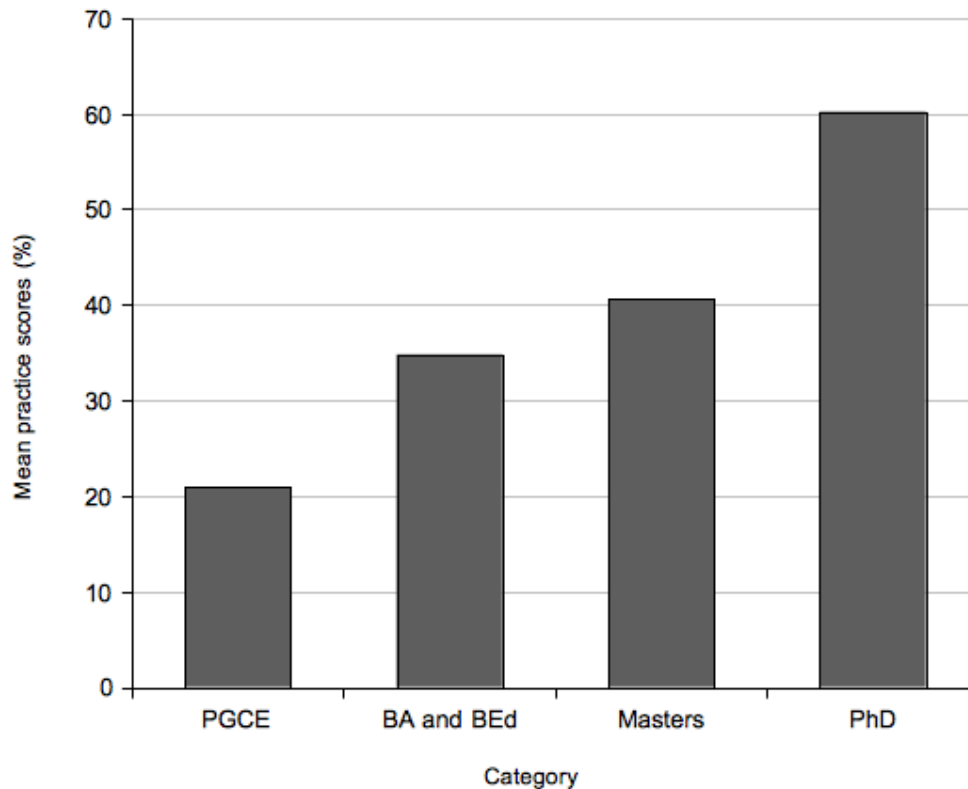


Figure 4.4: Section A, mean practice scores by highest educational level

Figure 4.4 shows that respondents with PhDs engage more in these research practices at 60.2 per cent, than Masters at 40.6 per cent, BA and BEd at 34.8 per cent and PGCE at 20.9 per cent qualified respondents. However it can be seen that PhD qualified respondents are more likely to be critical of the value of these activities, see Figure 4.3. These findings show that this type of cross-tabulation analysis is important, and can reveal differences between groups in the same sample. These findings show that PhD respondents are more involved in research activities than other respondents, but they are also critical of these activities which lends support to previous research by Biddle and Saha (2002).

Table 4.10 below shows the combined highest educational level category data for section B, ordered by the item number.

Table 4.10 : Section B value-practice gap scores by highest educational level

No.	Description	BA and BEd n=33	PGCE n=37	Masters n=47	PhD n=8
B1	In your school research is discussed in staff meetings.	24.2	35.2	55.3	12.5
B2	In your school research is discussed in departmental meetings.	28.1	43.3	56.4	12.5
B3	In your school research is discussed in pastoral meetings.	33.9	33.6	38.1	16.1
B4	In your school research is discussed in parent meetings.	25.3	25.1	30.6	0
B5	In your school research is discussed in SMT meetings.	35.6	51.3	46.9	28.6
B6	In your school research is discussed in professional development meetings.	15.7	40.6	40	-25
B7	In your school research is discussed in informal networking events.	34.4	37.8	28.8	0
B8	Your school provides funds for research generation and utilization.	42.6	27.8	50	42.9
B9	Your school encourages/facilities action research.	18.3	31.3	35.5	28.6
B10	Your school builds ongoing relationships with external researchers.	15.2	23.8	44.7	37.5
B11	Your school encourages research related professional development (post-graduate studies).	32.6	34.3	34.1	50
B12	Your school sponsors/coordinates research focused events (workshops, conferences).	42.5	27	38	35.7
B13	Your school provides opportunities for informal networking related to research.	49.5	31.1	37.8	25
B14	Your school circulates research articles.	36.3	40.5	46.6	62.5
B15	Your school provides staff with time to engage in research related activities.	46.9	63.1	59	62.5
B16	Staff at your school incorporate/link data to reporting.	15.1	13.5	27.1	33.9
B17	Staff regularly discuss research to plan their teaching.	42.4	43.5	57.5	44.6
B18	Your school has a member of staff with responsibility to bring new research into school.	40.8	41.8	47.9	45.8

Table 4.10 shows two large value-practice gap scores in the category PhD. The first is for the item 'your school circulates research articles' (B14) at 62.5 per cent. This high score is because PhD respondents highly value this item at 75 per cent, but they have low practice scores of 12.5 per cent. Other less qualified respondents do not place such a high value score on this item. The second item is 'your school provides staff with time to engage in research related activities' (B15). This item has the highest value-practice gap score for the three categories PhD, Masters and PGCE due to high value scores and low practice scores. The lowest score for this item is 46.9 per cent for BA and BEd respondents because of a high practice score of 28.1 per cent.

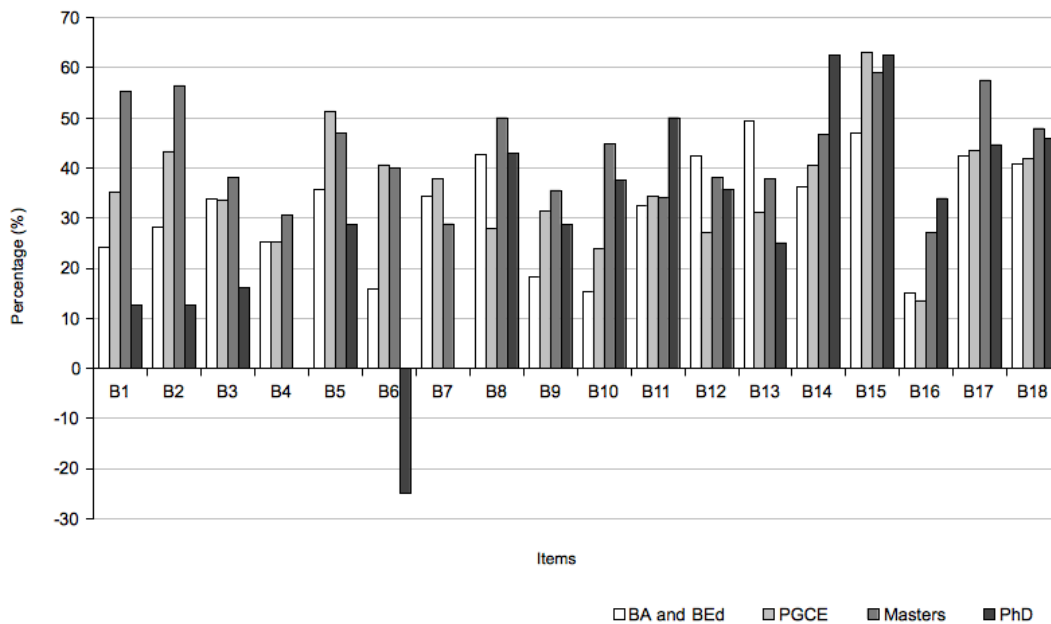


Figure 4.5: Section B value-practice gap scores by highest educational level

Figure 4.5 highlights the negative value-practice gaps score, of -25 per cent, for the item 'in your school research is discussed in professional development meetings' in the category of PhD. Respondents with PhDs have a practice score of

75 per cent and a value score of 50 per cent, hence they are discussing research in professional development meetings but do not see the value in doing so. The other categories all have positive scores for this item. This is the complete opposite of the other highest educational level categories. This maybe caused by PhD respondents being overly relied upon in these types of meetings because of their greater experience of research, or that they can see that discussing research in these types of meeting has little effect on the professional development of themselves and/or others. This is an area for further research.

In summary, it can be seen from these data that respondents with a higher educational level are more involved in research practices through their high practice scores. But these respondents are more likely to be critical of these research practices, this can be seen in their value scores. To some extent these results lend support to the assertion made by Biddle and Saha (2002) that practitioners with a higher level of educational achievement were more likely to have a higher regard for research. One caveat shown in these data is that practitioners with a higher level of education are more likely to be highly critical of the research practices in which they are involved.

These data do suffer from small subsample sizes, especially in the category PhD, however these data do show that cross tabulation is useful “in showing the general trends or tendencies in the data” (Cohen *et al.*, 2011, p.624). Greater subsample sizes would improve these data and the inferences that can be made from them. Nevertheless these findings provide a foundation for further work in this area.

4.2.3 Initial questionnaire exploratory factor analysis

In order to further understand the links between teachers, schools and research practices, factor analysis was conducted on the questionnaire data. Previous experience in the use of factor analysis, in the ESRC funded Learning How to Learn project, demonstrated that it would be a worthwhile method to use in this study. Factor analysis can be one of two forms; Exploratory Factor Analysis and Confirmatory Factor Analysis. Exploratory Factor Analysis (EFA) is used to explore unknown groupings of variables to find underlying patterns and clustering. Confirmatory Factor Analysis (CFA) is used for the testing of a found set of factors against a hypothesized model of groupings and relationships (Cohen *et al.*, 2011). In this study Exploratory Factor Analysis was used to explore the data rather than testing the data against a hypothesized model. As Robson states, EFA “seeks to replace a large and unwieldy set of variables with a small and easily understood number of factors” (2002, p.433), and is typically used as an exploratory tool. EFA is a statistical technique that has been “widely utilised and broadly applied” in the social sciences (Costello and Osbourne, 2005, p.1). Furthermore, Cohen *et al.* explain that EFA is:

...a method for grouping together variables which have something in common. It is a process which enables the researcher to take a set of variables and reduce them to smaller number of underlying factors which account for as many variables as possible. It detects structures and commonalities in the relationships between variables. (2011, p.674)

There are a number of broad statistical tests that should be conducted before EFA is carried out. These tests are used to determine if the data to be used is suitable for EFA. Initially, sample size and the ratio of sample size to the number of variables in the questionnaire are considered. Tabachnick and Fidell (2007, p.613) suggest that a sample size of 100 is poor and that 200 is fair, although others, Hutcheson and Sofroniou (1999) suggest using a sample size of at least 150 cases. In this study the sample size was 156, and consequently this was considered

enough to carry out EFA. Researchers also suggest that the ratio of sample size to variables needs to be considered, and again there is much debate about the exact number. “Different ratios are given in the literature, from 5:1 to 30:1” (Cohen *et al.*, 2011, p.676). When applying this approach to this study $n=156$ and the number of variables is 29, giving an acceptable ratio of 5.37:1. However the analysis was carried out by section, thus ratios could be calculated for each section thereby giving a ratio of 14.18:1 for section A and 8.67:1 for section B. As these are considered acceptable ratios EFA was used.

Further statistical tests were conducted to see if the data was good enough for factorisation. These include the Bartlett's test for sphericity³² (Bartlett, 1937) and the Kaiser-Meyer-Olkin³³ (Kaiser, 1970) measure of sampling adequacy. In this case these are covered below and the analysis is broken down by section A and section B.

Section A: You and research

Bartlett's test for sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy were carried out on the section A data. The results can be seen below:

- Kaiser-Meyer-Olkin 0.848
- Bartlett's test for sphericity $p = 0.000$

High values in the Kaiser-Meyer-Olkin test result, i.e. close to 1.0 and not less than 0.5, indicate that EFA will be useful, and for Bartlett's test of sphericity a significance value of $p < 0.05$ is a good indication that EFA is worth doing. Here

³² Bartlett's test for sphericity investigates the correlations between the variables, and should show statistical significance of $p < 0.05$ (Cohen *et al.*, 2011).

³³ Kaiser-Meyer-Olkin is a measure of sampling adequacy, this test correlates pairs of variables and the magnitude of partial correlations amongst variables. It requires many pairs of variables to be statistical significant and should yield a value of 0.5 or higher (Cohen *et al.*, 2011)

the results show that EFA can be used on these data and that it is worthwhile to proceed.

Factor analysis with varimax rotation to generate orthogonal factors was conducted for each section of the questionnaire based on the respondent's practice scores. Factors with Eigen values of 1.0 or greater were extracted. This yielded two factors accounting for 29.49 and 21.33 per cent of the variance³⁴ respectively, giving a total variance accounted for of 50.82 per cent. Only variables with factor loadings above 0.5 were considered for inclusion, having such a “high cut off gives considerable power to the factor” (Cohen *et al.*, 2011, p.680). Cronbach's Alpha (Cronbach, 1951) was also calculated for each factor. Cronbach's Alpha is an estimate of internal consistency reliability, and is sometimes referred to as the alpha coefficient of reliability. This measure increases as correlations between variables increase. Thus the following guidelines can be used to understand this:

- >0.90 very highly reliable
- 0.80 – 0.90 highly reliable
- 0.70 – 0.79 reliable
- 0.60 – 0.69 marginally reliable
- < 0.60 unacceptable

Cronbach's alpha coefficient was used to check the correlations between variables within a factor. Table 4.11 below shows the first factor, A1, for section A, the alpha coefficient, its definition³⁵, the component variables and the factor loadings.

³⁴ Rotated sums of squared loadings values.

³⁵ As Cohen *et al.*, state “the researcher has to devise a name [for] the factor [...] this can be tricky, as it has to catch the issue that is addressed by all the variables that are included in the factor” (2011, p.680). “Factor analysis is an art as well as a science” (Cohen *et al.*, 2011, p.679).

Table 4.11: Factor A1 definition and component items

questionnaire item		factor loading
Factor A1	Engagement with research	alpha = 0.759
	Engagement with research including reading, discussing, networking, collegiality	
AP2	You engage in research related reading.	0.786
AP3	You engage in research related networking.	0.736
AP1	You engage in research focused discussion with colleagues.	0.729
AP4	You engage in research related events.	0.557

Item AP4 loaded onto both factors with the value of 0.557 for factor A1 and 0.509 for factor A2. Cohen *et al.* state that “each factor should usually contain a minimum of three variables, though this is a rule of thumb rather than a statistical necessity” (2011, p.681), therefore AP4 was included within the factor A1. Item AP7, 'you have attended research focussed Local Authority events in the last year', did not load onto either factor in this section and was therefore left out of the factor structure.

Factor A1 was named 'engagement with research'. The items that comprise this factor all show a personal commitment and engagement with research through one's reading, discussion with colleagues focused on research, and further engagement in research focused networking and events. Thus the items in this factor are about the individual and how they engage with research.

Table 4.12 below shows the definition, the component variables and the factors loadings for factor A2.

Table 4.12: Factor A2 definition and component items

questionnaire item		factor loading
Factor A2	Engagement with the research community	alpha = 0.820
	Engaging with the wider research community including students, colleagues, academics and other research professionals	
AP11	You have attended research focussed academic conferences.	0.755
AP9	You have attended research focused college or university sponsored events in the last year.	0.742
AP8	You have attended research focused professional conferences in the last year.	0.712
AP5	You engage in postgraduate studies.	0.631
AP10	You have attended research focused outside organisation sponsored events in the last year.	0.624
AP6	You have received funds from school to carry out research.	0.565

Factor A2 was named 'engagement with the research community'. These items all highlight an interest in further engagement with research through post-graduate studies and attendance at a range of professional research based events, including academic conferences and university sponsored events. These items show a personal wider and broader engagement with the research community, outside the context of the practitioner and their own school setting.

The use of EFA allows the original eleven items in section A 'you and research' to be reduced to two underlying factors of 'engagement with research' and 'engagement with the research community'. Mean value and practice scores can be calculated to give a more useful overall comparison for section A.

Section B: Your school and research

EFA was also run on the section B practice data. Again Bartlett's test for sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy were carried out. The results are presented below:

- Kaiser-Meyer-Olkin 0.885
- Bartlett's test for sphericity $p = 0.000$

The results from these tests were again well above the acceptable range and showed that EFA could be conducted on the section B data. Again, factors with Eigen values of 1.0 or greater were extracted. This yielded three factors accounting of 29.73, 17.05 and 13.44 per cent of the variance respectively, giving a total variance accounted for of 60.22 per cent. Again only variables with factor loadings above 0.5 were considered for inclusion in the factor structures. Cronbach's Alpha was also calculated for each factor. Table 4.13 below shows the first factor for section B, the alpha coefficient, the definition, the component variables and the factors loadings.

Table 4.13: Factor B1 definition and component items

Factor B1	Promotes professional discussion of research	alpha = 0.737
	Your school encourages and promotes research to be discussed in professional capacity by teachers in meetings	
questionnaire item		factor loading
BP2	In your school research is discussed in departmental meetings.	0.841
BP1	In your school research is discussed in staff meetings.	0.741
BP6	In your school research is discussed in professional development meetings.	0.596
BP5	In your school research is discussed in SMT meetings.	0.526

Item BP3, 'in your school research is discussed in pastoral meetings', and BP4, 'in your school, research is discussed in parents', did not load onto any of the three factors and therefore these items were left out of the factor structure.

Factor B1 was named 'promotes professional discussion of research'. The items in this factor show that there is a professional dialogue by teachers around research and that research is considered and discussed in a range of meetings within a school. Thus the discussion of research is practised by teachers in a range of professional meetings and the school takes a professional view of the discussion of research by teachers. Item BP3, 'in your school research is discussed in pastoral meetings' and BP4, 'in your school, research is discussed in parents' do not load onto this factor or the other two section B factors. This may indicate the lack of research discussion that happens in pastoral meetings and in discussions with parents, or that teachers do not regard this in the same way as they do their professional discussion of research.

Table 4.14 shows the second factor, B2, for section B, the alpha coefficient, the definition, the component variables and the factors loadings.

Table 4.14: Factor B2 definition and component items

questionnaire item		alpha = 0.700
	Promotes teacher knowledge creation	
	Your school encourages the generation, use and discussion of research by teachers, encourages action research and provides funds	
BP8	Your school provides funds for research generation and utilization.	0.805
BP9	Your school encourages/facilities action research.	0.798
BP7	In your school research is discussed in informal networking events.	0.616

With Factor B2 although the three questionnaire items do load on the same factor, this may be regarded as the weakest factor in this analysis compared to the others, as Costello and Osborne state “a factor with fewer than three items is generally weak and unstable” (2005, p.5).

Factor B2 was named 'promotes teacher knowledge creation'. Although weak, the items within this factor point to a school that encourages its teachers to use and generate research knowledge. This may be done through action research projects with the results being discussed in informal events. The weakness of this factor may indicate that there is some way to go in the development of what Hargreaves has called the “knowledge creating school” (1999).

Table 4.15 below shows the third factor, B3, for section B, the alpha coefficient, the definition, the component variables and the factors loadings.

Factor B3 was named 'promotes wider engagement of the school with research and the research community'. The items that compose this factor all show that a school is able to encourage and promote building relationships with researchers, professional development of staff, provide research articles and provide staff with time to use research both in the planning of their teaching and in linking to school reporting procedures.

Table 4.15: Factor B3 definition and component items

Factor B3	Promotes wider engagement of the school with research and the research community	alpha = 0.818
questionnaire item		factor loading
	Your school looks to build relationships with researchers, encourage professional development, events and networking. Provide staff with new research and time so that they can use it in their teaching and reporting.	
BP18	Your school has a member of staff with responsibility to bring new research into school.	0.826
BP13	Your school provides opportunities for informal networking related to research.	0.806
BP12	Your school sponsors/coordinates research focused events (workshops, conferences).	0.801
BP17	Staff regularly discuss research to plan their teaching.	0.778
BP10	Your school builds ongoing relationships with external researchers.	0.774
BP15	Your school provides staff with time to engage in research related activities.	0.738
BP11	Your school encourages research related professional development (post-graduate studies).	0.735
BP14	Your school circulates research articles.	0.675
BP16	Staff at your school incorporate/link data to reporting.	0.573

For section B, the eighteen items of 'your school and research' was reduced to three underlying factors of 'promotes professional discussion of research', 'promotes teacher knowledge creation' and 'promotes wider engagement of the school with research and the research community'.

The use of EFA revealed a factor structure that reduced the overall 29 variables of the questionnaire to five underlying factors; two for section A and three for section B. Further analysis was conducted on these five factors to reveal their mean practice and value scores.

Mean practice and value scores for each factor

Following the example of analysis used by Pedder (2006), mean practices and value scores for each factor were calculated to give another way of analysing the gaps between teachers' values and practices for each of the factors. Paired sample t-tests were conducted to show that differences between practices and value scores were statistically significant (Pedder, 2006).

Figure 4.6 below shows the mean value and practice scores for the section A, factors A1 and A2. Teachers place a greater value score on a personal 'engagement with research', 71.7 per cent, than with 'engagement with the wider research community', 50.3 per cent. This may reveal that while teachers are willing to engage with research in a individual capacity, they may be more unsure of engagement with the wider research community. In effect the teacher may feel that they are not part of the research community and may feel a novice compared to other members of the community. Thus the practitioner is moving from expert teacher to novice researcher.

Equally the practice scores reveal that they practice 'engagement with research' more than 'engagement with the wider research community' at 51.3 per cent and 26.2 per cent respectively. This figure shows that although teachers are able to engage with research in a personal capacity and that they value this, they are unable to have as much engagement with the wider research community. This finding makes sense due to the nature of teachers' jobs, where most of their time will be spent in classrooms teaching. Only about a quarter of respondents were able to engage with the wider research community and yet twice as many respondents valued this wider engagement.

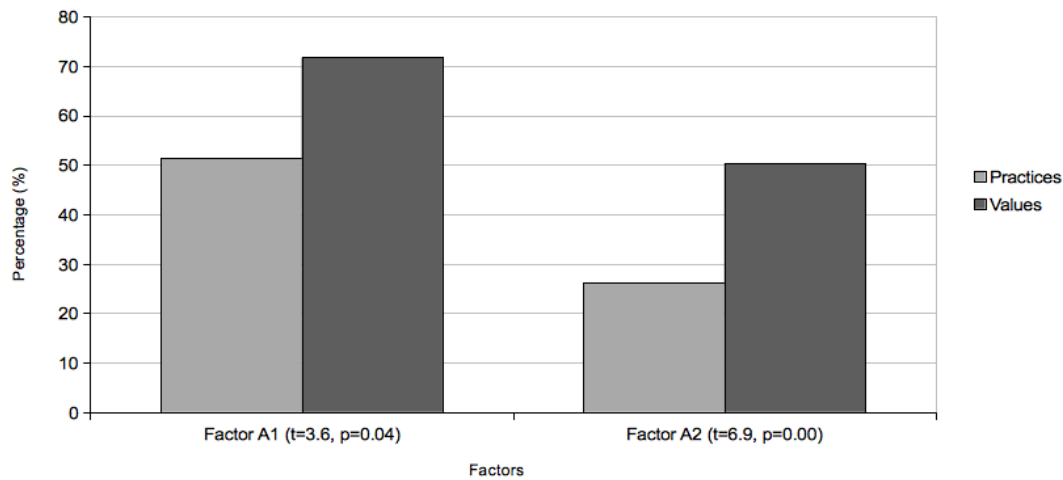


Figure 4.6: Section A you and research factors : A1 – engagement with research, A2 – engagement with the research community

These findings correspond with Cooper and Levin's finding that “respondents reported [...] that personal experience was the most powerful influence on their views, followed by colleagues or professional networks” (2010, p.363). The teacher's personal experience of, and engagement with, research is the most valued and the most practiced in Figure 4.6, and this is followed by engagement with the wider research community, colleagues, academics and professional networks.

Table 4.16 below shows the mean value and practice scores for the section B factors.

Table 4.16: Section B factors mean value and practice scores

Factors	Values (mean scores)	Practices (mean scores)
B1 - promotes professional discussion of research.	67.8	31.7
B2 - promotes teacher knowledge creation.	55.6	22.8
B3 - promotes wider engagement of the school with research and the research community.	60.9	23.2

It can be seen that teachers' mean value and practice scores are the greatest for factor B1 'promotes professional discussion of research'. Thus teachers place a high value on the professional discussion of research in their work meetings at 67.8 per cent. Teachers place a slightly lower value on the wider engagement of the school with the research community, at 60.9 per cent and a lower value on the practices that help teacher's generate their own knowledge at 55.6 per cent, but this mean value is still over half the respondents. The practice scores, however, show that teachers are constrained by their daily work or unsupported by their schools in these practices. Mean practice scores for these factors are 31.7 per cent, 23.2 per cent and 22.8 per cent respectively. Figure 4.6 below shows these figures.

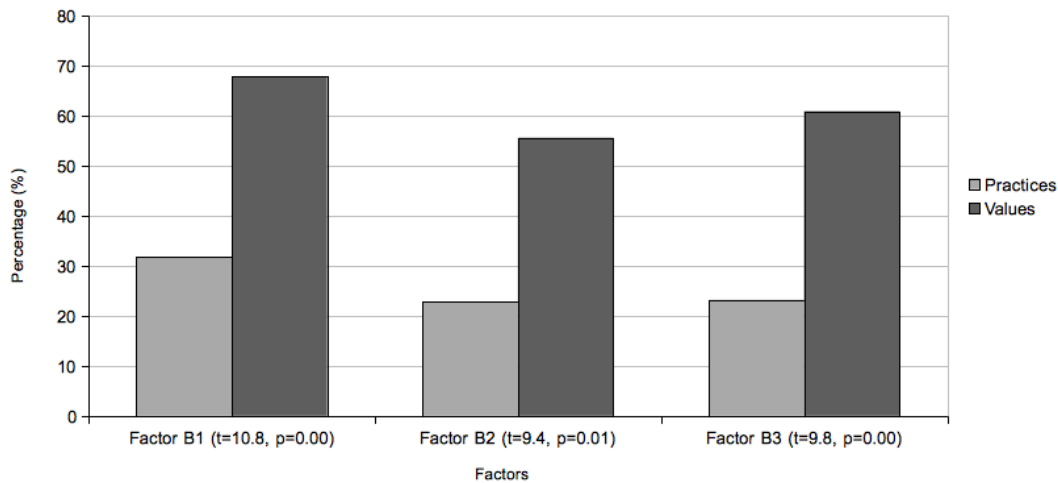


Figure 4.7: Section B your school and research factors : B1 – promotes professional discussion of research, B2 – promotes teacher knowledge creation, B3 – promotes wider engagement of the school with research and the research community

Cooper and Levin's findings suggest that “schools [...] tend to lack formalised research capacity, resources or time to engage with research” (2010, p.363), and the mean scores of these factors would confirm this. Teachers value these three factors but are constrained in their practice and schools may have difficulty supporting these practices. As Cooper and Levin state, “one of the key considerations is whether there is an infrastructure (people, policies, systems, processes) that support and facilitates KM, whether in research or in practice organisations” (2010, p.360). Thus schools need to support teachers if they are expecting them to engage with research and use this on which to base their practice. To state it more formally, these findings suggest that schools are better at promoting and supporting teachers in their professional discussion of research than they are at promoting the wider engagement of the school with research, and the research community, and in promoting and supporting teachers in knowledge generation activities.

4.2.4 Reflections on the method

Overall the use of a double Likert scale questionnaire to gather this kind of data can be judged as having been successful. The use of two Likert scales allowed both value scores and practice scores to be gathered at the same time and has produced a range of interesting and insightful findings. The method has allowed value-practice gap scores to be reported, highlighting where practitioners may be constrained in their practices or even where practitioners are doing activities that they do not value. The use of the double Likert scale extends the research beyond a simple rerun of the original work completed by Levin and Cooper (2010) and their research team.

Two statistical tests that were tried with the data, these were Exploratory Factor Analysis (EFA) and cross tabulation. The EFA was exploratory and produced an unexpected and robust underlying factor structure. The cross-tabulation provided interesting and useful findings but this is offset by the problems of small subsample sizes. An increase in overall sample size and subsample size would improve these findings and make them more rigorous.

4.3 Findings of the interviews

In this study interviews were carried out to provide a further depth of understanding to the issues that were raised in the literature and the themes that emerged from the initial quantitative data. The interviews also provided a way for the insights and opinions of practitioners to be considered in this study and allowed an understanding of the daily problems and issues that practitioners have to deal with when trying to use research knowledge in their practice. The questions used in the interview schedule were developed both from the feedback that was gained at British Educational Research Association (BERA) conference (2012), when early findings from this study were presented, and from the themes and issues that were raised in literature. The themes of the original interview questions were; conceptions of research, teachers' use of research evidence, basing practice on research evidence, current sources of new knowledge, and your school's encouragement of the use of research. A number of themes emerged during the analysis of the interview data, these included money, time, postgraduate study, and professional judgement.

The interviews were also used to gain an understanding of the value-practice gaps that were observed in the quantitative data. Thus the intention was not just to provide descriptions of teachers use of research practices and their use of research knowledge, but also try to understand why there are value-practice gaps in the quantitative data.

Due to the relatively small nature of the sample, direct quotes of interviewee data are presented rather than a developed amalgamation of data from across a number of interviewees. Cohen *et al.* explain this approach as:

Some researchers feel that it is important to keep the flavour of the original data, so they report direct phrases and sentences not only because they are often more illuminative and direct than the researchers' own words, but also because they feel that it is important to be faithful to the exact words used. (2011, p.539)

This approach allows a faithfulness to the words of the interviewees rather than the production of an interpretation across a range of interviewees. It was felt by the researcher that this faithfulness to the original data was more powerful in the reporting of the findings.

4.3.1 Current conceptions, uses and sources of research knowledge

Practitioners' answers to the original interview questions are discussed, followed by themes that emerged in the course of the interview and through the subsequent analysis of the interview data. The themes of the original interview question were; what is research or evidence, teachers' use of research evidence, your use of research evidence, your current sources of new knowledge, and your school's encouragement of the use of research. The additional themes that emerged from the analysis of the interview data were money, time, postgraduate study, and professional judgement. These findings provide a further depth of understanding to the quantitative data that has been presented in the previous section. These findings will also be used to improve the next design iteration of the online pathways approach³⁶. All interviewees are referred to as female for ease of analysis.

Question: What do you think research or research evidence is?

This question asked interviewees what they thought research or research evidence was. This question was used to see if there were different conceptions of research evidence from the range of participants. Colleagues at the BERA conference

³⁶ See <http://www.meshguides.org>

(2012) had highlighted that it was important to see if teachers have different conceptions of what research and research evidence are.

Research for me in terms of the educational setting is a way of being able to research different practices that work, or might not work and being able to improve them and then to make your practice better. And the evidence from that research can then be used to help improve your practice. (NF, secondary English teacher)

In this case the interviewee is only considering her research of her own practice, in an iterative action research form. When questioned more broadly about the research of others, she discussed other teachers in a school context.

For example there is some research in science, well I'm not going to use that. (NF, secondary English teacher)

Researchers need to be aware that teachers are very bound up in the context of their daily working lives, their subjects, their classrooms, their pupils and therefore see research from that perspective. The online pathways approach needs to reflect this in its design.

I think that sometimes you do find out things that don't work and that people don't like and actually that's just as important as what does work and what people do like. (OW, secondary psychology, HoD)

This interviewee highlights that negative findings, or what does not work, are equally as important as what does work. But for this interviewee research was still bounded in the context of the classroom. Other interviewees had a broader, more process driven, approach to what research is:

Research evidence is getting information together to answer a hypothesis or a question, a research question of some kind. That may be obtained by a wide variety of research methods. (ZT, secondary SMT member)

I think research is somebody going out to find something out and investigate whether a certain theory works or whether something is a good way forward or not and then obviously the data that they collect is the evidence to say yes this is good or no that's not working, which then should in theory guide our practice. (WL, primary head)

Research evidence in an educational context is a collection of work which is conducted through both qualitative and quantitative approaches following methodologies which are legitimate, looking to give correlations between or evidence on ideas, and propositions and to see whether there's a basis of evidence within it. (WN, secondary head)

For another interviewee engagement with research is about getting away from what is a work view of research to a more philosophical view.

But I think research for me is something much more philosophical. Its an engagement with strategy and its an engagement, with psychology and trying to apply that. (TJ, secondary History HoD)

These quotes highlight three broad views of what research, or research evidence, is; feedback and evidence to make changes to one's personal classroom practice, a process view of research gathering data to answer research questions, and a deeply more philosophical engagement as to how research can be used to inform strategy. These views change with different roles in a school. These views resonate with Levin's review that:

...most studies show that educators at all levels have a strong interest in research findings that can usefully inform their work (Biddle & Saha 2002; Landrum *et al.*, 2002; Rickinson, 2005; Cordingley, 2008; Berhstock *et al.*, 2009). At the same time, as Tseng (2012) points out, educators have very different ideas about what 'counts' as research. (2013, p.18)

Question: What do you think teachers uses for research and evidence are?

This question moves beyond what interviewees think research is, to what they think they should be doing with research or what they think people should be using it for.

...our key use is about raising achievement but I think as well there is always an element of raising enjoyment of learning. (OW, secondary psychology HoD)

Raising achievement is one of the reasons for using research, and although an important issue, this may not be the only reason for using it. As this interviewee states it also needs to be remembered that there should be enjoyment in learning. Another interviewee offered:

But I think for most teachers, especially the new generation, research is very much problem solving, it's going beyond the classroom and trying to find solutions to issues they have in the classroom and trying to experience, to sort of add to that pedagogy or whether its looking at a more philosophical approach to teaching and learning. (TJ, secondary history HoD)

This interviewee highlights two points; that research can be used to add to pedagogy and can be used to solve problems that are based in the classroom, the 'engineering' model (Hammersley, 2002, p.38), but also that research enables teachers to establish, or become aware of, a more philosophical approach to teaching and learning. This second point is about using research to challenge the beliefs and values of teachers, the 'enlightenment' model (Hammersley, 2002, p.38), again moving beyond a purely 'what works' conception of research.

A primary head highlights the difficulties of introducing new practices into a school, and that these new practices had to be based on research to get past the

questions of the staff.

I think teachers need the confidence because the first question when ever you introduce anything new is, but what do OFSTED think. So what you need to say is [this] has been proven by this, this and this and this is the research, have a read of this programme, see what you think of this guy here. (WL, primary head)

Thus teachers concerns about changes of practice are that they need to be research based. Not to prove that this is good practice to raise attainment, for example, but that they can justify their practice to the inspection agency. The headteacher further explains how she thinks this is a larger problem of teachers' lack of confidence.

I think people need the research, to know that its worked somewhere else, and that it is the right thing to do. I think we are very lacking in confidence as teachers. (WL, primary head)

This lack of confidence may be caused by a lack of knowledge about research, with teachers unable to make informed decisions about their own practice based on research. As Levin states, educators have:

...difficulty in finding relevant research, reports written in ways that practitioners find hard to understand, lack of skill to interpret research, and the difficulty in knowing how to apply much of the research in daily practice. (2013, p.18)

All of these challenges are faced by teachers and could be improved with more engagement with research, but as this headteacher states, teachers need to have more confidence in justifying their practice to outside inspections.

This interviewee was also critical of teachers' use of, and engagement with,

research.

I think we use a lot more anecdotal evidence if you see what I mean, as opposed to true evidence based on good quality rigorous research. (OW, secondary psychology HoD)

...lots of the teaching forums [TES] these days are people sharing what works for them and so I don't actually think we do use rigorous research as our evidence for raising achievement. (OW, secondary psychology HoD)

Again this highlights the perceived lack of engagement with rigorous research by teachers and the use of anecdotal evidence on which to base practice. This supports the assertion of Cordingley *et al.*, (2004) that “...personal recommendations from colleagues affected what research was even considered by teachers, let alone whether it was accepted” (cited in Levin *et al.*, 2010, p.5). As noted in the previous headteacher's comment this maybe due to a lack of self confidence and critical engagement with research by teachers.

Teaching, although important, is one part of the work in a school and other factors are also involved in the development of teaching and learning.

Well not totally research, I mean research had a part to play in terms of the teaching and learning and in the development of the teaching and learning but it was many factors, you know it was change in headship, change in leadership, change in direction and strategy. (ZT, secondary SMT member)

This quote shows that other aspects of organisational culture have a part to play in the development of teaching and learning in a school and that the use of research cannot be isolated from these other factors. As Levin states “research evidence is mediated through personal experience, collegial knowledge and organisational culture” (2013, p.12).

Question: Do you think your practice is based on evidence?

This question asks, whether practitioners think that their practice is based on research evidence and the use of research evidence. In other words, how much, and in what ways do they think they are using evidence at the moment?

My practice is based on the feedback I get. I use the feedback I get from my observations, from my appraisal, my performance management, and OFSTED if they come in, and also what I have to do. I know that our school needs to get more, show more good and outstanding lessons and my lessons accordingly and I do the best I can with, you know, with what I have to do. (NF, secondary English teacher)

This teacher may be confusing the two ideas of evidence and feedback. This quote also reveals some of the pressures teachers are under to constantly produce outstanding lessons. These pressures come from both internal and external sources. There are personal pressures to do well and pressure for her school to do well. She is aware of all these pressures. The interviewee was further asked if she gathered feedback from her pupils.

Do you know what I didn't even really think about it in terms of feedback from the kids. (NF, secondary English teacher)

Thus with all the obvious internal and external pressure put on this interviewee, feedback from the pupils may be overlooked, which is concerning. Another interviewee highlighted how studying for a Masters course had changed her attitude towards the use of research in her classroom.

I think that once you've opened that door [to research] and you've realised that your lessons can be better, more enjoyable, your students can achieve better, then it actually opens the door for your thinking that, actually research has got a place in the classroom, but it's not always easy. (OW, secondary psychology HoD)

The idea that you open the door to research and that once open you cannot close it is useful, and is an awaking of awareness and engagement with research from this practitioner. This resonates with what Hammersley (2002) has called the enlightenment model, where knowledge and ideas influence the way practitioners think about their work (2002, p.38). For another interviewee the use of research evidence was about the generation of their own evidence for backing up their own practices.

What we do try and do, is with anything that we put in place, we try and ascertain the impact of it, whether it is through qualitative observations of children or whether it's through analysis of our data. (QG, nursery teacher)

So sort of on a basic level, we are making sure that there is evidence for what we do. (QG, nursery teacher)

This suggests that observation and analysis of data are used to generate data on which to justify changes of practice. The following headteacher interviewee explained that the CPD programme in her school was underpinned by educational research.

...that CPD programme that we have in place here, and everything that programme is run by, is underpinned by educational research. (WN, secondary head)

Again this comment highlights the difference in how the nature of the use of educational research changes with the different roles in the school. Thus rather than the specific use of research by teachers, this head explains how all the CPD in the school is underpinned by educational research. The interviewee below again explained how research and CPD were related.

...the CPD aspect certainly involved a fair amount of research and generating research for other members of staff. (ZT, secondary SMT member)

Interestingly this CPD programme generated research for other staff within the school, rather than just explaining how that research could be used to justify changes in both practice and policy.

The use of research evidence can be interpreted in a number of different ways, depending both on the context of the practitioner and the underlying pressures that may be guiding that practitioner. Hence practitioners' use of research is for feedback, and to support the use of practice and policies within a school, rather than some kind of narrow use in which all research evidence is used to raise attainment. Although these interviewees talked of the use of evidence in a number of ways, there is an underlying theme of using evidence to support or justify what they are doing, so that when they are asked, be it an internal or external evaluation, they can point to the use evidence to justify their practices.

Question: What are your current sources of knowledge to support your practice, where do you get information from?

This question looked at the current sources of knowledge that teachers use. This question provides insights into how the online pathways resource would fit into the current range of knowledge resources that are available to practitioners. As Levin states, “practitioners have a range of connections to research and ways in which to find and use research” (2008, p.7). The first interviewee suggested that my question needed to be divided into both pedagogic knowledge and subject knowledge.

Right, subject knowledge I get from lots of different sources of research, and teacher knowledge I get from the OFSTED framework cause that's what I have got to do and school and department policy. (NF, secondary English teacher)

OFSTED framework. Yeah yeah, oh, that is chucked at us all the time. (NF, secondary English teacher)

This interviewee highlights that because she is measured against the OFSTED framework, then that is what she needs to know and to base her practice on. Another interviewee talked about the use of government documents as a source of information.

We also do, as a school, use quite a lot of the kind of new ideas brought in by government but we are quite picky and choosy and we pick the ones that we like so we work quite a lot on the PELT skills. (OW, secondary psychology HoD)

This quote shows that some schools have the confidence to be “picky and choosy” about what they are prepared to spend their time doing. They are able to use their professional judgement about new ideas.

A number of interviewees mentioned that they used online forums for sharing resources with other teachers.

There are times when I will go on the TES website and I will look at some resources and someone will be saying this worked really well with that group but you differentiate this bit, then you'll do it. (NF, secondary English teacher)

You go to TES and you look at a couple of things oh that looks good oh yeah we'll have that, we'll get that. I'll differ that and tweak that and make that more appropriate for the group. (NF secondary English teacher)

But as these quotes show, the resources that are shared have to be critically assessed by the teacher for use with their groups and these resources will always need to be edited or tweaked before they can be deployed in the classroom.

One interviewee explained how working with trainees was a source of knowledge for her.

Well I've got a trainee again this year, [...] I think certainly by working with them and having them come back and say to me, 'right we have been talking about so and so today' - OK right never heard of them explain, that's certainly a great source I think of knowledge. They come in and they are hearing things for the first time often and they are really excited by it because they are talking about [it], and it [is] always the same, always back to a bit of Vygotsky but there is often something new thrown in because it's a new government report that they have been told that they have got to learn about. So that is certainly a great way of finding things out. (OW, secondary psychology HoD)

Thus trainees give this interviewee an opportunity to re-engage both with the educational theories that her trainee is discovering for the first time, but also she is made aware of new policy documents and procedures that are highlighted to the trainee. Cooper and Levin have highlighted in their work that graduate students can be a bridge between the research and practice worlds. As they state, “developing these practitioner-researchers into intermediary agents between university researchers and schools has the potential to be a productive linking mechanism” (Cooper and Levin, 2010, p.361).

For this interviewee knowledge is what is in academic journals and she explains the difficulties of accessing that knowledge.

Obviously that's gonna be a little more difficult. That's one thing, as a school, we are not good at. We don't have any subscriptions to university libraries or journals online. That's where we do, as a school, fall down a little bit. We rely on people like me for the last three years who do have memberships and they find stuff and bring it in for us to look at. So I think that's somewhere we would like to extend but it's just prohibitive for a school. (TJ, secondary history HoD)

This quote highlights the difficulties schools have in gaining access to journals and how the cost of these subscriptions is beyond the resources of a school. Although as the interviewee points out the subscriptions of current Masters students can be used to gain access to online journals through university libraries.

Subject associations were also highlighted as good sources of up to date knowledge.

So that's historical association, geographical association, politics association. They're good. (TJ, secondary history HoD)

I don't do as much academic reading as I would like to but I do tend to use quite a lot of the teacher exchange websites which particularly because of the subjects I'm involved in, the psychology and sociology which is research based stuff. The teachers of it tend to be very keen to know the theory behind it. (OW, secondary psychology HoD)

This second quote shows that subject associations and the teacher associated with them will be online, sharing knowledge and resources with each other. Subject associations are no longer based around the monthly magazine that arrives in the staff room and it is very important for them to have an online presence.

Finally a headteacher interviewee highlights that she gains access to knowledge through the use of her own personal network.

I think one of the key sources of information comes through working with other colleagues. Networking is a massive thing and you know there is a lot of sharing. (WN, secondary head)

Professional educators networks, both online and offline, are a way of gaining and sharing information across all roles in schools, see McCormick *et al.* (2010) for more information on professional networks in education.

This is a broad and varied array of knowledge sources that the online pathways resource will have to complement. These sources of knowledge show that there is a lot of competition in this area and resources need to be specific, trusted and focussed. For practitioners one of the difficulties is sorting the wheat from the chaff.

Question: Does your school encourage you to use research in your teaching?

As highlighted in the literature it is important that practitioners are supported in their use of research on which to base their practice (Levin, 2004, 2008; Nutley *et al.*, 2007; Cordingley, 2008). Thus organisations need to be supporting practitioners. Interviewees were asked if they felt supported in using research.

It never did [the school], I'll be honest, it never ever did, until this year and we have got a new CPD system, at the moment where instead of having, like, training evenings where we have people stood in the hall and talking to us for a couple of hours which is always fun, we decide on our own professional development and we decide what area of professional development we would like to work on. (NF, secondary English teacher)

Here there is a change in the way professional development is managed in a school, giving more autonomy and choice to the teachers over the content and focus of CPD. The same teacher highlights that doing your own research is now part of the CPD programme.

...in order to do that I have got to undertake some research. So from what I can gather the whole school are (*sic*) having to under take some research. (NF, secondary, English teacher)

So teachers undertaking research is part of the new CPD regime, within the school, although staff may not be completely behind the rhetoric of the programme.

...they keep saying its progressive and we are taking more responsibility and blah, blah, blah. (NF, secondary, English teacher)

Other interviewees explained that they are supported by the school as long as they have a rationale for what they are doing.

Yes! I would say in that respect we have got one of the most laid back schools I have ever worked in, in the sense that as long as you can explain why you are doing what you are doing. (OW, secondary psychology HoD)

So as long as you have got a reason and your reason is to improve something, we are just allowed to get on with it really. Which is really really nice. (OW, secondary psychology HoD)

Again the idea of external evaluation is always prevalent amongst teachers (Ball, 2003) and schools, and any changes of practice or the use of research to do that have to have a rationale. Another interviewee highlighted how staff are being allowed to engage with research that they are interested in.

Yes definitely, definitely, [at the] beginning of the year, we each have a sort of project that we take on our particular area of interest and we tend to look at that research, do whatever it is we want to do and just analysis the impact at the end, just as part of our general development I suppose as practitioners. (QG, nursery teacher)

Again teachers are allowed to follow their interests and look into areas that they think will help their practice. The following interviewee comments how teachers are placed in triads so that they can engage with research.

We think it's important that people research. We have learning triads, teaching triads whatever you want to call them, where we are basically teamed up with two other teachers and we observe each other teach and we sort of do a little bit of action research as a trial and get a different group every year, we get names out of a hat. (TJ, secondary history HoD)

Sometimes you're with people you think, oh god, but its nice in a way because you see a different side of them and people you didn't think were that good at teaching actually are pretty good, and they just don't teach the way you teach and you can pick something up from them. I quite like that but it's very action research based. (TJ, secondary history HoD)

Here triads are used so that teachers engage with research and carry out small research projects, but also the triads are engineered so that there is cross departmental collaboration, so that ideas can be shared across the school.

This new headteacher shows an enthusiasm for the use of research in her school.

...definitely, definitely I think particularly as a new head coming in, I've obviously brought in a load of ideas which either I've tried and tested and trusted or it's something that is current in terms of educational thinking so we are in quite a dramatic period of change at the moment. (WL, primary head)

Equally another head highlights again that they want colleagues to engage in risk taking but always being aware of external evaluation.

Well I think we encourage that, you know, it's not. What we want is, we want colleagues who are able to take risks to a degree and evaluate the effectiveness of what they have done. (WN, secondary head)

This head shows that although she is happy for colleagues to take risks, the reflection of that practice, or the evaluation of practice, is something that has to be considered. All these quotes suggest that schools are supportive of staff taking risks and are prepared for staff to use research to change their practice, but always being aware that they may be evaluated and that reflection, evaluation and effectiveness of any changes needs to be considered as part of these changes of practice.

4.3.2 Themes that emerged from the interviews

These are some of the themes that were developed during the process of the interview analysis. These themes, although not specifically sought for in the process of the interview, emerged during the analysis of the transcripts. These data are included here due to their relevance to the study.

Money

A number of interviewees mentioned that money was one of the biggest issues when it came to teachers' engagement with research.

...we are still fighting for survival in a way because our budgets have been cut to the point that we may not survive another year so we feel quite... [...] We feel that early years is..., the research is saying one thing and yet the purse strings are saying something else. (QG, nursery teacher)

This interviewee highlighted that the research into early years education³⁷ had shown its value and yet these types of institutions were having their budgets cut. Other interviewees suggested that money was one of their biggest constraints.

³⁷ The DfES funded studies into early years education: Effective Provision of Pre-school Education (EPPE) 1997 – 2003; Effective Pre-school and Primary Education 3-11 (EPPE 3-11) 2003 – 2008

...I think the only constraint is sort of money, I can't go on courses that I would like to go on, I can't go and observe members of staff that I would like to observe because they have got to take my cover, and I can't get cover. (NF, secondary English teacher)

In school literally time is money. If a teacher needs to be out of their class for a course or other CPD activity then someone needs to pay for a cover teacher. A SMT member who had been in charge of CPD budgets in her school explained.

There is only ever going to be two constraints for teachers I think, one is time and one is cost. (ZT, secondary SMT member)

When probed further this interviewee explained the costs were incurred when teachers were out of school.

Well I mean in terms of cost you would be looking at about £180 a day [for cover], £180 a day for a member of staff being out. (ZT, secondary SMT member)

Thus to get a teacher out of their own classroom is £180 before they have even left the school. This interviewee further explained that a typical course could then be up to £500 for the day. It can be seen that the training of practitioners is very expensive.

As Bolam and Weindling point out, “value for money, as a potential feature of CPD, is rarely taken into account in evaluations of CPD effectiveness” (2006, p.104). The difficulty in making a value for money judgement has been identified in a previous report by Ofsted and may be one of the reasons for the lack of research on this topic:

Many [school managers] doubted that a value for money assessment was feasible. And yet they were making a considerable investment in CPD activities, but could not establish convincingly if they were worth the money. (Ofsted 2006, 21). (Opfer and Pedder, 2010, p.416)

Time

Lack of time for teachers to engage with research was one of the findings of the initial questionnaire. Teachers' lack of time has been noted by a number of studies (Salleh, 2006; McCormick *et al.*, 2011; Levin *et al.*, 2010; Cooper and Levin 2010; Witherow, 2011). These extracts highlight that teachers lack the time to read the research that they are given and to think about and discuss it.

We get thrown lots of random bits of research but I would say 99 per cent of teachers don't have time to go away and read about the quote that someone has decided that we need to be told. (OW, secondary psychology teacher)

I think the general feeling at the moment is that a lot of teachers just don't have the time and they are feeling stretched and their managers just don't understand them and I think that all teachers would love to have more time to just think and talk. (TJ, secondary history HoD)

Thus if teachers struggle to read and discuss the research that they are presented with, it can be seen that it will be difficult for them to search for other research knowledge and online resources that could be used to support changes of their practice. The headteacher in the following quote shows how her use of time has changed with her change of role from class teacher to head.

As a class teacher I never had time to look into any of that but as a head that's what I spend a lot of my time doing, finding things out and kind of cascading it down to staff and just drip feeding gradual little bits. (WL, primary head)

This headteacher is very aware of how much new research she should be giving to her staff, not over burdening them with information. The following interviewee had other problems related to time and the internet.

...there are occasions, I don't often read forums or anything because I just get bogged down and I'll be there for quite a few hours and I really don't have the time to be honest. (NF secondary English teacher)

One of the problems of reading online forums, or sites that share resources, is the way in which one could get easily distracted from the task in hand.

Postgraduate study

The recent encouragement and support for teachers to study for Masters degrees towards the end of the term of the last Labour government has had an effect on the number of teachers who have engaged with research through their recent Masters courses. Access to postgraduate study allows “teachers to develop a more robust and critical stance through the process of their own research, as well as a vocabulary and confidence to access wider literature” (Hall, 2009, p.672). Thus interviewees talked about their experiences of their Masters courses.

It has made me certainly more aware of research out there and certainly makes me think about it more and also much more willing to engage with other staff members about what their research has discovered. (OW, secondary psychology HoD)

So I think that by being involved in research has certainly left me more open to it. (OW, secondary psychology HoD)

For this interviewee the process of studying for a Masters has made her more aware and open to engaging with research, including discussing research with

others. Another interviewee explained how her work on her Masters would be fed back into the work of the school.

I was one of the first to go on the Masters programme, others had done it in their own time but we started to develop that all new teachers were to go on to the Masters programme and involve themselves in research. And if the school was contributing towards that research ultimately the dissertation side of things would be school based in some way which could be fed back into the school. (ZT, secondary SMT member)

Thus here the Masters course is engaging teachers in research and providing evidence for schools to use.

Professional judgement

The role of professional judgement has been shown as important in evidence-informed practice (Hammersley, 1997; Hargreaves, 1997; Chalmers, 2003; Cordingley, 2004; Elliot, 2004; Biesta, 2007;). These discourse extracts show that teachers are able to make a professional judgment when engaging with research and are not willing to accept changes without some kind of consideration of its value. These kinds of judgements are an important part of evidence-informed practice as opposed to evidence-based practice.

...its about looking outside of the classroom and looking outside of where you are and getting in touch with the literature, and then seeing if that's applicable and trying to find models and approaches that can improve your practice. (TJ, secondary history HoD)

This comment suggests that teachers are aware that one size does not fit all, and that teachers need to be able to judge if something will work in their classrooms. This professional judgement can be helped by further engagement in the world of research through programmes such as a Masters degree.

But it is very much that you need to share and actually I would say again that my department is very good at that. That we do spend quite a lot of time, particularly the three of us who are full time, sitting down discussing things, why did that work? Now not all of our conversations are kind of deep within pedagogical theory or anything, kind of too deep but a lot of it is well why, why, what is it about? That activity that the students got what is it and often on the fringes of the conversation there is the kind of ideas that we know from pedagogy but we just don't always make that kind of clear link in a conversation. (OW, secondary psychology HoD)

This comment shows that teachers reflect on their practice, both on an individual level and with their colleagues in their department. Judgements are also made at a school level.

...we also do, as a school, use quite a lot of new ideas brought in by government but we are quite picky and choosy and we pick the ones that we like so we work quite a lot on the PELT skills. (OW, secondary psychology HoD)

Thus professional judgement is also exercised by the school, so that the school does not waste time on ideas that are either ill thought through, or would be wrong for that particular school and it's pupils.

Further this head discusses the use of professional judgement in terms of trying to second guess what new initiatives will be.

...we are looking in terms of research for kind of leading a school is at a very high level because we're in many ways looking to see whether an initiative is going to be of benefit. We are testing it against, you know, the merits for pupils within our own schools and we are choosing to ignore and disregard what we feel is not worthy of time and effort and do the few things that really can make a tangible difference and impact. (WN, secondary head)

It is reassuring that underlying any new initiative, the head is interested in what

the merits of it are for the pupils in the school, and if there are not enough merits then the initiative is ignored.

But there are times when you have to be brave as a school, you know to say, despite the fact there might be, you know, political pressure and pressure from government about a particular area, that might not be right for us and for our particular constituents, our particular stakeholders. (WN, secondary head)

Again judgments are made to make sure that initiatives or changes of practice are right for this school, with these pupils, at this time. These kinds of professional judgements should be informed by research but also by the experience and tacit knowledge of professional practitioners. Practitioners and schools need to have the freedom to deploy these judgements for the benefit of their pupils in their schools.

4.3.3 Reflections on the method

The interviews generated a large amount of qualitative data. The process of analysis of this data revealed the difficulties of keeping interviewees on the correct subject. The interviewees have a habit of talking about what they want and one of the difficulties highlighted during the analysis is keeping them talking about the focus of the interview without cutting them off and appearing rude.

Interviews were conducted face-to-face, on the phone and on Skype. It was noted that the researcher relies more on the question schedule when using the phone or Skype than when they are face to face. When the interview is face to face there are visual prompts that are used to make the conversation flow. When using Skype or the phone these visual clues do not exist and the researcher has to rely more on the interview schedule to move the interview on. Thus a good schedule with a logical sequence to the questions is a must for non face-to-face interviews.

Overall the interviews contributed useful data due to the one to one nature of the interactions. The fact that the researcher is able to give the participant their full attention and is able to listen and follow up on points that the participant raised, is important. The qualitative data generated by the process of interviewing, complements and provides a better depth of understanding to the quantitative data. It is difficult to see how this could have been achieved by other methods.

4.4 Findings of the focus group

After an initial demonstration of the online approach the members of the focus group were engaged in a conversation through a series of questions. Although the questions were based on a schedule the focus group was a semi-structured interaction with the researcher willing to let the discussion evolve if it was deemed to be pertinent to the aim of the session. The focus group lasted for forty minutes and generated twelve pages of transcription. The findings below are divided into three parts; how the online pathway resource fits with their current practice, the themes that emerged from the focus group discussion and themes around the look, feel and design of the online pathways resource.

4.4.1 Fit with current practices

These findings are presented through the questions that were asked in the focus group and are about how the use of the online pathways approach would fit in with practitioners' current practices. This provides practical aspects rather than thematic aspects of the findings.

Question: Would you use a resource like this?

The initial question explores whether participants would actually use a resource of this nature. They stated that:

We thought it was really useful. (FE)

Yeah once we had got our heads round it we thought it was really useful.
(FG)

Other participants stated that:

I think this potentially huge, this has a huge amount of potential what I'm thinking though is if it became so big that you need someone almost working full time on it to keep it updated [...] so that someone can be employed, because it has got to be up to date the whole time. (DN)

These statements highlight that the resource would need to be kept up to date, and content would need to be reviewed on a regular basis by a competent number of reviewers. The content of the resource needs to be current, trusted and rigorous.

Question: How would you use it?

Participants all agreed that they would use the resource, but the next question was how would you use a resource like this, how would it fit with your current practices?

But I can see this as something that all students across England PGCE, NQT could use once it is set up in a very high quality way. (DN)

All participants agreed that this would be a good resource for both PGCE students and NQT who need supporting in their first post university position.

It takes a minute to kind of go ooo how's that work but once you have been shown. So I guess it would be worth them showing... if its for an NQT resource then at the end of the course PGCE or BA or whatever course the person has done. Then they do like a session specifically on, this is how you use this, you can access this, whenever once you have left the university. (FE)

Participants were concerned that a resource like this would need to be introduced as part of a training course so that students were aware of it and would consult it.

Yes cause it does have to be a long session, not ridiculous, just a half hour, an hour, so people can write down the address. (FE)

It can be seen that the intuitive nature of the user interface is good enough so that any training session would not need to be long, a short session would be enough for students to learn how to use the resource. Participants also commented on the growing nature of a resource like this:

Could it not be developed as you go along anyway, so like when people are at the university questions will come up and things need addressing, so the tutors and various people will know what those things are, that need things, that they need either to learn about at a latter date or to revise, or to go back to at a later date and they will say these need to be on that site. (FE)

The idea of input from tutors and students throughout a university course is useful and highlights that the knowledge needed by students is not static and changes throughout their course. The same participant also stated:

...but then the next year when we are NQTs we might need to ask more questions so if we are emailing questions to our former tutor, [...] or our schools, our schools should know that this is here so that they can say to the university this question needs adding because my person didn't know about that [...]. It should almost be growing because there is always going to be new stuff to learn about isn't there. (FE)

Again this NQT participant highlights that the knowledge needed by students and NQTs changes as the student moves into work as an NQT based in a school. These comments show that participants could see who could use this resource and when, both on their training course and on their initial NQT year, but they were more vague as to how exactly they would use this resource. This may be due to how the researcher originally asked the question, but details of actual use strategies were not forthcoming.

Question: Who should be writing online pathways?

This question asked participants who they thought should be writing or authoring the online pathway resources:

It would be for the person who trains you, so for us the university. (DT)

Yeah. (All)

Later in the focus group another participant added:

I think it has to be from the university because it has got to be evidence-based academic research has it. It has got to come from someone with... . (FE)

The NQTs in this focus group, all agreed that the knowledge for the online pathway resources and the authorship should come from, what they saw as, the experts at the university. They did not consider that teachers or other educational professionals may be able to write these resources.

Question: Would you want to build your own?

When participants were asked if they were interested in building a resource like this themselves they equated this with the idea of building a wiki³⁸.

Oh like a wiki. I would say I would rather be able to ask the university some questions and then them to put the resource and for them to take charge of that resource as opposed to us. Cause also you don't know how accurate, if its like a wiki and people can just add to it you don't know how accurate that is. (FE)

³⁸ A wiki is website that the users can edit the content of quickly, wiki from the Hawaiian word for quick.

It can be seen here that participants are well aware of how accurate user generated wiki pages may be, they are also aware that for knowledge to be trustworthy and robust it needs to come from a trusted source, in this case university staff. As they further explain:

...if the university is putting it on then there is some research behind it, then you know that then rather than opinion stuff on. Where as if NQTs are doing it... (FE)

Again the implication being that university staff are trusted to put up knowledge that is trustworthy and reliable, and on which practice can be based.

4.4.2 Emerging themes from the focus group

These themes are not responses from any specific question in the schedule but emerged over the course of the focus group discussion. These themes became apparent in the analysis of the data and are included here because of their relevance to the study.

Access to knowledge

Participants highlighted the difficulties of gaining access to research knowledge in journals, now that they were NQTs, and outside the journal subscriptions services of their training university library:

Don't get me wrong, journals are boring but you do get info you do get, you are getting you have got somebody who has tried something and you have got that in its, they have tried and tested it. (DT)

Maybe so many of us aren't using them is because it takes so long to find the relevant ones. (FE)

Well you can't get them, there are so many you just can't get yeah. (DT)

So much of what becomes good practice and good professional practice comes from academia. (FE)

Participants also recognised the links and relationship between the practice of research in academia, and then how that research becomes good professional practice in schools. These comments came out in the course of the focus group and show the difficulties NQTs have in accessing and engaging with research.

Academic and professional practice

The participants' comments below highlight the difficulties that NQTs have in converting academic theories and research knowledge into practical strategies that they can use in their classrooms:

So actually what you want is the academic side of things and then somebody to show you how that looks like in the... everyday. And then the school to come in and say this how we want it. (FG)

You can see the two, you have read the theory, you have read the article and you know what the flowchart looks like, and you know you have understood the principles and then you see it in practice, and then someone comes in and shows you some examples and then you can kind of relate it back you know a real life example, I'm seeing that those principles. (FE)

And I think that AfL is a very good one to actually use that, because we did look at the journals, we really worked on the journals but we do have the Shirley Clark and that did really work. (DT)

You can also maybe when you go back to the academic stuff you can see where things have come from have been mixed. (JW)

This series of comments highlights the interplay between the academic research knowledge and the practical classroom practice. One of the difficulties for the NQT is taking the theories from research and applying them in a practical way in the classroom. They are able to understand the principles of research but may struggle to implement them in a dynamic classroom situation.

4.4.3 The online pathways resource look, feel and design

A series of questions were posed to participants to elicit some responses about the look, feel and overall design of the site, what if anything was missing and how in general it could be improved to make it more useful and more user friendly. This section is structured around the theme of the question asked.

Structure

Participants were asked what they thought of the way that the resource was structured and the way that knowledge was presented in the form of a pathway:

So it goes like a branch, so it branches out. (JW)

Yeah yeah. (Researcher)

Yeah clear yeah clear. (JW)

While some considered this to be clear, other participants explained that “...I find that hard to work through for me I keep wanting put it into a spider diagram...” (DN) and “...I see what you mean by spider diagram though, you have got that and then it goes off and then you then click on assessment for learning...” (DT), yet others suggested “...more like a mind map...” (FG). These suggestions provide good ideas for the structure of the resource and will need to be considered against a design consistency that runs throughout the site.

Search

Participants wanted to know if there would be a search facility as part of the resource.

...is there going to be a search, where you can just plug in the key words and you can... it will bring up the pages you need anyway” (FE).

It was highlighted that the search would bring the user to an online pathway result, “so it would take you to the tree” (FE). Participants also highlighted that the use of tags, or the tagging of items in a resource site, is something that is expected. These are used so that users can search for material either by tags or some system of hierarchical categories.

You can do that [tags, tagging] with some things, for example, on the TES site if you are looking for resources you can go through categories primary, KS 2, geography, lesson plan or whatever you are looking for or you can just put in a keyword search so both ways are useful. (FG)

Content length

Participants were concerned with the amount of material per page of the resource as seen in this extract:

I think its OK as long as you don't end up with like 30 things on one page and loads to sift through, as long as its you know... (FE)

Clear. (DT)

Yeah, that looked clear to me, the one before looked clear to me, if there were 30 things on that page, you'd be spending all your time scrolling through it looking for half of them. (FE)

There is a danger you could go on too far and then you lose people using it, cause I won't want to be scrolling down and down and down and down it would be easier for me to just go and ask some one or... You want it to be easily accessible. (FE)

Again these comments highlight that the amount of information that is displayed on each page of the site needs to be considered. The design needs to avoid information overload and large amounts of pages scrolling, but there needs to be sufficient information on a page to make sense of the topic that is being covered. The edit and review process needs to be aware of the optimal amount of information that should be displayed on a page taking these comments into consideration.

Titles and layout

Participants made it clear that in the editing of potential pathways for the site there will have to be consideration of the titles and layouts of the pathways:

I don't know how well thought out these titles have been but you have got the overall heading 'learning how to learn', and 'assessment for learning' then you have got that split either side, then in the middle you have got learners but then here again you are back to four key aspects of assessment which to me would be better over there. I can't actually... for my brain I cannot follow through, and I wouldn't know where to... because what you are wanting is, ah that's the box and for me I can't see easily looking at you sort of titles, what would be in each of those boxes, does that make sense? (DN)

Titles and layout may make sense to the original author of the work but these will need to be reviewed before resources are published.

Use of colour

Participant wanted to know if the site would be colour coded, the pathway shown was less than colourful. They were asked how it could be colour coded:

Just so that if you were going into, I don't know, resources, you could hit the red button and if it was 'assessment for learning' it was the green button or something, so that you knew, you could see with out having to read every thing every time. (JW)

Yes that's a good idea. (DT)

Again the editing and review process for the development of pathways will need to consider the use of colour and how fits with a site wide consistency of design.

Feedback

Participants suggested that there should be some way of giving feedback to the authors of the pathways:

I was about to say is there going to be a suggestion tab or something but then if there were questions we wanted to ask we could type it in there and, you know, to add it or if we think why is there assessment for learning instead of there, we could type that and you could rectify it. (FE)

But participants were unsure as to what form this should take, whether a simple suggestion box would be enough or whether the site should have an open forum where the resources could be discussed, or whether each page should have a 'talk' page behind it in the style of wikipedia.

Comparison with other online resources

Participants were asked how this resource compares to other resources or websites that they may use. Participants explained how they used both forum sites and resource sites.

I use TES for finding resources as opposed to answering questions if that makes sense. (FE)

I use forums for questions. (DT)

I don't use forums at all. (FE)

I find that if I'm stuck for an idea, because people post ideas there they have got a question, like oh I'm stuck with this, this is my situation and I'm stuck with this have you got any ideas and then people post ideas I do look through things like that. (FE)

It is interesting to note that participants consider answering questions and finding resources to be two very different activities and therefore would go about these two activities in two very different ways. Another early years specialist explained her use of resource sites:

I use TES to find resources but for me because I'm early years I use the early years foundation stage forum. Again not for the waffle but to find resources, their format is very good, they have research formats as well. (DT)

This quote highlights the difficulties that teachers may have in finding the information they need from the “waffle” that may be on forum sites such as TES, and that there is a place for a resource and that is clear and simple to use and delivers the information and knowledge that teachers need to improve their practice.

4.4.4 Reflections on the method

The focus group provided an opportunity to put an early version of the resource in front of the potential audience. What the focus group did not allow for was the participants to interact with the resource in their own time, and this was a failing of the method. Thus the resource was demonstrated to the participants and comments and discussion were solicited. One of the difficulties of the method was keeping the discussion on track and around the issues that were important. There was a tendency for participants to digress into their own issues. Equally one participant was able to dominate the discussion and focussed the discussion on their specific issue. This type of behaviour had to be kept in check by the researcher. Overall it was felt that the method was not interactive enough for the participants. The participants could not operate and explore the resource in their own time, or at their own pace. The resource was demonstrated by an expert, to them, rather than them gaining time interacting with the website to the detriment of the discussion. More user testing is recommended.

On the whole it was felt that the participants were too polite in their responses to the overall detriment of the discussion. This may be because the researcher was face-to-face with them in the room. Thus this method may have a lack of critique that may be available with alternative methods. The method did generate a lot of data, twelve pages of transcript, but other methods may produce a better quality data *i.e.* data that is critical and sharp, rather than data that is prosaic and vague, although of course this may be the fault of the researcher. The participants were all NQTs or NQT trainers and this did have an effect on the data, thus the range of views was narrowed by everyone being in the same role in a school. The participants were unable to see much beyond their own school contexts and this again affected the range of data.

4.5 Findings of the second questionnaire

This questionnaire was designed to provide data about the online pathways approach, see section 3.2.4 above. In all 46 responses were gathered which although a small sample for the quantitative data, is a good sample size for the qualitative data. This questionnaire provided a good range of data about the proposed approach. The nature of the sample is first discussed followed by the quantitative data and then a discussion of the qualitative data.

Background information is reported initially to give some insight into the nature of the sample. The sample was 55.6 per cent female and 44.4 per cent male, compared to the actual workforce data, of 74.6 per cent female and 25.4 per cent male (DfE, 2011, p.2).

The respondents reported that 25 per cent worked in primary schools, 68.2 per cent worked in secondary schools and 6.8 per cent in middle schools. The majority of the respondents were class teachers at 48.8 per cent, with 30.2 per cent heads of department, 9.3 per cent deputy heads, 2.3 per cent headteachers and 9.3 stated their post as other. The highest level of education was reported as 22.7 per cent and was Postgraduate Certificate in Education (PGCE), 22.7 per cent were studying for a Masters degree (in progress), 20.5 per cent Masters degree (completed), 13.6 per cent Bachelors degree, 9.1 per cent Bachelor of Education, and 4.6 per cent had either completed a PhD or it was in progress. These data show that the respondents were from a broad range of different educational phases, roles and were in general highly qualified professionals.

4.5.1 Analysis of the quantitative data

The quantitative data was gathered using a 5 point Likert scale, thus the respondents were able to indicate their strong agreement through to their strong disagreement with a series of statements. Table 4.17 gives a more in-depth break down of the

scores for each individual item.

The results of the questionnaire can be categorised under two broad areas, those related to the design and structure of the resource, and those related to how teachers would use this resource and fit it in with their current practice. Strongly agree and agree categories are added together in the analysis to produce a positive score of the item, this is done to simplify the analysis.

Table 4.17: Online pathways questionnaire: percentage scores for individual items

No.	Description	Strongly agree (%)	Agree (%)	Neutral (%)	Disagree (%)	Strongly disagree (%)
Q1	This resource would be useful to me.	20	37.8	20	11.1	11.1
Q2	I would use this on a regular basis.	4.5	29.5	31.8	15.9	18.2
Q3	This resource would fit in with my planning and current practice.	11.1	42.2	13.3	15.6	17.8
Q4	The flowchart approach makes sense to me.	28.9	53.3	8.9	4.4	4.4
Q5	I would use this with colleagues.	29.5	27.3	18.2	9.1	15.9
Q6	I see no benefit to this resource at all.	13.3	9.1	13.6	38.6	25
Q7	This resource is easy to understand.	32.6	39.5	20.9	4.7	2.3
Q8	This has already been done.	2.2	15.6	53.3	24.4	4.4

Design and structure

It can be seen that 57.8 per cent agree or strongly agree that the resource is useful

with 20 per cent neutral. Furthermore, 82.2 per cent agree or strongly agree that the approach of using a flowchart to highlight how knowledge of a subject is linked together made sense to them. This is useful for the overall design and structure of the site. Moreover, 72.1 per cent agree or strongly agree that the resource was easy to understand, again the design needs to be as intuitive and easy to learn as possible, people do not need to be reading how to use the resource instead of just reading and reflecting on the content. As to whether this approach had been done before 17.8 per cent agree or strongly agree, with 28.8 per cent either disagree or strongly disagree, although 53.3 per cent of respondents were neutral about this item.

Fit with current practices

Respondents reported that 34 per cent agree or strongly agree that they would use this resource on a regular basis, equally 34.1 per cent disagree or strongly disagree, with 31.8 per cent of respondents remaining neutral. This suggests that respondents would not use the resource on a regular basis. It will need to be considered how the resource can be more integrated into teacher's practice and teacher standards (Ingvarson, 2013). In the area of planning 53.3 per cent agree or strongly agree that this resource would fit in with their planning and current practices with 33.4 per cent disagreeing or strongly disagreeing and 13.3 per cent of respondents remaining neutral. This suggests that teachers would consult this resource to adjust or reflect on their planning for a scheme of work, but may be unlikely to use it more regularly. As a collaborative resource 56.8 per cent of respondents agree or strongly agree that they would use this resource with colleagues. This idea of teachers working in collaboration has been shown to be effective in terms of student outcomes by Cordingley *et al.* (2005a; 2005b). The final question was phrased negatively to check the consistency of responses, and 63.6 disagree or strongly disagree with the statement that there was no benefit to this resource. Again it is noted that respondents thought that the resource had

some overall benefit and that the strategy to check consistency worked.

Overall it can be seen from the quantitative data that teachers are positive about the approach, they are able to understand what the resource is designed for, how it is structured and how they can interact with it. The interface is intuitive and does not require training or instructions for teachers to use. Teachers are less positive that they would use the resource on a regular basis, maybe they see this as something that they would consult with respect to a specific problem when working on their planning, whether individually or with colleagues rather than one that they would use daily. Although the sample size for this online questionnaire was small it can be seen that this approach to gathering data about online resources through the use of an online questionnaire is worthwhile and has brought out some useful findings.

4.5.2 Analysis of the qualitative data

The qualitative data was gathered on the same online survey as the quantitative data, hence for the quantitative data the sample size is small, whereas for the qualitative data the sample size is relatively large. The analysis is carried out on a question by question basis under a series of headings below. A series of codes are used to give some context to the respondent, these relate to a respondent's role, their school phase and the respondent's case number. Table 4.18 explains the codes.

Table 4.18. Respondent's phase and role codes

Code	Explanation
PT	Primary Teacher.
ST	Secondary Teacher.
PHOD	Primary Head of Department.
SHOD	Secondary Head of Department.
SAST	Secondary Advanced Skills Teacher.
PDH	Primary Deputy Head.
MDH	Middle Deputy Head.
SDH	Secondary Deputy Head.

The three questions 'how would you use this resource', 'how would you fit the use of the resource into your current practice to help develop you teaching' and 'what sources of information do you use at the moment' are all focussed on how teachers will be able to use the resource and how they would fit it in with their current practices and their current sources of information.

Question: How would you use this resource?

This question tries to explore how respondents would use this resource. This allow some insights into both the future design and the types of content that may be appropriate. A number of respondents reported that they wouldn't use the resource (ST-33, ST-35, SHOD-42). Others stated that they would use it “as an aid to focus my own practice” (PT-3), and “to back up decisions related to teaching practice” (PT-37). Thus respondents would use the resource to improve their own personal practice.

A number of respondents stated they would use the resource in relation to their own planning; “when planning” (ST-9), “as a reference material” (ST-9), and “as a

reminder to what I should be using in my planning” (ST-21), and again as a “reminder about key aspects of AfL especially when planning lessons and writing schemes of learning” (ST-30), and the rather worryingly “to remind myself of pedagogy when planning lessons” (ST-46). Again these comments are about improving their own practice through the use of a resource to help with their planning.

Other respondents looked to use the resource more collaboratively with colleagues. Examples suggested were;

- With colleagues to start a discussion (SAST-7),
- Mainly with colleagues (ST-38),
- When supporting a member of staff (ST-41),
- As an excellent resource to assist my encouragement of the staff in my faculty (SHOD-20),
- Staff meeting as a reminder to colleagues...discussion points for specific subjects (PDH-36),
- To investigate research which provided discussion starters for school improvement (PT -37),
- For professional development purposes when working with colleagues to further develop department/school assessment policies/practices (ST-45).

Respondents also mentioned using the resource to help trainees; “use with trainee teachers with whom I work” (PT-3), and “I could see myself using it if I had newly qualified staff who were not confident in the process or if, as has happened in the past” (SHOD-22). The resource could be used as a development tool for trainees “possibly looking up new initiatives or unfamiliar terms. Be great for

trainees and students!” (PT-25), and “inform student teachers in my class about AfL, clearly and simply” (ST-31). Many of these comments confirm the original goals for the development of the resource.

Further respondents commented that they would use the resource “for my own CPD and also as references when providing CPD for colleagues” (PT-15), and “this would be great for teacher training and staff CPD to get teachers to understand what evidence says about practice so there is something concrete to base change upon” (SHOD-16). This comment highlights that for teachers to change practices they need solid evidence on which to base that change of practice. This resource would be useful “for staff training purposes as an introduction to AfL, also to remind myself about simple AfL techniques” (SHOD-43), and finally “bring it into peer INSET training” (ST-39), although one of the respondents wished to use it for the opposite case “to avoid attending an INSET” (SHOD-34).

Although some of these responses are about teachers developing their own practice, the majority of comments are about discussion with colleagues, or developing and supporting colleagues, focussing discussion with colleagues or supporting NQTs and students in the development of their practice. These data suggest that practitioners see this resource as a collaborative tool to help develop and support colleagues through discussion, training and CPD rather than a tool to improve one's own individual practices. This supports McCormick *et al.* who suggest that “...meaning is created through participating in social activity...” (2011, p.43) and Cordingley *et al.* (2005a; 2005b) who have shown that collaborative CPD is effective in terms of student outcomes.

Question: How would you fit the use of the resource into you current practice to help you develop your teaching?

This question explores how respondents would fit the use of this resource into their current practice and tries to understand if they would use it on a regular basis. A number of respondents stated that they would not (SHOD-5, SHOD-6, ST-8, SHOD-24, ST-33, ST-35, ST-42), whereas others stated that “I would refer to it on an as and when basis” (PT-3), and “refer to it when needed” (ST-41). Respondents also stated that they would use the resource “when planning” (ST-13), and “look at how I can cover the AFL criteria in my planning” (SDH-23), and also “I can use it to prompt ideas/remind myself of resources I already have when planning” (ST-46). So it can be seen that the resource would be used for dealing with specific problems or when reference material would be need to support planning and schemes of work development rather than on a regular basis.

Other respondents commented how they would use the resource with colleagues in that “...it would enhance the sorts of discussions about teaching and learning we already have...” (SAST-7), and that they would use it “...when part of working party on AfL or other topics. As a reference material” (ST-13). Again the fact that respondents may not use it on a regular basis was stated, “I don't think I would use it regularly in my practice but I would definitely refer to it every so often (particularly for staff meetings around assessment)” (PT-31) and others stated that “it is more suited to showing other new teachers” (SHOD-43). One respondent explained how they would fit it into their practice, “probably use mostly at home, then use references in CPD sessions”(PT-15) and a student respondent stated that “as a student I'd have used something like this to get started on an essay” (PT-25). It can be seen from these data that teachers would use this resource mainly for reference.

Question: What source of information do you use at the moment?

This question is of interest as it is important to know what sources of information teachers use at present and how the resource that is being developed can fit in with other sources.

Respondents cited a number of specific websites:

- DfE website (PT-3)
- TES, (PT-3, SHOD-5, PDH-14, PT-15, SHOD-22)
- Teachers Media (PT-3)
- Twitter (PT-3)
- TeachMeet (PT-3)
- RSC journals (SHOD-5)
- Online forums (ST-8)
- Education blogs (SHOD-12)
- Early years professional website (PT-15)
- TES forums (ST-30)
- AQA (SHOD-22)
- Teachit (SHOD-22)
- Kerboodle (SHOD-22)
- Geographical Association website (ST-35)
- Online journals (ST-35)

- Open University resources (PT-37)

As well as more vague comments such as “online sources” (PT-37), and “random websites” (SHOD-43). The TES website was cited a number of times as was the TES forums site. This was to be expected as the online questionnaire was posted on a number of TES forums, and so featured high in the list of sources of information. It can be seen that a number of these web resources are what may be termed 'Web 2.0 resources' (DiNucci, 1999), where there is collaboration and interaction rather than just static delivery of content. Sites such as Twitter, TES forums, online forums, and education blogs, provide the opportunity for teachers to discuss, collaborate and interact online. TeachMeets are meetings arranged by teachers to demonstrate and discuss practice, and have been held both online and in the physical world.

Other sources that respondents noted which may be websites, or may be reading content acquired from websites, although respondents did not specify this, were:

- Subject association journals (SHOD-12)
- Government papers (SHOD-16)
- Research articles, subject specific books, general teaching books (ST-10)
- Early Year Foundation Stage (PDH-14)
- Research articles relating to early years (PDH-14)
- Reading of academic research (SHOD-16)
- DfES documentation (PT-37)
- Ofsted subject specific reports (SHOD-42)

These sources of information are of a more traditional content delivery type.

As well as online sources many respondents cited “colleagues” (SHOD-5, SAST-7, ST-10, PT-25, ST-46) as another source of information. This included “information from colleagues” (ST-33) but also “discussion with colleagues,” (SHOD-12, ST-40) also cited was the idea of “sharing good practice with colleagues” (ST-30) thus colleagues are used and collaborated with in a number of different ways. Other suggested sources of information involving colleagues included “staff meetings” (SHOD-16), “peer observation, team teaching” (ST-9), and “learning and teaching group within school” (ST-21), again highlighting that there are many ways that information can be obtained from colleagues. The idea of teachers' professional networks (McCormick *et al.*, 2010) is also apparent in some suggestions thus “sharing practice with fellow heads of music” (SHOD-42), and “discussion with practising teachers who share their excellent ideas” (ST-8). It can be seen that many of these interactions with colleagues would be on an informal basis, rather than in the formal setting of a training course or a continuing professional development session.

Training courses (SAST-7, MDH-32) and CPD (ST-10, ST-21, ST-40) were mentioned but to a lesser extent, also “training through LA and training through SLT” (PT-31), as well as “master research in progress” (ST-13), and “masters course information and reading suggestions” (ST-35). Informal interactions with colleagues, either through discussion or sharing of practice, were as important as more formal training or CPD provided in school or by outside providers. What was not mentioned at all was conferences, be them subject association or research focussed.

Question: What topics would you like to see covered by this resource?

Respondents were asked 'what topics would you like to see covered by this resource', thus trying to elicit details of topics that would be of interest to teachers. When posing this question it was expected that a broad range of responses would

be gathered, for both pedagogical topics and subject specific topics. One of the surprises of the findings was the lack of respondents asking for subject specific topics. This maybe because an AfL example was chosen as the demonstration example for the questionnaire. An example was needed that would be relevant to the largest range of respondents possible and therefore it could not be phase or subject specific. The responses were divided into pedagogic knowledge and content knowledge. There were a large number of pedagogic topics, these are listed below:

- Practical differentiation (SHOD-5)
- Differentiation (SHOD-16, SDH-23)
- Questioning in lessons (SAST-7)
- Setting vs Mixed ability (SAST-7)
- Aspects of teaching and learning (SHOD-12)
- Gifted and talented (ST-13)
- Use of new media in teaching and learning (ST-13)
- Links to foundation stage curriculum (PT-15)
- Effective target setting and review with pupils (SDH-23)
- Behaviour management (PT-25)
- Classroom management (ST-41)
- Qualities of an outstanding lesson (ST-41)
- Child development (all ages) (PT-15)
- Guide to different SEN with links to implications for teaching (PT-25)

Other respondents were more broad in their comments such as “all teaching pedagogy covered in a PGCE course” (ST-46) and “all OFSTED criteria” (SHOD-20). All of these responses highlight some of the specific challenges and issues that respondents are dealing with in their daily practice.

Respondents were also interested in content knowledge. Respondents were interested in subject specific topics including, “all subjects, including foundation” (SHOD-22) and “also subject specific stuff would be good” (SHOD-20). A number of respondents had subject specific suggestions such as “GCSE topics for Modern Foreign Languages (MFL)” (ST-30), “language resources” (PT-25), and “As a history teacher, I can see a variety of topics and varied types of assessment which this resource could support” (ST-45). As pointed out above there were far fewer comments suggesting subject specific topics which was a surprise.

A small number of respondents suggested broad “school management” (SHOD-12), issues including, “all topics related to teaching practice, leadership and management, strategic planning and pastoral matters” (PT-37), which would cover a large body of work. Other broad suggestions were, “see the stuff that John Hattie did, and Geoff Petty's book” (MDH-32) and “up to date research and then linking research to practice” (ST-35). Therefore for the resource to be used regularly it must be reviewed and the content kept up to date.

Question: What would prevent you from using this resource?

This section considers the question 'what would prevent you from using this resource', *i.e.* what are the potential barriers to people's use of this resource?

The look and feel of the resource was highlighted by respondents with comments such as “it's not very attractive” (PT-3) and “needs some colour” (ST-38). Other

comments about the overall design included “nothing controllable by yourself!” (PT-31) and “it's not very good or user friendly” (SHOD-6). These types of comments will need to be considered in the second iteration of the design, comments like these cannot be easily dismissed if the overall objective is to create a resource that will be used by teachers.

The largest number of responses to this question were “time” (SHOD-5, PDH-14, SHOD-16, ST-21, PT-25, PT-37, ST-41, ST-45), and “lack of time!” (PT-15), and “time - same as everything!” (MDH-32). This is not a surprise as this has been highlighted in the literature (see Ertmer *et al.*, 2006; Levin *et al.*, 2010) as one of the barriers for teachers. This finding was also highlighted in this study in the initial questionnaire, section 4.2.1, where the item 'your school provides you with time to engage in research related activities'. This item had a value score of 73.6 per cent and a practice score of 15.8 per cent producing the largest value-practice gap score in the initial questionnaire, of 57 per cent. This finding was also highlighted in the interview findings, see section 4.3.2 in this chapter.

Other comments included “time/money/accessibility” (ST-46), and “...time! If I had to pay for it” (ST-30), so the resource needs to be accessible from a design and user interface point of view but also the resource would need to be a free open educational resource (OER) for teachers to engage with it.

A number of comments were very negative about the resource such as “the fact I don't need it” (ST-8) and “the fact that it is irrelevant” (ST-9), which are unhelpful as there is not enough detail to deal with these respondents concerns. Other negative comments included, “I have no idea what or how I'd use it - little point” (SHOD-42), and “my suspicion and disrespect for the whole area” (SHOD-24). The first of these comments shows that the aim of the resource will need to be stated although the second maybe a bigger issue. There were also a number of very positive comments including “nothing” (SAST-7, ST-13, SDH-23, SHOD-

43), and “nothing! Going to use it now!!!” (SHOD-20).

One comment highlighted that this resource is competing with the ever growing amount of information that is available to teachers on the internet, risking “forgetting about it amongst all of the other information out there” (SHOD-12). Hence it is important how this resource is promoted and how it can be a continuing trusted source of knowledge for teachers.

Question: How could this resource be improved?

Finally the improvements to the resource are considered with the question 'how could this resource be improved'. The improvements that respondents suggested fall mainly into two categories. Suggestions around the look, feel and design of the resource and suggestions as to how it could be more practical are included.

A number of respondents stated that the look and feel of the resource could be improved including, “make it more attractive looking” (PT-3), and “more aesthetically pleasing” (SHOD-12), with others adding that the “presentation - currently quite bland” (ST-21) and that it could be “more colourful” (ST-46). Other responses were more to do with the design of the resource itself such as the “expandable information in the right hand box/links to further reading on a topic” (ST-46) and “I would like to be able to keep some or all of the 'boxes' open at same time, to gain an overview” (PT-15) which although a good suggestion, may overcomplicate the screen layout of the resource. One respondent suggested that “more innovative, up to date research topics; some variation in layout - the flow chart idea is good but too much when on every single page. Even varying the colour would help” (ST-35), however, again changing from the flowchart layout may go against a consistent and simple design throughout a large number of topics.

Many respondents stated that they would like to see more practical examples such as “a link to practical examples of good practice” (PDH-14), “more practical strategies” (SHOD-16), and “examples of work would be nice” (SHOD-20). Subject specific examples were also suggested, “subject specific practical ideas” (ST-30), “plenty of subject specific examples” (SDH-23), and “real life examples? (photos of assessed work?) (*sic*)” (PT-31). Thus it can be seen that teachers are looking for practical strategies and ideas. Discussions of research may be enough to inspire teachers, but they may also be after practical strategies and ideas to solve their immediate context specific problem both of a pedagogical nature and of a subject specific nature. This strategy has been advocated by Black and Wiliam who state that “living examples of implementation, as practiced by teachers with whom they can identify and from whom they can derive the confidence that they can do better” (1998, p.146).

Two respondents also commented that the resource could be improved “by actually stating the point of the resource, what, where and how do you see it used?” (SHOD-42), and that “it needs a purpose which is important to teachers” (ST-8). Both of these comments highlight that the overall aim of the resource, how it is expected to be used and the philosophy underpinnings of its development will need to be stated somewhere in the resource to reassure teachers of its intentions.

4.5.3 Reflections on the method

The use of an online questionnaire to gather data about an online resource is an innovative way of gathering this type of data. However there were limitations and the use of this method may explain the low sample size and response rate. Not only are respondents volunteering to fill in an online questionnaire they are also being asked to use and review an online resource. These two actions, being willing to complete a questionnaire but then finding out that it directs you to another website that you need to interact with, may account for the low sample size. If the questionnaire was of a more general nature about a less specific topic,

then a greater response rate may have been obtained.

Equally the link to the questionnaire was posted on the Times Educational Supplement (TES) forums website and therefore the members of this site may be more predisposed to fill in an online questionnaire about an online resource. Overall the sample size was both small for the quantitative data and of a good size for the qualitative data, it would have been a more difficult and time consuming task to gather this much qualitative data about an online resource through other methods. This method also allowed respondents to interact with, and operate, the online resource at their own pace and in their own time and with their own technology, which again would have been difficult to do using other methods.

The method allowed for honest responses, thus respondents were able to say exactly what they thought, without the pressure of being in the same room as the person asking the questions. A number of negative comments were also received, to the point where at least two respondents apologised for their responses being too negative, with “sorry, I really don't see any value in this” (ST-8) and “sorry for being negative, but I really can't see the point of this other than for a GTP / Teach 1st person” (ST-9). I do not think these kinds of honest responses could have been gathered through more traditional methods such as interviews or focus groups. Overall the method was more useful than the focus group, as respondents were sharp, honest and critical, and did not have the researcher in the room with them and therefore unable to influence them in their opinions.

4.6 Summary

This summary provides a number of reflections on the findings section of the study. The initial questionnaire provided a large set of data that was able to be analysed in a number of ways. This provided a number of surprises and extended the work of Levin *et al.* (2010). Their work lacked the dimension of teachers' value of research practices and they were unable to conduct factor analysis on their questionnaire, both of which proved insightful. The qualitative data provided a depth of understanding into quantitative data and was worth carrying out to gain practitioner views on these specific issues. The use of both quantitative and qualitative data has proved useful when asking teachers about the use of research evidence. All these data show that teachers want a way to gain access to research evidence to justify their classroom practice.

When gathering data on a specific approach to knowledge mobilisation through the use of online pathways, the online questionnaire provided a richer data set than the focus group. In terms of costs in time, resources and money, the online questionnaire was by far a better approach for gathering this data. This rich data will be used in both the next iteration of the design of the resource, and in the way that the resource is explained to practitioners, in the governance and editorial policies of the editorial board.

These data show that there is a need for a resource like this to be developed as teachers are interested in, and value, the use of research evidence in their practice but struggle with both access to research and ways of implementing this in their practice. They struggle with regard to their own skills, knowledge and time and the support they have from their schools.

Overall it can be seen that these methods used to gather data; questionnaire, focus

groups and interviews, produced a large amount of useful data. These data sets will be used in the following sections to answer the research questions posed in this study.

5.0 Discussion of findings

The purpose of this chapter is to discuss and evaluate the findings from the analysis of empirical data and literature and demonstrate how the resulting synthesis has added to the body of knowledge. This chapter seeks to bring some overall clarity to the research findings and to answer the research questions. Hence this chapter is a commentary on the research findings and not a reiteration of those findings.

The findings are discussed by the broad themes that were identified in the literature review and that emerged from the research. Firstly, the themes of individual and organisational engagement with research, individual and organisational factors, and context. Secondly, the theme of knowledge mobilisation and how online pathways are related to issues such as teacher learning, continuing professional development for teachers, teacher quality and models of future teacher development. Thirdly, the discussion focus is narrowed down so that the specific research questions set at the beginning of the study are answered.

5.1 Individual and organisation

This section explores the findings by the themes of individual engagement with research followed by organisational engagement with research. Then the factors from the Exploratory Factor Analysis are discussed and a model developed showing how the individual factors and the organisational factors are linked together. Finally the contexts of the individual and the organisational actors are discussed.

The findings show that there is a large amount of congruency between the quantitative data from the initial questionnaire and the qualitative data from the interviews. Both of these methods were concerned with teachers' and schools' use of research and research practices. The quantitative questionnaire data provides an overview of teachers' use of, and value of, research, whereas the qualitative interviews were carried out to further illuminate and provide richness and depth to the study. This proved successful and this section triangulates both sets of data to provide insights on the themes identified above.

5.1.1 Individual engagement with research

The data within this study shows that teachers do engage with research by using a number of different research practices. Research practices such as reading research, attendance at professional conferences and postgraduate study are discussed here to show how individual teachers engage with research.

The findings of the initial questionnaire, section 4.2.1, highlighted how engaged teachers were with research and how much they value research practices. The quantitative data shows that over 80 per cent of teachers in this study value research related reading. These quantitative data do not explain the forms of reading, and the reasons that teachers engage in research related reading, but the qualitative data does allow a number of insights.

These insights include, using research to solve problems and looking for solutions to classroom issues beyond the classroom. For one headteacher her research reading was used to support and provide rigour for changes of practice that she was trying to implement in her school. These examples from the qualitative data illustrate that there are very practical reasons for research related reading by teachers. Teachers are trying to find practical research based solutions to issues of classroom practice and have to access knowledge beyond their classrooms. Equally a headteacher uses research knowledge from legitimate and trusted sources to justify and provide support to changes in the practices of the teachers in her school. Her teachers will not accept or make changes to practice based on research evidence that is not convincing, rigorous and from a trustworthy source.

Teachers' attendance at professional conferences that are organised by professional associations had a high value score of 60 per cent. This value score was greater than any other type of research related event. That research needs to be relevant to practitioners has been highlighted by other researchers (Levin *et al.*, 2010, p.4). Examples of professional associations that were highlighted by interviewees included the *Historical Association*, the *Geographical Association*, the *Politics Association*, the *Association for Teachers of Psychology*. Subject association journals were mentioned as a source of research knowledge. Thus research knowledge can be mediated in a number of ways, through attendance at professional conferences where teachers are able to network and share ideas and through the use of subject association journals. For the individual teacher, attendance at subject association conferences is highly valued.

This study showed that for many teachers the opportunity to study for a postgraduate degree provided a way for teachers to engage with a research qualification. Just under 50 per cent of the sample were engaged in postgraduate studies and respondents gave a value score of 60 per cent for this item. Of the respondents nearly 20 per cent were studying for a Masters degree and 16 per cent

had already completed one. Thus just over a third of the respondents in the study either had or were working towards a Masters qualification. Interviewees stated that their participation in Masters courses had made them more aware of research, made them think about research and engage more with research. Interviewees were keen that the research from their own studies fed back into the development work of the school. This lends support to the work of Biddle and Saha (2002) who found that a higher level of qualification gives a more positive attitude towards research.

The quantitative and qualitative data in this study show that teachers are interested in research through their reading, through attendance at research focused conferences which should be relevant to their own needs and are engaged with research through participation in Masters courses. Teachers value all of these research practices and these research practices provide a way for teachers to engage as individuals in research. As Hall states:

For the teacher researchers, their developing sense of self as agents within their own enquires gives them permission to engage more actively with the research methods and the products of others' research. (2009, p.677)

5.1.2 Organisational engagement with research

A school's organisational culture, norms and the ways that a school engages with research and supports its teachers also have an effect on the research practices that are used by teachers. Thus the themes time, postgraduate study and support structures are discussed. In the data about schools and research (see section 4.2.1) the highest scored item on the value scale was 'school provides staff with time to engage in research related activities' with a score of 73.6 per cent. This item had a corresponding low score on the practice scale of 15.8 per cent. Showing that teachers value having time to engage with research but in practice this does not

happen. The qualitative data in this study gives some insights into why teachers lack the time to engage in research related activities.

One teacher stated that in her/his school teachers are given research to read “but I would say 99 per cent of teachers don't have time to go away and read” (OW, secondary psychology teacher). Other practitioners highlighted the same issue when asked about their engagement with research; “as a class teacher I never had time” (WL, primary head), and “I really don't have the time to be honest” (NF secondary English teacher). Other researchers have highlighted the problem of teachers' lack of time, “unsurprisingly, teachers report that they are short of time” (Salleh, 2006 cited in McCormick *et al.*, 2011, p.15). A more recent study by Witherow (2011) of secondary practitioners also found that 89 per cent of respondents reported time to be a barrier to the use of research. The lack of time teachers have to engage with research has been highlighted by other researchers (Levin *et al.*, 2010; Cooper and Levin 2010; Witherow, 2011). But if teachers are expected to engage with research knowledge to improve their practice then they will need to be given time and support in achieving this goal from their schools.

This research has coincided with a large number of teachers in this study studying for, or having completed a Masters degree. Most of the places on these programmes up to 2010 have been government funded. The effect of a large number of teachers involved in postgraduate study is evident from the data. Thus 'your school encourages research related professional development' has a value scale score of 71.9 per cent and 'research is discussed in professional development meetings' has a value scale score of 70.1 per cent. As this secondary Senior Management Team (SMT) member states:

I was one of the first to go on the Masters programme, others had done it in their own time but we started to develop [so] that all new teachers were to go on to the Masters programme and involve themselves in research. And if the school was contributing towards that research ultimately the dissertation side of things would be school based in some way which could feedback into the school. (ZT, secondary SMT member)

Teachers in this study were very aware that research carried out in their Masters degree programmes could have a positive effect on themselves as practitioners and on their schools. Qualitative data from this study shows that as teachers become more research aware from these types of courses, and more comfortable with research, they are more willing to engage with research, and more likely to discuss research with their colleagues. This may ultimately lead to them being able to provide their own evidence for changes of practice in their own school contexts.

This study also highlighted the differences between primary and secondary practitioners. Primary practitioners were found to be more engaged in post-graduate study and also valued it more highly. Primary practitioners also valued all research practices they were asked about more than their secondary counterparts. The value scores for post-graduate study and research practices may be due to primary practitioners studying for a three or four year degree with a large educational research component rather than studying a degree followed by a PGCE which has less of an educational research component. Equally primary practitioners show they have more time to engage with research than secondary colleagues. These findings may be related to the nature of their organisations, where primary schools are generally smaller and may be more collegial. This may allow individuals a greater voice in their professional development rather than secondary colleagues who work in large organisations.

Overall it can be seen from the qualitative and the quantitative data in this study that schools need to be supportive of teachers if they want teachers to engage with

research. Schools also need to promote the culture, norms and practices of research engagement throughout their organisation. As Levin *et al.* state “...while individual factors such as knowledge of research matter, organisational factors matter more” (2010, p.6). Thus teachers have a better chance of using research knowledge to inform their practices if the schools that they work for are supportive and promote a culture of engagement with research. Researchers at CUREE also note that “research is more readily integrated into school life, when systems are in place to enable the school to operate as a learning organisation” (2003, p.5).

The findings from this study have shown that there is a perceived lack of formalised structures to bring research into schools, to provide access to research in schools, and to provide staff with time to engage with, discuss, and plan. Schools need to be creating structures and norms that allow teachers to engage with research so that practices can be better research informed. Recent research from Canada has highlighted that “schools and districts tend to lack formalised research capacity or time to engage with research” (Cooper and Levin, 2010, p363). Thus if the objective is for teachers to use research to inform their practices, there will need to be organisational structures and processes in place to support this aspiration.

5.1.3 Individual and organisational factors

This section discusses the use of Exploratory Factor Analysis (EFA) and the five factors that it generated in relation to the individual and the organisation. Further analysis of the initial questionnaire data using Exploratory Factor Analysis (see section 4.2.1) revealed a robust underlying factor structure. EFA allows the researcher to detect the structures and commonalities in the relationships between the variables (Cohen *et al.*, 2011, p.674). The questionnaire items in this study were based on the work of Levin *et al.* (2010). Witherow (2011) also based her study on the work of Levin *et al.* (2010). Both of these studies did not carry out

EFA on their data, thus this study provides a unique contribution and extends the work of both these researchers. The use of EFA in this study revealed two individual factors and three organisational factors for enhancing the use of research by teachers in schools.

The individual factors revealed were:

- 'engagement with research' (A1)
- 'engagement with the research community' (A2)

The three organisational factors revealed were:

- 'promotes professional discussion of research' (B1)
- 'promotes teacher knowledge generation' (B2)
- 'promotes wider engagement of the school with research and the research community' (B3)

These five factors need to be considered if the use of research is to be enhanced in schools. Figure 5.1 below shows these five factors together.

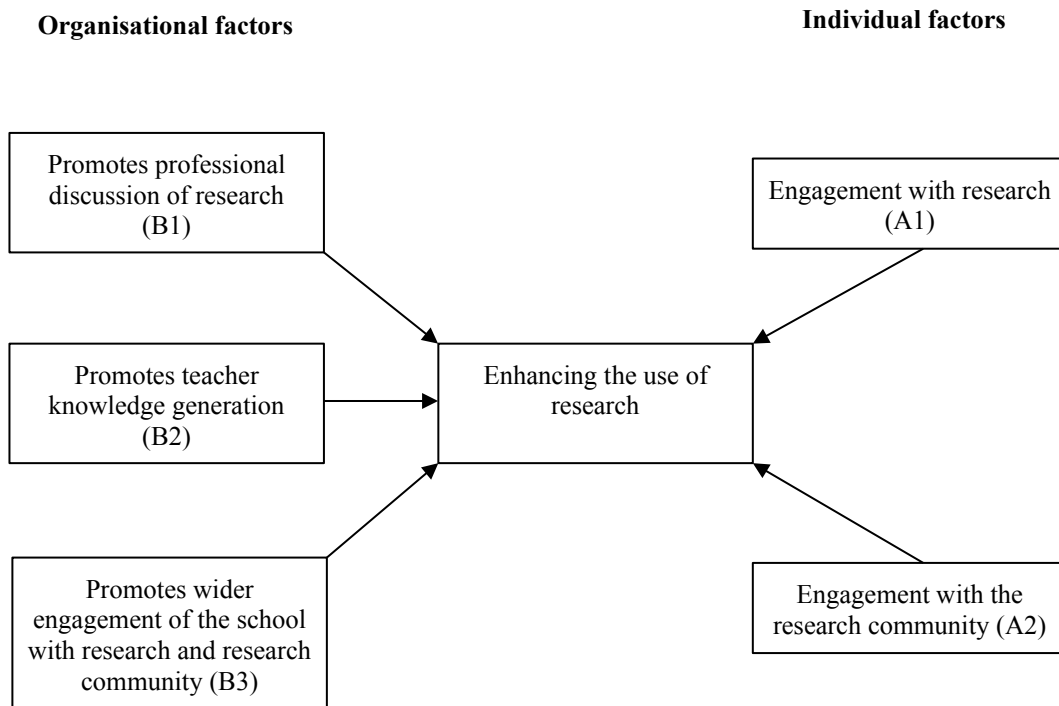


Figure 5.1: Diagram of the underlying factor structure

Figure 5.1 shows the five factors that need to be engaged with by teachers and school leaders if knowledge mobilisation, and therefore the link between theory and practice, is to be strengthened in schools. These factors are taken directly from the empirical findings and show the conceptual and theoretical uniqueness of this study. This analysis develops the theoretical concept of knowledge mobilisation (Levin, 2013) and shows how it can be promoted in educational settings, extending the work of previous researchers (Cooper and Levin, 2010; Witherow, 2011; Levin, 2013). This provides a structure onto which practical strategies can be developed. Online pathways approach is one way in which these five factors can be engaged with both by schools and by practitioners. These findings shows that engagement with research is not just the domain of the individual teacher but that engagement needs to be carried out in a supportive environment that promotes teacher engagement with research and the wider research community.

Figure 5.1 shows that for teachers a personal engagement with research includes discussion of research with colleagues, research related reading, networking with others and attending research related events. Equally engagement with the wider research community for teachers would include postgraduate studies, attendance at research focused conferences and events, and to a lesser degree receiving funds from the school to carry out research.

For schools the three organisational factors in Figure 5.1 are needed to enhance use of research. Hence schools need to promote the discussion of research in a range of meetings at a professional level. They need to encourage action research, and provide funds for research generation and utilisation. Schools finally need to promote the building of relationships through events and networking to encourage professional development, provide access to research and the time for staff to engage in research related activities. This suggests that school leaders need to be aware of the ways in which they can promote the use of research by their teachers. As Cordingley suggests, “leaders in schools are beginning to act as knowledge brokers” (2008, p.41). However one of the problems for school leaders, as highlighted by Levin, is that “most organisations have weak infrastructure for supporting knowledge mobilisation in areas such as communication or internal and external circulation of materials and ideas” (2008, p.24). School leaders need to see themselves as filling the role of knowledge brokers and set up support systems and processes so that they can support teachers in engaging with research. Overall, if these five factors are promoted and supported both by individual teachers and their schools, then the use of research will be enhanced within the organisation.

Figure 5.1 shows that enhancing the use of research in an organisation is a combination of both individual factors and organisational factors. This finding supports the work of other researchers (Levin, 2008; Cooper and Levin, 2010). However, the unique contribution that this study makes is that it provides the

details of these five factors so that both teachers and organisational leaders can adopt, support and promote enhancing use of research in their schools. As Copper and Levin state:

...much of the empirical literature conceptualises research use in terms of individuals and focuses on individual level (Nutley *et al.*, 2007); research use is actually a social function that is deeply affected by organisational and system features (Levin, 2008). (2010, p.358)

Nutley *et al.* suggest that “fruitful research engagement that leads to practice change is often not just an individual activity; organisational learning and decision-making at school level seem to be particularly important too” (2008, p.63-64). Hence this study gives a unique insight into what these organisational and system features may be. In other work Levin states that “knowledge by itself is not enough to change practice, since practices are social and therefore reinforced by many elements such as norms, cultures and habits” (2008, p.8). Again this study lends support to the idea that the individual teacher needs to be supported by the practices and cultures of the organisation in which they are working. The norms, cultures and habits of the individual and the organisation have to be in place for the use of research to be enhanced and therefore for teachers' practices to be changed.

The mean value and practice scores for each of the five factors were calculated (see section 4.2.1). These showed that there is variation in how these factors are currently valued and practiced by teachers (see section 4.2.1). The high mean scores on both the value and practice scales for the factor 'engagement with research' (A1) maybe due to the three years of government support for teachers studying for Masters' degrees. Access to postgraduate study allows “teachers to develop a more robust and critical stance through the process of their own research, as well as a vocabulary and confidence to access wider literature” (Hall, 2009, p.672). The funding for teachers to access Masters programmes has since

been cut by government (Gove, 2010b). This may turn out to be short sighted, as it reduces the opportunities teachers have to engage with research, produce their own research and engage with the wider research community.

For teachers the factor 'engagement with research' (A1) has both higher value and practice scores than the factor 'engagement with the research community' (A2). Thus teachers value a personal engagement with research more than engagement with the wider research community. This suggests that teachers need to be encouraged to engage with the wider research community to enhance the use of research in their schools. This lack of engagement maybe due to the time and workplace constraints of their role, as Stenhouse has stated, “the research act must conform to the obligations of the professional context” (1983, p.20). Equally the lack of engagement may be due to the difficulties and apprehension of engaging with the research community; being an expert teacher is very different than being a novice researcher and engaging in the research community. Other researchers have stated that “for the teacher researchers, their developing sense of self as agents within their own enquiries gives them ‘permission’ to engage more actively with the research methods and the products of others’ research” (Hall, 2009, p.677). As teachers gain more confidence through their own research enquiries they develop a sense of self, allowing them to engage more actively.

For school leaders this study provides three factors that should be considered to enhance the use of research in their schools. The factors 'promotion of the professional discussion of research' (B1) had the highest mean value and practice scores. The 'wider engagement of the school with both research and the research community' (B3) had the next highest scores and finally the 'promotion of teachers' knowledge creation' (B2) had the lowest mean value and practice scores. These mean scores highlight that teachers value, and are able to have, professional discussions about research, but that they need to be more supported in the creation of knowledge about their practice.

These findings suggest that Hargreaves' (1999) idea for the development of the 'knowledge creating school' will need a significant amount of support both from teachers and schools. Hargreaves had suggested that the "...seeds of professional knowledge creation already lie within the school systems, ready to germinate if the right conditions can be provided" (1999, p.130). Hargreaves suggests there are four principal seeds:

- Tinkering - "*ad hoc* inexpensive and unscientific experimentation" (Jelinek and Schoonhoven, 1990)
- Involvement with initial teacher education - "Trainees often bring new ideas from their work in higher education" (1999, p.132)
- Teachers engaging in research - "teachers studying for professional award undertake an empirical dissertation" (1999, p.132)
- Schools making effective use of middle managers - "the deployment of middle managers in secondary schools as the critical 'knowledge engineers' of educational knowledge creation" (1999, p.133)

The findings in this study show that teachers are involved in all of these four suggestions to varying degrees. Teachers tinker with all resources before they are deployed in their classrooms, teachers are involved in initial teaching education and are open to new ideas from trainees, and teachers have been involved in research through Masters studies. What this study shows is that schools are lacking in the development of middle management with the role of knowledge engineer (Hargreaves, 1999, p.133) or knowledge broker (Cordingley, 2008, p.41). The findings of this study show that low practice scores for items such as 'your school circulates research articles', at 18 per cent and 'your school has a member of staff with responsibility to bring new research into school', at 6 per cent suggests that schools are missing the opportunity to develop roles such as knowledge engineer or knowledge broker. As Levin states, "most organisations

have weak infrastructure for supporting knowledge mobilisation in areas such as communication or internal and external circulation of materials and ideas” (2008, p.24). Although teachers are involved to some degree in the majority of these practices they need to do this in an environment that promotes and supports the use of research.

Overall these five factors need to be considered by teachers, school leaders, and policy-makers if they wish to enhance the use of research in schools and make sure that the practices of teachers are based on research evidence in education systems. Teacher quality and knowledge mobilisation will not improve in an educational system, unless these five factors are considered.

5.1.4 Context – individual and organisation

What is not shown in the diagram of the underlying factor structure, Figure 5.1, is the context of both the individual and of the organisation. Analysis of the interview data showed that teachers were under a range of pressures that are both internal and external to their organisations. One interviewee stated that she had to deal with pressures such as observations, appraisals and performance management within her school. Equally teachers were fully aware of the pressure their schools are under from agencies such as OFSTED and the associated pressures schools are under to perform well in league tables.

One headteacher interviewee explained that in attempting to change the practices of teachers in her school she had to present the research to them to convince them that a change of practice was worth pursuing and it was the right way to develop. Her teachers were concerned that OFSTED would question them about the reasons for changes in practice.

These organisational pressures are also part of the context of the teacher's work.

An examination of the combination of these internal and external pressures may give some more insight into why teachers find use of research knowledge difficult. These are not just barriers to the use of research as highlighted by other researchers (Davenport and Prusak, 1998; Bransford *et al.*, 2009; Estabrooks *et al.*, 2003; Mitton *et al.*, 2007; Nutley *et al.*, 2007), but rather pressures that are on teachers, both internal and external to always produce what may be called in OFSTED terms 'outstanding' lessons. As one interviewee pointed out “you should be delivering outstanding lessons everyday, I mean who's got the energy?” (NF, secondary English teacher). The pressure to produce these 'outstanding' lessons does not encourage teachers to experiment or change their practices. Thus the findings of this study support the issues identified by Black and Wiliam that a “teacher cannot be expected quickly to abandon habitual roles and methods for a limited experiment” (1998, p.20).

For teachers a change in their practice is an experiment they have to conduct with their pupils, moving away from the familiar and habituated practices and methods to try to produce something new. As Coe states “many of the most effective strategies are complex, open to interpretation and hard to implement” (2013, p.xi). So even if teachers are prepared to experiment with their practice and try to develop new practices they need to have collaborative support, both from other teachers they work with and from their schools. This difficulty in implementing changes of practice correctly has also been pointed out by Marshall and Drummond whose analysis found that when teachers tried to change their practice they may follow either the spirit, “high organisation based on ideas” or the letter “only the procedures [...] are in place” of the new practice (2006, p.137). As Coe states “we may think we are doing it, but are we doing it right?” (2013, p.xi). There are difficulties in how teachers interpret and implement new practices in their classrooms, and it cannot be assumed that teachers are getting it right. Teachers need support in making sure that they are implementing changes in practices correctly. This may be challenging to their beliefs and values. Again Coe states that teachers need to be implementing new practices “in ways that are

faithful, effective and sustainable” (2013, p.xi).

5.1.5 Forms of professional knowledge

The discussions above allow for a reconsideration of the forms of professional knowledge as discussed in section 2.4.3 (Capel, Leask and Turner, 2013). Taking the themes of individual and organisation it can be seen that individual actors and organisational actors engage with professional knowledge in different ways. Table 5.1 below shows the types of knowledge that teachers need to engage with to improve the learning outcomes of their pupils.

Equally school leaders need to engage with different types of professional knowledge in different ways so that they can enhance and support the use of research knowledge in their schools. This work extends and challenges the work of Cordingley (2008) and Hargreaves, (1999) whose premise appears to be that managers play an indispensable role in knowledge mediation within the school. For them schools need to be developing knowledge engineers (Hargreaves, 1999, p.133) or knowledge brokers (Cordingley, 2008, p.41). Table 5.1 aims to highlight which actors should be dealing with which types of knowledge. Again this provides some insights into how teachers and school leaders should engage with which type of knowledge, rather than insisting that everyone needs to engage with more knowledge.

Table 5.1: Forms of professional knowledge (developed from Schulman, 1986 cited in Capel, Leask and Turner, 2013)

Organisation (school leader role)		Forms of professional knowledge	Individual (classroom teacher role and how they engage)	
role/task	resources		role/task	resources
Monitor/support/CPD.	Specialist knowledge beyond the school.	(Subject) Content knowledge.	Acquire and keep up to date with sound subject knowledge.	Initial qualifications/ professional associations.
Monitor/support/CPD.	Research knowledge.	General pedagogical knowledge.	Specific for their individual pupils.	Theories about teaching and learning.
Monitor/support/CPD.	Knowledge from subject associations and research knowledge.	Pedagogic content knowledge.	Keep up to date with subject specific pedagogies.	Knowledge from subject associations.
School-wide view of curriculum.	Guided by national regulations and exam boards.	Curriculum knowledge.	Develop subject materials for classroom context.	Guided by national regulations and exam boards.
Knowledge of learners and their contexts.	National test results/ exam results/ school data.	Knowledge of learners and their characteristics.	Knowledge of individual pupils.	Feedback from pupils/ class data.
Nurture, form and maintain networks.	Contacts with the community, local, national and international.	Knowledge of educational contexts.	Nurture local networks.	Interactions with the local community.
Set and enact the school ethos.	School ethos and polices.	Knowledge of educational ends (aims).	Reconcile school and own beliefs and values.	School ethos, polices, and philosophies of education.

The data gathered for this research indicate that even in organisations without leadership in research, the individual can, on their own, engage with research. But although an individual may enhance their use of research this needs to be supported by schools so that school-wide research use can become the norm and schools have a better chance of increasing research capacity, be this in the use of or the generation of, research.

5.2 Knowledge mobilisation - teacher learning, CPD and online pathways

The qualitative data in this study reveals that participants spend a great deal of time searching the web for resources and materials to help them in their teaching (see section 4.2.3). In many cases teachers are struggling to sort the good and useful resources from the clutter of poor ones, and to find resources and materials that are helpful to their practice. Levin states, “practitioners have a range of connections to research and ways in which to find and use research” (2008, p.7). This is echoed by Wiliam, when discussing the professional development of teachers, “this professional development model assumes that what teachers lack is knowledge. For the most part, this is simply not the case” (2007, cited in Coe, 2013, p.xiii). The findings from this study show that teachers are looking for up to date, trustworthy, rigorous knowledge that is backed up by educational research and is accessible to them.

The online pathways approach would be one way to provide this type of knowledge. As one NQT participant stated in this study, “I google, I will search for days, [...] until I find what I want, I will search” (DT, focus group NQT). Thus providing teachers with a way to access rigorous research knowledge is crucial. Cordingley states that “searching the internet produces many more hits than school based knowledge brokers can deal with. Few websites make serious efforts to connect research materials with the needs of identifiable groups of teachers at particular stages of development” (2008, p.41). This link between research knowledge and practice that online pathways can provide needs to be backed up by strategies, examples of practice, teachers' CPD activities and a model of learning that supports teachers development. Teachers need what Black and Wiliam have called “lived examples of implementation” (1998, p.15), rather than complicated research based texts that have no relation to their classroom contexts. This study's findings show that when asked how the online pathways approach could be improved, teachers wanted more practical examples, “a link to practical

examples of good practice” (PDH-14) and “real life examples” (PT-31). These findings show that teachers need help translating research knowledge into practices that can be used in their classroom contexts.

Researchers have pointed out that simply providing practitioners with access to the knowledge will not change practices (Nutley, Percy-Smith & Solesbury, 2003; Adams, 2009). “Knowledge by itself is not enough to change practice, since practices are social and therefore reinforced by many elements such as norms, cultures and habits” (Levin, 2008, p.8). Thus the norms, cultures and habits of the organisation are as important as the engagement an individual may have with research. The factor structure, in Figure 5.1, shows that engagement with research needs to be at the level of both the individual and the organisation. Hence there is a need to give teachers access to knowledge, and for teachers to engage with that knowledge using a range of practices. But also schools need to promote research and support their teachers in doing this through good quality CPD, be this through enquiry (Stenhouse, 1979; Arthur *et al.*, 2006; MacBeath *et al.*, 2007) or collaborative CPD (Cordingley *et al.*, 2005a, 2005b).

The support of teachers by schools will need improvements in the provision of CPD, as Wiliam states:

We assemble teachers in rooms and bring in experts to explain what needs to change and then we're disappointed when such events have little or no effect on teachers' practice. (William, 2007 cited in Coe, 2013)

Coe has also stated “if we want teachers to learn hard things like using formative assessment, assertive discipline or how to teach algebra, we often don't get beyond just explaining what they have to do. For a profession that is so dedicated to learning for others, teachers seem to take little care over their own learning” (2013, p.xiv). Coe further suggests that there is a need for “big cultural shifts”

(2013, p.xiv) if there are going to be improvements in the quality of CPD that is available to teachers. Cordingley and others (see McCormick, 2010) have pointed out that teachers' CPD has to be considered as learning and should be treated as such:

Learning for teachers (as for their students) has to build on and/or be related to what learners know, can do, believe and care about already. Unless learners have the opportunity to make such connections, new knowledge, ideas or skills are all too often quietly forgotten, discounted or simply remodelled and shoe horned in to preexisting practices and beliefs. (Cordingley, 2008, p.42)

Therefore teacher learning needs to build on what teachers already know, believe and value. Just providing teachers with knowledge may not be helpful as they need to be supported in developing their practices so that they can use that knowledge. But the providing of knowledge via websites has been described as a weak means of sharing new practice:

Despite his faith in the role of ICT, Hargreaves (2003a in book), like many authors, feels that websites are a weak means to use to share practice because they can only contain disembodied practice. We have argued that if artefacts are considered as reifications of practice that need associated participation, then they have a role in sharing practices because they become the basis for a negotiation of meaning. (McCormick *et al.*, 2011, p.166)

McCormick *et al.* argue that knowledge or artefacts, as they term 'knowledge', are reifications of practice. To retain its dynamic relationship with change there needs to be participation in the use of that knowledge. This participation in the knowledge becomes a way for practitioners to negotiate the meaning of that knowledge. This has been called the duality of knowledge (Wenger, 1998, p.66). Wenger tries to explain this:

Participation and reification both require and enable each other. On the one hand, it takes our participation to produce, interpret, and use reification; so there is not reification without participation. On the other hand, our participation requires interaction and thus generates short cuts to coordinated meanings that reflect our enterprises and our takes on the world; so there is no participation without reification. (Wenger, 1998, p.66)

Hence knowledge is both at the same time reification and participation. This needs to be considered when designing resources to improve knowledge mobilisation in education. Reification developed from research knowledge needs to be considered with participation in mind. As discussed earlier, the reification is providing the access to the knowledge but this is not enough, and how practitioners participate in, and with, that knowledge needs to be considered. This point has been made in earlier work by Csikszentmihalyi:

Artefacts and practices entail each other, they are mutually constitutive: practices generate artefacts, which in turn structure practices. The artefact serves as an embodiment of practice, which makes that practice knowable by others, repeatable over time. It seems to hold things together, not least by helping us to think as well as to do; things orientate our thoughts as well as our actions. (Csikszentmihalyi, 1993 cited in Freeman and Maybin, 2011, p.165)

Again the artefact in this case, the online pathway, is an embodiment of practice developed from research. Freeman and Maybin state this more plainly as “the artefact requires the practice, which in turn requires the artefact” (2011, p.165). This more philosophical discussion highlights that online pathways can only ever contain “disembodied practice” (McCormick *et al.*, 2011, p.166) or an “embodiment of practice” (Csikszentmihalyi, 1993 cited in Freeman and Maybin, 2011, p.165). Either way teachers will need a large amount of support to take these artefacts/reification/knowledge and use them in a practical sense in their own classroom contexts. So when teachers ask for practical examples of how research knowledge or, “lived examples of practice” can be implemented in their classrooms they need to be supported. As Black and Wiliam state:

Teachers will not take up attractive sounding ideas, albeit based on extensive research, if these are presented as general principles, which leave entirely to them the task of translation them into everyday practice. (Black and Wiliam, 1998, p.15)

This act of translation, from principles and strategies based on research knowledge, to everyday practice, must be supported if resources such as online pathways are to provide research knowledge to teachers. Indeed the whole idea of knowledge mobilisation will need the support of teachers, schools and policy-makers.

5.2.1 Teacher quality

If the goal is to improve the educational outcomes for pupils then improving teacher quality must be considered (OECD, 2009; OECD, 2010; Barber and Mourshed, 2007). For resources such as the online pathways approach, it can be seen from the literature that just providing research knowledge is not enough (Nutley, Percy-Smith & Solesbury, 2003; Adams, 2009). Both the qualitative and quantitative findings of this study show that a resource such as this will need to be used by teachers who are engaged with research and work in schools that support and promote the use of research. Resources such as online pathways will need to be integrated with a good model of CPD. Critically CPD that moves beyond sitting teachers in rooms and talking at them, and moves beyond an instrumental model of knowledge. A model of CPD will provide teachers with a way to participate in the knowledge, reifications or artefacts. Without this participation in the knowledge that is provided by online pathways, teachers will not learn new practices and will not be able to change their classroom practices.

The use of online pathways is not about producing more knowledge; as Wiliam (2007) has stated, lack of knowledge available to teachers is not the problem. There needs to be participation in that knowledge. The online pathways approach provides a way of presenting knowledge that has already been generated and

presents it in a way that can be engaged with by practitioners. A finding of this research indicates that good research knowledge, illuminated with lived examples of practice, using a model of CPD that moves beyond being instrumental, and allows teachers to interact with that research knowledge, will go some way to improving teacher quality.

5.2.2 Online pathways to support teacher learning and CPD

When considering how the online pathways approach could be developed to support teachers' learning and development, the metaphors of learning proposed by Sfard, (1998) and Paavola *et al.*, (2004) have been considered. The three metaphors of learning provide a way of thinking about how learning could be organised for teachers throughout the development of their careers. This section discusses how the model of teacher learning needs to change as a teacher's career develops and thus one model of learning is not enough when considering the career development of a practitioner over, what in many cases, may be a forty year career. How the online pathways approach can support the continuing professional development of teachers is proposed.

In the acquisition metaphor, where learning is considered as the acquisition of something, i.e. a banking model of learning (Freire, 1970, p.58), online pathways will be able to provide an overall structure to the knowledge being presented. For a teacher this may be useful when learning subject knowledge and initial pedagogical strategies.

For the participation metaphor, where learning can be considered as, becoming a participant within a community. Online pathways can support this type of learning by providing knowledge of the practices, processes and norms of the community to new novice members. This would be useful for teachers in their initial NQT year.

For the third metaphor, the knowledge creation metaphor (Paavola *et al.*, 2004), online pathways may become a mediating artefact that are to be developed. Thus teachers who are engaging with research through programmes such as Masters' degrees, become the authors of online pathways. Online pathways in turn become a way of developing collaborative artefacts or common objects of activity. This process of developing online pathways from research or knowledge created by teachers for others to use, is a way in which online pathways can support the knowledge creation metaphor of learning. This model could be used for teachers' ongoing professional development throughout their careers.

In conclusion, the model for teacher learning moves beyond the acquisition of knowledge by teachers and the participation of teachers in the practices and processes of becoming a member within a community, to a model of knowledge creation based on teachers "collaboratively developing mediating artefacts" (Paavola and Hakkerainen, 2005, p.539). Thus the future for resources, such as the online pathways, is for teachers to be collaboratively developing them as a way for them to make explicit the knowledge that they have generated, a way of making 'systematic enquiry made public' (Stenhouse, 1981, p.104).

Teachers will be aware of what they have learned from their own research enquires and will be able to deploy these resources so that other teachers can learn from them. This study looks to move beyond the acquisition and participation metaphors of learning as models for teachers' professional development, to a knowledge creation metaphor of learning. This would go some way to addressing the problem of how teacher learning is conceptualised which McCormick has described as the root of CPD (McCormick, 2010, p.400). Therefore as teachers become knowledge producers themselves through their own research enquires, they have to consider how to mobilise the knowledge that they have created. Online pathways would be one way for teachers to make explicit the knowledge that they have created.

For online pathways to support teachers it is useful to consider the barriers to teachers use of research that were presented in Table 2.6. This table can now be re-examined to see how the online pathways approach deals with these barriers. Table 2.6 is reprinted below. The barriers are discussed by category.

Table 5.2 Barriers to teachers use of research

Description	Category	Reference
Inaccessibility.	Problem with research.	Levin <i>et al.</i> (2010, p.5).
Inconsistent results.	Problem with research.	
Lack of synthesis across multiple studies.	Problem with translation.	
Failure to be clear about practice implications.	Problem with translation.	
Knowledge and skills of individual practitioners.	Practitioner knowledge.	
Unable to assess the quality of the work.	Practitioner knowledge.	
Unable understand the meaning in practice of findings expressed in terms of, for example significance level or effect sizes.	Practitioner knowledge.	
Lack of applicability.	Problem with translation.	Castle (1988) cited in Hemsley-Brown and Sharp, 2003 p.454.
Ambiguity of research material	Problem with research.	
Irrelevant, unhelpful.	Problem with research.	Shkedi (1998) cited in Hemsley-Brown and Sharp, 2003, p.454.
Too theoretical.	Problem with research, problem with translation, practitioner knowledge.	
Lack of time.	Organisational problem.	
Did not trust the findings.	Practitioner knowledge.	
Unable to understand the language.	Practitioner knowledge.	
Unable to make sense of statistics.	Practitioner knowledge.	
Teachers believed research should exclusively identify strategies and techniques that could have a direct impact on their teaching.	Practitioner knowledge.	Zeuli, (1994) cited in Hemsley-Brown and Sharp, 2003,p.452.

For the category 'problems with research' the online pathways approach was initially designed to deal with issues such as inaccessibility, inconsistent results, ambiguity of research material, and irrelevant and unhelpful research. These criticisms of research were drivers for the development of the online pathways resource. For these types of barrier to be dealt with pathways need to be well written, peer reviewed and reviewed over time to take account of changes in the evidence base of a topic. These processes will reduce these barriers.

For the category of 'problems with translation', online pathways need to be written so that they are a synthesis of the best research across a number of studies. There needs to be clear practical implications included in a pathway about the use of the research by practitioners and the research knowledge presented needs to be applicable to the audience for which it is intended. The data in this study, the second questionnaire, show that practitioners want practical examples or real life examples of how research can be used in practice. The level of theory that is presented in pathways needs to be considered in the editorial process.

The lack of practitioner knowledge needs to be considered when designing pathways. Online pathways need to be developed not just with content knowledge but with pedagogical knowledge and pedagogical content knowledge in mind. Thus the design of pathways is not just an exercise in presenting knowledge but presenting knowledge in a way that supports the development of the practitioners in expanding their use, understanding and critical engagement with research. Therefore pathways cannot be overly theoretical, practitioners need to trust the evidence presented, and the language and the use of statistics needs to be able to be understood. The aim of the pathway is to try to improve and support the knowledge and skills of the practitioner in their engagement with research.

The organisational problem of lack of time was one of the primary concerns in initially designing online pathways. The use of a pathway as the interface to the

resource was to provide quick routes into the knowledge presented, allowing quick engagement for busy professionals. The graphical element of an online pathway needs to be designed so that knowledge is presented in a way that makes it accessible.

Overall the online pathways approach provides a way to challenge the barriers to teachers' use of research.

5.2.3 Teacher learning

Nearly half, 47.7 per cent, of the practitioners sampled in this study were 'engaged in postgraduate studies'. Teachers also valued postgraduate study with a score of 59.2 per cent. These quantitative data are backed up by discourse extracts from the qualitative data such as "I think that once you've opened that door [to research] and you've realised that your lessons can be better, more enjoyable, your students can achieve better" (OW, secondary psychology HoD). These data show that teachers, can engage with research through studying for a postgraduate qualification. Thus for teachers, enrolling on a Masters course or other postgraduate study is a valued way for them to engage with research. Other findings in this study show that 60 per cent of primary teachers and 36 per cent of secondary teachers in this sample were engaged in postgraduate study. These findings shows that there are differences between primary and secondary teachers and that there may be more opportunities for postgraduate study in smaller organisations such as primary schools. These examples show that teachers practice and value postgraduate study, and that they see postgraduate study as a way to be engaged with research about their practices.

This research shows that teachers were willing to engage with postgraduate studies in their own time after their normal working hours. It may be difficult to achieve this commitment from teachers if they are not studying towards a postgraduate qualification. The data presented above shows that for teachers,

postgraduate study provides a way for them to engage with research on a personal level and to engage with the wider research community. The wider research community may include teachers from other schools, university staff and contacts made at postgraduate conferences. These findings support the view of Gove (2010a) who stated that, “I want to see more data generated by the profession to show what works, clearer information about teaching techniques that get results, more rigorous, scientifically robust research about pedagogies which succeed” (cited in Brown, 2012b, p.60). Unfortunately the funding for teachers to study for Masters' degrees was cut by Gove (2010b).

Summary of discussion

In summary, this discussion has shown that for knowledge mobilisation to be enhanced, for research to be used more by teachers, and for research to be the basis for teachers practices in school, there are a number of individual and organisational factors that need to be strengthened. Equally knowledge that has been translated from research knowledge into online pathways needs to support the work of teachers and be aware of their contexts.

Thus the development of online pathways needs to take account of the following characteristics:

- that translations of research knowledge need to provide support for teachers moving beyond a simple restatement of principles based on research,
- online pathways need to include lived examples of practice,
- online pathways may have more impact when used in a coordinated CPD

model with teachers, either individually or collaboratively.

These types of resources should not just be given to teachers in the vague hope that from providing the information teachers will be able to change their practices, and improve the learning outcomes of their pupils. The current government policy in England (DfE, 2010b) looks to provide teacher training through schools, thus reducing the engagement with research and the wider research community that trainee teachers were likely to have through a university based teacher education course. In conclusion, the need for good resources to support teachers in school based training is even more important.

5.3 Research questions revisited

In this section a synthesis of the findings generated in this study are used to answer the research questions originally posed. The initial two questions are about teachers' use and value of a range of research practices. The following three questions are about views and opinions of the online pathways approach.

Research Question 1 – What research practices are currently used by practitioners and schools?

This study shows that teachers and their schools engage in a large range of research practices and that teachers have a better chance of engaging with research practices on a personal individual level, rather than engaging with the practices of the wider research community. Teachers are able to engage in research related reading, networking, postgraduate studies, events and discussion with colleagues, but struggle to engage with professional conferences, local authority events, university events, academic conferences and receiving funds to carry out research. Practices that can be carried out on a personal level by teachers, and in their own time, such as reading, networking, discussion and postgraduate studies, are practiced more. Practices that have more of an effect on other colleagues are more difficult for teachers to engage with. For a teacher to have a day out of school, lesson plans and cover work need to be prepared, and other teachers or supply teachers need to be used to cover lessons. Moreover there is a cost involved in teachers being out of school both financially and in terms of other colleagues' time. The cost of a supply teacher and the cost of the event that the teacher is attending also need to be covered. Cost in terms of pupils not having instruction from their regular teacher may also need to be considered. Schools may be unwilling to provide both the time and the money for teachers to attend events inside of normal school hours. This study shows that it is difficult for teachers to engage in activities that remove them from their school work

environment.

The research practices used by schools were reported on by teachers and demonstrated a substantial range. Teachers reported that schools were good at using research practices, such as the use of data, in reporting, discussing research in professional development meetings, encouraging professional development including postgraduate study and encouraging the use of action research. Also it was seen that encouraging postgraduate study and encouraging action research both scored highly. These findings may be because this study was carried out at the same time that a large number of teachers were being encouraged by the government to study for Masters' degrees. Equally another interpretation is that these are practices for schools trying to encourage teachers to use research in their practice.

Teachers judged schools to be 'less good' at the research practices such as discussing research in SMT meetings, staff meetings, and department meetings. They were also 'less good' at building relationships with external researchers, discussing research at informal networking events, and providing opportunities for informal networking. Although it can be seen to be good practice for research to be discussed in a range of meetings by staff, these types of practices were not being carried out. Practices such as building relationships and informal networking are useful practices in a research community. But the marginalising of Local Authorities in the school system, and more school autonomy being given to schools through academisation, highlight the schools which are better at these types of practice and will be better at encouraging the use of research in their schools. These types of practices will no longer be mediated through the Local Authority. This study shows that teachers and schools may not appreciate, or be aware, of which practices may be useful when trying to bring new research into schools.

This study also shows that schools were not very good at sponsoring their own research events such as workshops or conferences, circulating research articles within schools, discussing research to plan teaching, or providing time for research related activities. Again a number of these items show that schools need to consider the research practices that they can use to bring new research in to support teaching and learning, improve teacher quality and improve learning outcomes for their pupils. Providing research articles, discussing research when planning teaching and providing time for teachers to engage in research related activities were difficult for schools but these are the types of practices that schools will need to consider when focusing on encouraging teachers to use more research in their practices.

This study shows that schools were particularly poor at a range of research practices. These were providing funds for research generation and utilisation, discussing research in pastoral and parent meetings, and having a member of staff with responsibility to bring in new research into the school. Although schools may be poor at discussing research in pastoral and parent meetings, these findings show that teachers regard the discussion of research to be inappropriate in some instances. In these types of meetings the focus maybe on the pupils and how they can be supported. Schools are poor at practices such as providing funds for research generation and utilisation, and for having a member of staff with responsibility to bring in new research. These findings show that schools need to consider which practices can be leveraged the best, so that teachers can be supported in their use of research.

Although some of these practices may be difficult for schools and teachers to implement if teaching is to become a research based practice, schools need to consider which practices they can use to bring more research into school to support and improve the quality of teachers and teaching so that learning outcomes can be improved for pupils.

Research Question 2 – What value do practitioners place on these research practices?

Overall, teachers value research practices. In all cases teachers' value scores were higher than the corresponding practice scores for each of the research practices considered by this study. In essence, their aspiration is beyond what they experience.

Teachers value a range of practices including research related reading, discussion of research with colleagues, events, networking and professional conferences. In all cases teachers value these practices more than they are able to practise them. Teachers value the reading of research and the discussion of research with colleagues the highest. Indicating that discussion is very important as it is through this type of interaction that teachers are able to make sense of research knowledge, and discuss how they can use this in their context specific practice. Teachers also value professional conferences that are run by their own subject associations. Teachers can see the value in these types of conferences more than other types of academic focussed conferences.

For teachers, the lowest valued research practices were receiving funds from school to carry out research, attending research focused academic conferences, or outside organisations sponsoring events. Although schools are not primarily in the business of funding research, schools and teachers need to be aware that this is an excellent way for teachers to develop professionally. This finding shows that teachers may be restricted to small research enquires without funding, unless they are able to develop relationships with professional researchers. Again one way of doing this would be through studying for postgraduate qualifications.

These findings show that teachers have problems engaging in the wider

community of research because they do not value research practices such as attending academic conferences. Although teachers value professional conferences run by subject associations for example, they place less value on academic focussed conferences. Both these findings show that for teachers to engage in the wider research community they need to be more aware of the value of these types of activities. For teachers to develop professionally through enquiring into the nature of their own classroom practice, teachers need to be aware of, and value, the types of practices used by the wider research community.

Overall the finding that teachers value research practices are reassuring. Teachers are able to see the value of these practices and would like to engage more in these practices. These practices are discussed in four groups below.

Firstly, teachers highly value a number of schools' research practices. These are; being given time to engage in research related activities, the school encouraging research related professional development including postgraduate study and discussing research in professional development meetings. Thus teachers value the time that is given to them and would like more time to engage with research related activities. If schools want their teachers to be more engaged in research then providing them with time to do this, although difficult, will be essential. Supporting teachers to complete postgraduate study may be one way to do this, as most postgraduate courses are attended outside of normal school hours.

The second less valued range of research practices, were discussing research in a range of meetings including SMT meetings, staff meetings, departmental meetings, linking data to reporting, facilitating action research, discussing research to plan teaching and providing opportunities for informal networking. These practices show that teachers are interested in the discussion of research with colleagues in a range of meetings and in the planning of their teaching. Teachers also value, but not highly, when schools encourage practices such as action

research and informal networking opportunities.

The third range of research practices included, circulating research articles, research being discussed in informal networking events, building relationships with external researchers, schools providing funds for generation and utilisation of research, schools coordinating research events, and a member of staff with responsibility to bring in new research. These are a range of practices that are less important to teachers. What is surprising and unfortunate about the value scores that teachers place on these research practices, if it is to be a research based profession, is that they should be valued highly by teachers as these are the types of practices used by researchers to develop and promote their research work. Thus if schools want to encourage teachers to use more research practices, and to use research to inform their work, then teachers need to see more value in these types of practices and researchers need to be open to engaging practitioners in their work through resources such as online pathways.

Fourthly, the least valued research practices were the discussion of research in pastoral and parent meetings. This important finding shows that teachers do not consider research to be important when engaging in these types of meeting. This may be because research is not relevant due to the nature of the meeting.

Overall it can be seen that teachers value research practices, but the types of research practices that they engage in are accessed, for the most part, on a personal level. Research practices that are common to the wider research community are not valued by teachers. This is either because teachers have so little chance of engaging in these practices that they cannot see the value in them, or that the world of research may seem so far removed from their day-to-day practices that they cannot see the value in these practices.

If teaching is to be a research based profession then schools and policy-makers need to encourage and support teachers in seeing the value of these types of research practices. This may include supporting teachers to conduct their own research enquiries. As Hall states:

For the teacher researchers, their developing sense of self as agents within their own enquires gives them permission to engage more actively with the research methods and the products of others' research. (200, p.677)

Thus for teachers, the development of their own enquires allows for further engagement with the wider research community. Overall teacher engagement with the wider research community will be one way of promoting knowledge mobilisation in schools by teachers.

Research Question 3 – What are the processes that need to be undertaken to take research knowledge in reports and journals and present it in online pathways?

In the course of this study online pathway examples were created and presented to practitioners. So the processes that need to be considered when producing online pathways were undertaken by the researcher. Therefore the answer to this question lies in the reflections on the processes that needed to be considered when constructing online pathways. Ideas and input into how to develop online pathways was also provided by study supervisors.

An initial software platform was developed so that online pathways could be written and edited by multiple authors. Although useful, this initial platform was constraining in the way the online pathways could be developed visually. These design constraints meant that the initial platform was too constrictive and was therefore quickly abandoned. The online pathways were then constructed using

HTML³⁹ image maps, and PERL⁴⁰ scripts to provide the interactive nature of the text on the screen. Although more technical in its approach this version allowed much greater freedom in the way the image of the research topic could be presented. This extra freedom allowed for more creativity in the design of pathways. This change was also important so that the author of a pathway was not constrained in their creativity due to the limitations of the software platform that was being used. The platform needs to allow for the author's creativity in visually displaying the knowledge of a research topic. Although creativity is important, practitioners want online pathways to be focussed, not overly busy on the page and designed so that there is not a large amount of scrolling on the page. These factors need to be taken into consideration when designing online pathways.

Online pathways are translations or representations of knowledge and therefore it is a difficult task to take original research across a topic and make a synthesis of that knowledge. To produce a visual representation of that knowledge also adds a complication. Thus online pathways move beyond simply producing a narrative literature review, or even systematic review of the state of knowledge around a topic, and add the extra dimension of how knowledge can be represented visually as well as in written form. As Freeman has stated:

We communicate by means of signs (words and pictures, sounds and images), that is by choosing or making representations of what we mean. But the relationship between the sign and what it signifies is neither determined nor mechanical: what things mean or represent is a matter of convention (a social construct) and it is invariably inexact. (Freeman, 2009, p.440)

The writing or constructing of representations of the knowledge of a topic is an inexact and difficult task. Authors of online pathways need to be aware that what they produce may not be received in the way that they intended when they wrote

³⁹ Hyper Text Markup Language

⁴⁰ Practical Extraction and Reporting Language

it and that their representation of that knowledge may not make the same sense to their audience. Equally, Fenwick acknowledges the difficulties of knowledge mobilisation:

...if taken seriously, knowledge mobilisation will require dedicated time in design, development, and collaboration, by networks of individuals bringing various specialised expertise. (Fenwick, 2012, p.151)

The development of online pathways for knowledge mobilisation will be a time consuming task requiring a range of experts in the field. The editorial process will need to be strongly defined so that the stages in the development of an online pathway can be documented. The development of these processes will not be a trivial task, and time will be needed to define the editorial process.

Another challenge in writing online pathways, or any form of translation, is “who decides which representation is the most truthful?” (Fenwick, 2012, p.151). The act of synthesis and translation of original research knowledge into a new representation of that knowledge becomes a political act. Fenwick reiterates this point with “what knowledge is ultimately mobilised? Whose knowledge? For whose purposes?” (2012, p.151). For example, the development of online pathways may not be congruent with current government policy, e.g. the debate around the use of synthetic phonics (Wyse and Styles, 2007). These debates in the differences between evidence and policy need to be highlighted so that practitioners can make informed decisions about their own practices. The writers of online pathways need to try to be objective in their assessment of the research knowledge on a topic and in the ways that the research knowledge is represented. Again these issues need to be considered in any editorial process that is developed.

Another challenge is that practitioners in this study have reported that they prefer

more practical examples of research knowledge. Thus the state of knowledge in a topic needs to be synthesised, a visual representation of that knowledge needs to be constructed and the practices to resonate with educational practitioners' practical examples or "lived examples of implementation" (Black and Wiliam, 1998, p.15) need to be developed and presented. Providing practical examples of practice from a synthesis of research knowledge is not an easy task and any practitioner will interpret that research knowledge into their particular contextual setting of their classroom. Therefore practical examples need to have enough context so that they will resonate with practitioners and they can make sense of them, but not too much context so that any one example can appeal to the maximum audience range. In practice this is very difficult to achieve.

Overall practitioners want research knowledge to support their classroom practices, both in terms of what they are doing at the moment and to inform any future changes of practice. Practitioners need this research knowledge so that they can explain why they do what they do in evaluations of their performance both internally and externally. The pressures placed upon them by their departments, their schools, outside agencies such as OFSTED and league tables of performance appear to run through everything that they do and seem to be a distraction from what their focus should be *i.e.* teaching and learning and improving the learning outcomes of their pupils.

Research Question 4 – What views do practitioners have of the online pathways approach as a way of presenting research knowledge?

Overall practitioners had very positive views of the online pathways approach as a way of presenting research knowledge. Practitioners liked that it was accessible and focussed on research knowledge and that the online pathways were a synthesis of research around a topic. This allowed busy practitioners access to the knowledge on a topic without having to read a large amount of original research

journal articles. It was important for practitioners that original research articles were referenced. Practitioners wished to be aware of the sources that were cited in online pathways without having to read the original articles. Practitioners needed to know that the knowledge that they were basing their changes of practices on were supported by good and rigorous academic research knowledge. This was needed so that when lessons or practices were assessed either internally or externally, practitioners knew that the practices they were using, or the evidence that they were using, on which to base or inform those practices were based on solid, robust and rigorous academic research knowledge. This was very important for practitioners.

Although practitioners wanted to know that online pathways were based on original research knowledge they also wanted practical examples of this research knowledge. As Black and Wiliam state:

Teachers will not take up attractive sounding ideas, albeit based on extensive research, if these are presented as general principles, which leave entirely to them the task of translation them into everyday practice. (Black and Wiliam, 1998, p.15).

Practitioners need help in this act of translation, from research knowledge to everyday classroom practices. The more help that can be provided in the way of producing practical examples of practice the better the chance that a change of practice is carried out by a practitioner in their classroom. Thus changes of practice will need to be based on the 'spirit' rather than the 'letter' (Marshall and Drummond, 2006, p.137), so that changes of practice will produce changes in the teachers' ideas rather than just changes in their procedures. For this reason changes of practice need to be faithful, effective and sustainable (Coe, 2013, p.xi).

Practitioners stated that a search of all the pathways would be useful, allowing direct access to resources without having to go through some kind of controlled

vocabulary menu structure. Practitioners wanted to be able to tag resources. This type of crowd tagging would need to be controlled so that similar tags could be conflated into one tag to avoid repetition and the use of tags which are too similar. An alternative to this would be to require users to log into the site thus allowing the use of their own set of tags. This would require the use of usernames and passwords which may put potential users off engaging with the site.

Practitioners noted that the content of an online pathway needs to be focussed. There should not be too much content on one page, not too many boxes in a pathway image, and there should not be excessive scrolling, which can have a negative impact on users (Toepoel *et al.*, 2009). These kinds of issues present editorial challenges for authors of online pathways. Equally pathways need to be focussed so that practitioners stay engaged with the material rather than being distracted by excessive scrolling or images that may be overly complicated in their presentation of research knowledge.

Practitioners pointed out that more attention was needed to the overall design of the online pathways site, thus the design of the graphical parts of the site would need to be considered. Also colour could be made better use of in the site, so that areas of a similar nature could be highlighted with the use of colour.

Practitioners were asked if they would be interested in authoring online pathways. This was something that they had not considered and felt it would be the work of academics to author pathways although they would be willing to comment on them. So, although practitioners were used to the idea of commenting on online resources they seemed more reluctant to design and develop their own online pathways. The authoring of pathways could be considered for practitioners carrying out a research based qualification in their school as part of a CPD programme as pointed out in section 5.2.2.

Overall the online pathways approach provides a way of giving practitioners access to research knowledge, but the way that practitioners engage or participate in that knowledge needs to be considered. Just providing access to the knowledge will not be enough, ways need to be developed so that practitioners can engage with research knowledge. Practical examples, or lived examples, of practice need to be presented, so that the act of translation from general principles based on research knowledge to faithful and sustainable classrooms practices is made easier for practitioners. Online pathways may need to be designed with collaborative CPD (Cordingley, 2005a; 2005b, McCormick, 2010) in mind, rather than the focus being on an individual practitioner.

Research Question 5 – What processes do practitioners adopt to take the knowledge presented in online pathways and use it their practice?

As the previous research question explains, the knowledge from research papers and articles needs to be translated into a synthesised representation of research knowledge so that online pathways can be constructed. This process needs to be done within an editorial process and involves peer review so that objectivity in the production of these pathways can be maintained. The online pathway as a representation of research knowledge is then taken by the teachers and brought into their professional discussions. From these discussions, processes and practices that are represented in documents such as schemes of work and lesson plans can be changed. Schemes of work and lesson plans are the embodiment of the current practices of the teacher. These documents set out the practices and processes that are used by teachers. As Freeman and Maybin state, “documents express and reproduce norms and patterns of thought” (2011, p.159).

Professional discussions such as these are social activities and need to be part of a strategy at department level in secondary schools or year group level in primary schools. Professional discussion is an important part of changing practices or

bringing new practices into a school. Professional discussion is used by teachers as a way to make sense of new research knowledge. Teachers need to take research knowledge from the form that it is in, these maybe translated already, and develop it into practical processes and activities that they can use in their contexts with their pupils. Thus the practice of discussion is part of the process of turning research knowledge into practical examples and activities, that are then embedded into lesson plans. As Levin states, “research evidence is mediated through personal experience, collegial knowledge and organisational culture” (2013, p.12). The mediating of research is not just the work of an individual but needs to involve these other factors.

The professional discussions and collaborative activities of teachers need to happen in a school culture and climate that is supportive of its teachers and promotes their use of research knowledge. As Opfer and Pedder state, organisational conditions include “school-wide systems of support for CPD, promotion of networking and social capital resource of trust and mutual support” (2011, p.5). This research study has uniquely highlighted a number of factors that need to be considered by schools to promote the use of research by teachers, such as the promotion of the professional discussion of research, and teachers engagement with research. For teachers to use the knowledge that is presented in online pathways they need to be supported by the cultures and norms of the organisation in which they work. As other researchers have noted, the “main barriers to knowledge use in the public sector are not at the level of individual resistance but lie in an institutionalised culture that does not foster learning” (Louis (1996) cited in Hemsley-Brown and Sharp, 2003, p.459). The quantitative data in this study lends support to this statement. The use of research by teachers is as much about the practices that school leaders support and promote in their schools to support teachers as it is about individual engagement. School leaders need to be “creating organisation support and incentives that give greater prominence to the consideration of research

findings and their implications” (Levin *et al.*, 2010, p.7). School leaders who are open to research knowledge and supportive of its use are needed, and thus the research backgrounds of school leaders is an important factor in the promotion of the use of research in an organisation (Levin *et al.*, 2010, p.7).

Promoting teachers' professional discussion of research is important, so that teachers have the time and space to change and develop their practices. These changes need to be implemented in an organisational culture that promotes the use of research and supports its teachers in doing so. If there is little attempt to meet these factors it will be difficult to use the knowledge in online pathways in any useful and meaningful way.

Overall research question revisited

The overall research question for this study was 'in what ways might online pathways be used to enhance knowledge mobilisation and improve teaching as an evidence informed profession?' This study shows that overall knowledge can be mobilised so that teachers can make use of that knowledge to support and change their practices. Overall this research shows that teachers are interested in research, are interested in the use of research practices and are interested in engaging with research. This study also shows that teachers need to be supported in their use of research by the organisations that they work for. These organisations need to promote and support the use of research by teachers through the development of the culture, norms and practices of the organisation.

Teachers need to be, and should be, supported in their use of research knowledge both individually and collaboratively. Policy-makers and school leaders need to encourage and support teachers to engage both with research and with the wider research community. This will be one of the ways that the profession will be able

to develop and advance. This research was conducted at a time when a large number of teachers were engaged in Masters programmes. This research highlights that these Masters programmes were one way that teachers were encouraged and supported in developing and engaging in research and the wider research community. The cut to funding to support teachers engaging in Masters programmes is a missed opportunity to further develop teachers, and the quality of teaching, and ultimately improve learning outcomes for pupils.

This research shows that the online pathways approach is one of the ways that research knowledge can be presented to practitioners to support and improve their practices. Practitioners are interested and receptive to the approach although they would like more practical examples to be included. This approach should be further developed as a new way of presenting synthesised research knowledge to practitioners. Busy practitioners cannot be expected to translate research evidence into everyday practice without help (Black and Wiliam, 1998, p.15).

In England schools are being given more autonomy although this may result in less support. Therefore resources, such as online pathways, that are aimed at improving the links between theory and practice, improving teacher quality and improving learning outcomes for pupils, should be developed and supported.

5.4 Summary

This section has discussed the research findings of this study and how they relate to the literature on knowledge mobilisation and teacher development. This section has presented a number of factors that policy-makers and school leaders can use to develop the use of research by teachers. This study shows that both individuals and organisations need to be promoting and supporting the use of research. Hence encouraging teachers to use research is useful but this must be done in an organisational culture that promotes and supports that use of research.

Ultimately teachers need to engage with research so that they are generating research knowledge about their own practices. School leaders need to be supporting the endeavours of teachers so that knowledge creating schools can be developed (Hargreaves, 1999). Although a model of teacher learning and CPD based around teachers generating knowledge about their practices using online pathways was discussed, these ideas are ambitious and teachers and schools will need a lot of support if this is the model that is to be aimed for. In the end the majority of teachers will still have to spend 5 hours of their day in front of classes.

Online pathways can be used to improve knowledge mobilisation for teachers. The authoring of online pathways is not a simple process and for pathways to be developed so that the knowledge of an education research field can be mapped will be a difficult task. Teachers and school leaders are receptive to the approach of online pathways and this should be seen as encouraging. But the development of online pathways needs to be implemented within a strict editorial and peer review process so that objectivity, rigour and trustworthiness can be maintained. Thus the development of pathways should be considered a worthwhile but also a serious undertaking.

6.0 Conclusions

In this section the conclusions of this study are discussed and recommendations and implications that have arisen are presented. The research questions are then reviewed to see what could be learnt. The methodology is also reviewed, and this includes reflections on the methods employed in this study, if they were fit for purpose, and if the methods used produced the data that was needed to answer the questions posed by the study. This section also includes suggestions for further research and a number of recommendations are made as to how to do that.

This research study shows the importance of asking practitioners about their values as well as their practices. As highlighted in the introduction, the OECD state that “teachers’ beliefs, practices and attitudes are important for understanding and improving educational processes” (2009, p.89) and Levin *et al.* state that it is “probably more typical that research first acts on people's ideas and beliefs, with those changes later translating into changes in policy or behaviour” (2010, p.4). This study shows that practitioners value the use of research and research practices. Practitioners value these practices more than they are able to practise them. Moreover practitioners are constrained in their use of research knowledge and research practices by the nature of their work and the nature of their workplaces. If school leaders and policy-makers want practice to be evidence informed then practitioners need to be given time and support so that this can be implemented.

This study also shows that the use of research knowledge by teachers is not just about the actions of individual practitioners. Teachers need to be supported in their endeavours to use research knowledge and research practices. This means

that schools need to be promoting the use of research and supporting teachers to engage with it. Schools also need to be supporting teachers in the more difficult task of practitioner engagement in the wider research community.

Ultimately teachers engage with research and improve their knowledge of research through generating their own research knowledge about their own practice. Teachers need to be adding to the body of knowledge about their practices and about teaching and learning. This point has been raised by the Secretary of State for Education who stated that, “I want to see more data generated by the profession” (Gove, 2010a) and is closely related to the idea of the 'knowledge creating school' (Hargreaves, 1999). Overall teachers' knowledge generation will be one of the ways that the profession can be developed, teacher quality can be improved and the quality of teaching and learning can be improved. The authoring of online pathways can be one of the ways that teachers are able to produce knowledge translations of their own research enquires.

This study has also highlighted the social nature of teachers and teaching. The data shows that teachers value the professional discussion of research in a range of meetings. This professional discussion is a way of making collaborative sense of research knowledge when teachers are looking to change or introduce new practices. In the course of these changes new practices and activities are discussed and developed, and then become embodied in new schemes of work and lesson plans. Thus schemes of work and lesson plans become the new representations of these changes of practice which are then enacted in the classroom by teachers.

This study was carried just after the funding for teachers studying for Masters degrees was cut (Gove 2010b). A large number of teachers involved in this study were either currently studying for Masters degrees or had completed their studies. Both the qualitative and quantitative data in this study show that teachers value postgraduate study and see it as a way of engaging with research so that it could

be used as part of their practice. Teachers studying for Masters degrees were prepared to devote their own time to their studies, which usually took place outside of school hours, and if they had to, were prepared, to some degree, to fund these studies. Thus teachers studying for Masters degrees was an excellent way of engaging teachers with research knowledge and with the wider research community through interaction with their fellow students and lecturers, and at a relatively low cost to the school. To achieve the equivalent mass teacher education programme through CPD sessions in schools with providers would be excessively costly both in financial terms and in teachers time. If the UK is looking to emulate Finland and their high placings in international league tables, it needs to be recalled that in Finland all teachers study to Masters level, and have done so since 1979, and are then trusted to be professional practitioners (Aho *et al.*, 2006, p.11). If there is an expectation that UK teachers need to compete with teachers in Finland then ethically they need to be supported in doing so. Overall the cutting of funding for teachers to study for Masters degrees may be a costly mistake in trying to improve teachers and teacher quality in the UK.

One of the challenges of this study was to find out what practitioners thought of the online pathways approach which would be used as a way of presenting complex research knowledge to practitioners. As Leask states, “there is an assumption that practitioners have access to a professional knowledge base” (2011, p.645). This study has shown that practitioners have a positive attitude towards the resource and would use it in their professional practice. This indicates that the resource should be developed further and that work should be carried out so that online pathways become one way of developing a professional knowledge base for the field of education.

This research also shows that online approaches to knowledge mobilisation have more chance of succeeding in promoting the use of research knowledge, if they are to be used as part of a coordinated CPD programme. Thus research evidence

has a better chance of influencing and changing the practices of teachers if they can engage with an online resource through CPD rather than just be presented with access to research knowledge. This engagement with an online resource could be done individually or collaboratively, but this study shows that when teachers considered using the online pathways approach they explained that this would be done as part of some kind of collaborative activity. So although resources such as the online pathways approach are able to deliver knowledge to practitioners, they may be best utilised as part of a wider programme of collaborative CPD that works towards teachers generating their own knowledge.

This study shows that teachers want and value knowledge mobilisation. Teachers want their practices to be based on solid educational research evidence; teachers do not want to be 'caught out' by inspectors or observers either internal or external to their schools. Teachers are searching for research knowledge on which to base or inform their practices, and want solutions that they can understand, and that synthesise the current research knowledge around a topic.

This study supports and extends the work of Levin who states that knowledge mobilisation is a collaborative, social task that requires a specific effort to achieve (Levin, 2013). Practitioners highlighted the collaborative and social nature of how they would use the online pathways. The findings of this study also show that practitioners are regularly making judgements about how to use research in their own contextualised settings, as Levin states "...professionals are always making judgments about which research to apply, in what way, under what circumstances" (Levin, 2013, p.8). The findings from this study support the idea that for knowledge mobilisation to develop, researchers and practitioners need to both be involved in the knowledge mobilisation process.

Online pathways will be one attempt to achieve this and strengthen the link between research and practice, that moves beyond the systematic reviews that have been

produced by research centres such as the EPPI-centre review, and presents knowledge in a manner that can be used and understood by busy practitioners. This presentation of knowledge needs to be matched with efforts to produce “lived examples of implementation” (Black and Wiliam, 1998, p.15), so that new ideas can be embedded into teachers practices without teachers trying to do the difficult process of knowledge translation.

This study highlights that the process of knowledge translation is a political act. How a knowledge translation or online pathway is written and the types of knowledge or methodologies that may be privileged in the act of writing that translation is a political act. Resources such as online pathways should be objective in their nature, providing a trustworthy, accessible, and up to date synthesis of the research knowledge on a topic. What needs to be avoided is any subjectivity by the author or authors, although this will be always be difficult. Thus in the development of online pathways, or any act of knowledge translation, a strong editorial process and peer review needs to be in place to maintain the objective nature of the knowledge translation. This may be less important for documents that are trying to influence policy rather than research translations which should be purely objective in their nature if this can be achieved. As Ungerleider states “the first lesson for researchers is to recognise that the opportunity to influence policy will depend on the prevailing political ideology” (2012, p.69).

6.1 Recommendations and implications

This study offers a number of recommendations and implications for both policy and practice that have arisen out of this research.

6.1.1 Teachers

This study shows that to enhance knowledge mobilisation in schools, teachers need to be encouraged to engage more with research. For this to happen teachers need to be supported by their schools. If school leaders and policy-makers want education and the profession of teaching to be informed by up to date research and rigorous evidence, then teachers will need to engage more with research. This means that the teachers will need to be given the time and support to achieve this goal. This study also highlights the differences between primary and secondary practitioners and that secondary practitioners may need more support in achieving this goal.

Equally teachers need to engage with the wider research community. If they are to engage with research in a personal and individual manner, for example through postgraduate study, they also need to consider their engagement with the wider research community. Teachers need to consider themselves as part of this community as well as their community of teachers. So if teachers are generating knowledge about their practices they need to be given the help and support to publish that knowledge so that it adds to the body of knowledge on a topic. As Stenhouse states, “research is systematic enquiry made public” (1981, p.104).

This study shows that teachers have been able to engage both in research and the wider research community through studying for Masters degrees. Teachers have been willing to invest a considerable amount of personal time in these courses and see value in studying for them. These programmes of study are research intensive,

and thus can have the effect of changing teachers' attitudes to research. As one interviewee stated in this study, "it [research] actually opens the door for your thinking, that actually research has got a place in the classroom" (KS-P, secondary psychology HoD). The government's withdrawal of support for the Masters in Teaching and Learning (Gove, 2010b) was probably a short sighted judgement, if the government and policy-makers are interested in supporting the professional development of teachers. Overall the study for Masters degrees allows teachers to engage with research and the wider research community and provides critical thinking skills for teachers when they attempt to make professional judgements about research knowledge that they may wish to use to inform their practice.

6.1.2 Schools

Schools need to support teachers more in their endeavours to engage with research and the wider research community. Schools also need to be promoting the use of research by their teachers. The data in this study shows that some relatively simple practices could be implemented in schools so that staff could be more engaged with research. An example of such a practice would be having a member of staff in a school with responsibility to bring in new research into the school. This may be in the form of research papers and articles or research based practices. Equally providing access to research articles for teachers is another way that schools can support teachers trying to engage with research.

Schools need to be developing new or novel middle management roles such as knowledge engineer (Hargreaves, 1999, p.133) or knowledge broker (Cordingley, 2008, p.41). These will be the types of role that look to bring new research into a school and provide teaching staff with access to research knowledge and the latest research that may be useful to them. As Cooper and Levin have stated, in their work in Canada, "schools and districts tend to lack formalised research capacity or time to engage with research" (Cooper and Levin, 2010, p363). Thus roles such as knowledge broker (Cordingley, 2008, p.41) or knowledge engineer

(Hargreaves, 1999, p.133) could be used to increase the formalised research capacity within a school. Beyond the building of formalised research capacity, schools should be looking to support teachers in their efforts to generate knowledge about their own practices, ultimately leading to Hargreaves' idea of the 'knowledge creating school' (Hargreaves, 1999).

6.1.3 Online pathways

This study shows that practitioners have an overall positive attitude towards the online pathways approach but that there are differences between practitioners that need to be considered. Thus the approach should be further developed in both the scope of the resources to be included and the subject areas that can be covered. As pointed out in the previous section this is not an easy process and should be implemented with care. A strong and robust editorial and peer review process will need to be developed for authors so that the quality of the resource developed can be maintained.

This study shows that attention must be paid to the design of the resource, and its functionality to reduce any barriers to its use by practitioners (Ertmer *et al.*, 2006). Equally the design of the resource will need to be sensitive to the context of the user. The tagging of resources with keywords, for example, may be one approach that allows the content of the site to be tuned to a specific user audience. Equally the use of user comments and feedback would be one way of assessing impact in a practitioner's specific context.

This research also shows that teachers want and need practical examples of practice. This knowledge translation work will need to be carried out and needs to be part of the online pathways approach if the approach is to resonate with practitioners. Again this is a difficult process and will need to be carried out with care. One option would be to engage practitioners in the production of practical resources, activities and lesson plans which could then be linked to the original

online pathway that inspired their production. This type of participatory approach involving teacher-researchers and academic researchers would bring closer together the theory and practice around a topic.

Online pathways should be developed with collaborative CPD in mind. The findings from this study show that teachers would use online pathways collaboratively in their professional development programmes. Suggestions of how the online pathways could be used in conjunction with CPD programmes would be helpful. Another option would be to make online pathways more collaborative by increasing the use of Web 2.0 tools in the resource.

Web 2.0 (DiNucci, 1999) tools would consist of tools that allow teachers to provide feedback on a resource. This may be in the form of comments which could be posted on a pathway page or links through to a forum page where a pathway can be discussed. So the discussion by users could be maintained around the resources. Teachers could then make collaborative sense of the resources with other teachers beyond the limits of their normal face-to-face networks. These types of tools would allow users to suggest their own activities and practical examples based on the research knowledge in an online pathway.

6.2 Review of the research questions

The research questions in this study provided a good opportunity to explore two interlinked strands of research. Firstly, teachers' use of research knowledge and research practices were explored and the value they ascribe to those practices. These questions were answered directly by the data gathered in the initial questionnaire. The questions in the questionnaire were based on, and extended the work of, Levin *et al.*, (2010) which divided the questionnaire into sections based on the individual and their organisation. This approach produced data that was used to answer the questions. These questions revealed that teachers have an interest in the use of research but are constrained in their use of it. The use of qualitative data in the form of interviews with practitioners further illuminated the initial questionnaire data. These data were insightful for the second research strand in this study.

In the second part of the study teachers were asked for their views, comments and opinions of the online pathways approach and how they would use the knowledge presented in the pathways in their work. The study was also interested in how research knowledge from research papers and articles could be presented on online pathways. These questions were very focussed on the online resource that was being developed in the course of this study. These questions revealed that teachers were very interested in, and receptive to, a new approach to the presentation of research knowledge. Teachers waste valuable time searching the internet for research knowledge and resources, thus any trustworthy resource that attempts to simplify this process would be welcomed by them. These questions also revealed the difficulties involved in the process of knowledge translation and how certain knowledge can be privileged in the process of knowledge translation. Thereby being objective in this process is of the highest importance.

Overall these questions showed that teachers are interested in using research

knowledge and that the profession can be evidence informed if supported. The online pathways approach to knowledge mobilisation should be further developed towards this end.

6.3 Review of methodology

This study was a mixed methods study and was considered overall to be interpretive rather than positivist in its approach. The use of a mixed methods approach allowed a range of data to be gathered. These data sets complemented one another allowing a wider analysis than if only one method of data collection had been considered. Overall the qualitative data and the quantitative data gathered were both used to answer the research questions. The quantitative data provided the data on teachers' values and practices. The use of Exploratory Factor Analysis and cross-tabulation analysis provided further insights into the data. The qualitative data provided a number of useful further insights into the quantitative data.

On reflection it would be difficult to value or privilege one set of data over another set. Each set of data developed from different methods have their own advantages and benefits. Overall the use of different methods to generate different data sets has been one of the strengths of the study. The use of different methods has improved both the variety of data that was available for analysis and extended the professional capabilities of the researcher. This study would have been more limited if only one method of data collection had been used.

6.3.1 Reflections on the methods

The use of a double Likert scale design for the initial questionnaire was successful. This questionnaire generated data that gave two perspectives for each item, a value score and a practice score. This allowed differences between values and practices to be calculated and compared. The use of a variety of methods of delivery of the questionnaire also proved insightful. The initial questionnaire had a large sample which allowed a number of statistical tests to be employed such as

Exploratory Factor Analysis and cross-tabulation, generating a range of findings. One improvement for this method would be to increase the overall sample size thus increasing subsample sizes. This would improve the reliability of the findings.

The qualitative data generated from the interviews was able to provide insights into the quantitative data from the initial questionnaire. The qualitative data was also able to be triangulated with the data from the initial questionnaire. The interviews were conducted through a range of methods including face-to-face, phone and Skype. The lack of visual cues during the telephone interviews and Skype interviews proved challenging but not sufficient to negate using these methods. In fact Skype was so useful this is the method that would be used in the future. Overall the interviews proved invaluable in providing insights that would not be available by using purely quantitative methods.

The focus group again produced a range of qualitative data about the online pathways approach. A major disadvantage of the focus group method in this study was that it did not allow the participants to interact directly with the online pathways in a meaningful way. The focus group was made up of NQTs and again the quality of discussion may have been improved if the participants were from different roles within a school. The process of organising and managing the discussion of the focus group was not easy because the discussion had to be arranged around an online resource. Although a useful process this method would not be used in any future studies of this nature.

The second questionnaire used in this study was an online questionnaire that was used to gather data about the online pathways approach. This proved to be an excellent method of gathering data about the approach. The method allowed respondents to interact with the resource in their own time and at their own pace and this increased the quality of their responses. This method generated an

excellent range of qualitative data and a small amount of quantitative data due to the small sample size. This method was very innovative in its approach, and would be used again in future studies due to the quality of the qualitative data that it generated.

6.4 Further research

Although the data produced by this study was able to answer the research questions posed it is always useful to make suggestions about how the study could be further developed.

Further research could involve testing the use of a range of interventions to improve knowledge mobilisation in schools. The five factors from this study would provide a robust structure to support a range of interventions, thus interventions could be targeted at individual or organisational factors. This would mirror the work of Cooper and Levin (2010) more closely. Thus the initial questionnaire would be used as pre and post intervention assessment of knowledge mobilisation. Online pathways would be used here as one of the ways of delivering knowledge mobilisation and therefore this method could be compared to other more traditional methods of knowledge mobilisation interventions. This type of approach was attempted by Cooper and Levin (2010) who struggled in their study to make sure that the same respondents completed both pre and post questionnaires. They state that “we did not find significant changes in knowledge levels in the post-intervention survey, although this may be in part because many survey respondents were likely not involved in the interventions” (Cooper and Levin, 2010, p.364). This quote highlights the difficulties of administrating pre and post intervention questionnaire and maintaining a consistent sample of respondents across both questionnaires.

A future research proposal could be to repeat the initial questionnaire in 3 to 4 years time when there will be more teachers in the school system who are not funded or studying towards Masters degrees. This would provide longitudinal comparisons between a period of relatively high engagement in Masters degrees with a period of lower engagement in Masters degrees. Results from this study may provide evidence to policy-makers as to whether all teachers should be

qualified to Masters level. Equally international comparisons between educational systems could be considered.

7.0 References

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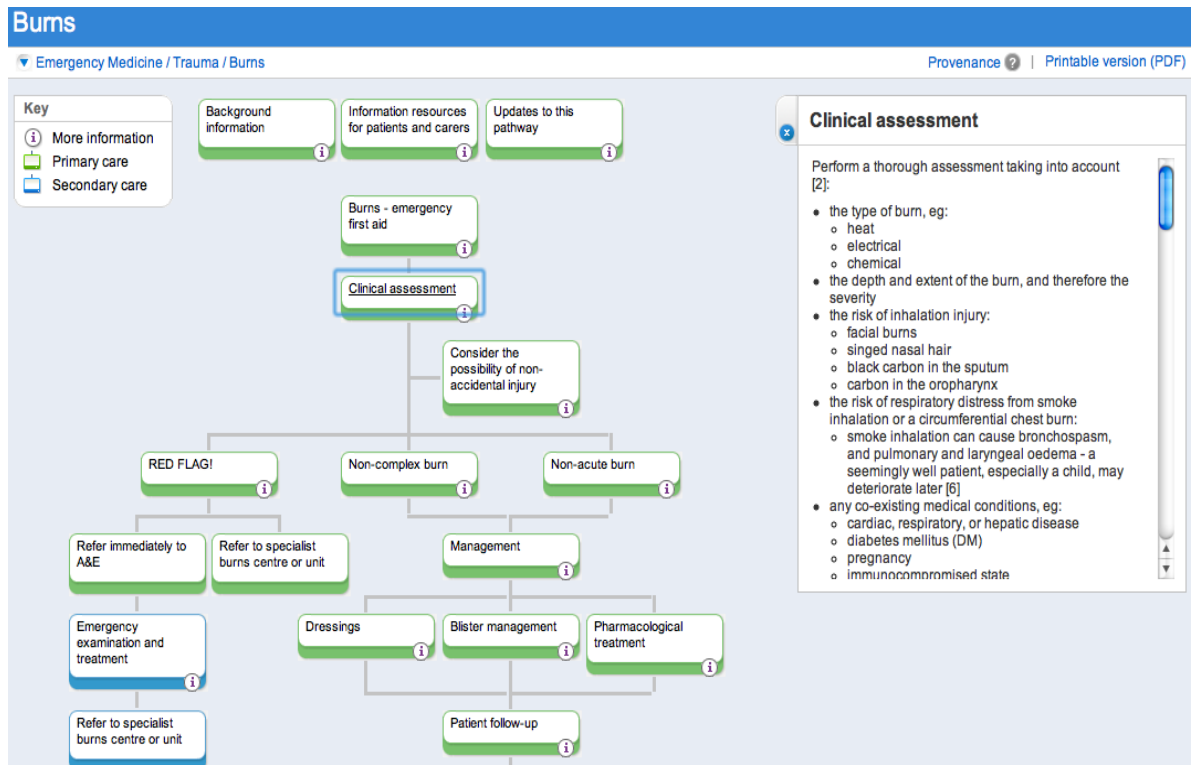
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8.0 Appendices

Appendix A: Map of medicine example

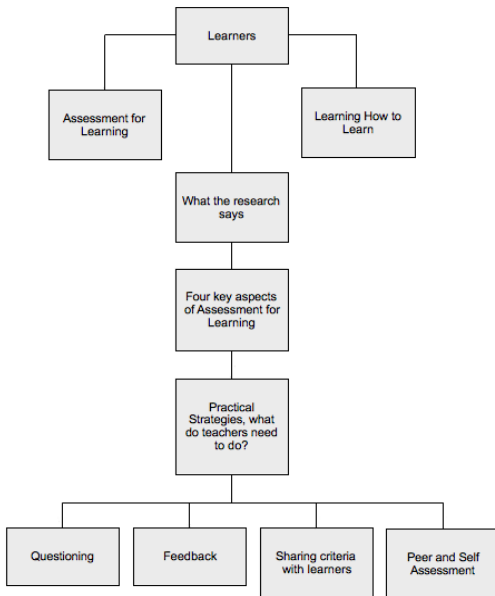
Example of a Map of Medicine online pathway.



Appendix B: Online pathway example

Example of an educational online pathway.

Learning How to Learn and Assessment for Learning



What the research says

- Reviews of research provide firm evidence that Assessment for Learning practices improve learning and raise achievement (Natriello (1987); Crooks (1988); Black and William (1998))
- Black and William's three questions:
 - is there evidence that improving quality of Assessment for Learning in classrooms raises standards?
 - is there evidence that there is room for improvement in our current practice?
 - is there evidence about how to improve Assessment for Learning?
- Substantial effects: About 50 studies, ranging over ages, subjects and countries, compared improvements in achievements for students in 'intervention' groups with students in 'control' groups. 'Assessment for learning' innovations typically produced effect sizes of between 0.4 and 0.7 - larger than those found for other educational innovations.
- What does this mean?
 - An effect size of 0.4 would mean the average student would attain the level currently attained by the top 35%.
 - An effect size of 0.7 would improve performances of students in GCSE by between one and two grades (and possibly three grades for the lowest attainers).
 - An effect size of 0.7 would raise England from the middle of 41 countries in international league tables for mathematics, to being one of the top 5.

Appendix C: Project code of practice

Code of Practice



**PhD Research Project
University of Bedfordshire
Richard Procter**

Introduction

This code of practice sets out a number of principles for informing the conduct and decisions of participants involved in the above named research project. We shall seek to adhere to these principles in all aspects of our professional partnership and particularly in relation to the collection, analysis and reporting of data. The rights of privacy of all individuals involved will be protected while at the same time respecting the public right to information about findings and results developed by the project.

Richard Procter
Researcher

Anonymity, Privacy, Confidentiality and Respect for Persons

- In aspects of data collection and fieldwork, care will be taken to minimise the potential for anxiety and at every opportunity to build on the personal and professional confidence of all participants.
- Personal information concerning project participants shall be respected and kept confidential.
- Data shall be collected with the full knowledge and consent of the participants.
- Wherever possible, and providing the permission of participants has been obtained, oral data will be recorded, and when appropriate, transcribed.
- Data collected shall be shared and discussed openly between the researcher and the supervisor, in order to arrive at a detailed and authentic analysis of these data.
- The identities and research records of all participants shall be kept confidential.
- In the reporting of the data, individuals will be referred to by role descriptions and pseudonyms. Although this does not guarantee anonymity it reduces the likelihood that individuals can be identified.

Appendix D: Informed consent form

Informed Consent Form



**PhD Research Project
University of Bedfordshire
Richard Procter**

Introduction

The aim of this project is to evaluate if online technologies can be used to represent and present knowledge to teachers to support them in moving to evidence based practice and thus improving their classroom practice. As a participant of the study it is important that you agree to give your consent to be involved in the study and for your data to be used. Please make sure you read the code of practice and the informed consent form before signing the informed consent form. The researcher will be able to answer any concerns that you may have.

Richard Procter

Consent, Withdrawal, Anonymity, Privacy, Confidentiality

- I have read and understand the information provided about the project and have had the opportunity to ask any questions I felt necessary.
- I understand that I can withdraw from the project at any time.
- I am aware that my responses in interviews will be recorded and I am aware that notes may be taken through an interview.
- I agree that the information I give is to be used for academic purposes at the University of Bedfordshire.
- I am fully aware that I will receive confidentiality and anonymity throughout the study.
- I give my consent and confirm that I am a willing participant in this research.

Participant

Print Name _____
Signature _____ Date

Researcher

Print Name _____
Signature _____ Date

Appendix E: Initial questionnaire

Teacher Questionnaire

Thank you for agreeing to complete this questionnaire. It is about how research practices are used by you, your school and how much you value these research practices. The questionnaire is designed so that it can be completed by teachers of any school phase and any subject speciality.

The questionnaire takes 10 to 12 minutes and has three sections:

- Section A about you and research
- Section B about your school and research
- Section C asks for background information about you.

All personal information shall be kept anonymous and all responses will be treated as strictly confidential.

Please read the instructions carefully

Each section consists of a number of statements in the centre of the page.

The scale on the left is about you or your school. Please read the statement and think about your own practices in relation to research. The scale on the right is about your values in relation to each of the listed practices. Irrespective of how much or how little of the practice you do, tell us how important you think the practice is for enhancing the use of research.

If you have any questions or feedback about this questionnaire please email [Richard Procter](#). Thank you for your time in helping with this research.

See example below.

Example

About you				You and research	About your values			
How often is this true for you now?				Question	How important do you think the practice is for enhancing the use of research?			
Never true	Rarely true	Often true	Mostly true		Not at all important	Of limited importance	Important	Crucial
<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	1. You engage in research focused discussion with colleagues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

[Next Page](#)

Section A - You and Research

About you				Question	About your values			
How often is this true for you now?					How important do you think the practice is for enhancing the use of research?			
Never true	Rarely true	Often true	Mostly true		Not at all important	Of limited importance	Important	Crucial
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1. You engage in research focused discussion with colleagues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2. You engage in research related reading (e.g. journal articles, professional development materials, subject association materials).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3. You engage in research related networking (formal/informal).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4. You engage in research related events (e.g. conferences, workshops).	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5. You engage in postgraduate studies.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6. You have received funds from school to carry out research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7. You have attended research focused Local Authority events in the last year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8. You have attended research focused professional conferences in the last year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9. You have attended research focused college or university sponsored events in the last year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10. You have attended research focused outside organisation (company, agency, professional association) sponsored event in the last year.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	11. Have attended research focused academic conferences.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Next Page

1/4  25%

Section B - Your School and Research

About your school					Your school and research	About your values			
How often is this true for your school now?					Question	How important do you think the practice is for enhancing the use of research?			
Don't know	Never true	Rarely true	Often true	Mostly true		Not at all important	Of limited importance	Important	Crucial
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	1. In your school, research is discussed in staff meetings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	2. In your school, research is discussed in departmental meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	3. In your school, research is discussed in pastoral meetings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	4. In your school, research is discussed in parent meetings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	5. In your school, research is discussed in Senior Management Team meetings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	6. In your school, research is discussed in professional development meetings.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	7. In your school, research is discussed in informal networking events.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	8. Your school provides funds for research generation and utilisation.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	9. Your school encourages/facilitates action research (the teacher/practitioner as researcher)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

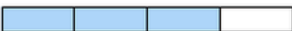
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Section B - Your School and Research (continued)

About your school					Your school and research	About your values			
How often is this true for your school now?						How important do you think the practice is for enhancing the use of research?			
Don't know	Never true	Rarely true	Often true	Mostly true	Question	Not at all important	Of limited importance	Important	Crucial
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	10. Your school builds ongoing relationships with external researchers.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	11. Your school encourages research related professional development (post-graduate studies, conference attendance)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	12. Your school sponsors/coordinates research focused events (workshops, conferences)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	13. Your school provides opportunities for informal networking related to research.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	14. Your school circulates research articles.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	15. Your school provides staff with time to engage in research related activities.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	16. Staff at your school incorporate/link data to reporting (e.g. data informed school improvement plan)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	17. Staff regularly discuss research to plan their teaching.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	18. Your school has a member of staff with responsibility to bring new research into school.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Section C - Background Information

1. Gender

Female Male

2. Name of school (optional)

3. Years of teaching experience

Less than 2	<input type="radio"/>
2-4 years	<input type="radio"/>
5-10 years	<input type="radio"/>
11-20 years	<input type="radio"/>
21+ years	<input type="radio"/>

4. Years at this school

Less than 2	<input type="radio"/>
2-4 years	<input type="radio"/>
5-10 years	<input type="radio"/>
11-20 years	<input type="radio"/>
21+ years	<input type="radio"/>

5. Main educational phase

Primary	<input type="radio"/>
Middle	<input type="radio"/>
Secondary	<input type="radio"/>

6. Post and responsibility (please read all categories before ticking one box)

Nursey teacher	<input type="radio"/>	
Class teacher	<input type="radio"/>	
Head of Department	<input type="radio"/>	
Deputy headteacher	<input type="radio"/>	
Headteacher	<input type="radio"/>	
Learning support teacher	<input type="radio"/>	
Other - please specify	<input type="radio"/>	<input type="text"/>

7. Highest level of education (please tick all that you have to date)

Bachelor's Degree	<input type="checkbox"/>	
Bachelor's of Education Degree	<input type="checkbox"/>	
PGCE	<input type="checkbox"/>	
Master's Degree (in progress)	<input type="checkbox"/>	
Master's Degree (completed)	<input type="checkbox"/>	
Doctorate (in progress)	<input type="checkbox"/>	
Doctorate (completed)	<input type="checkbox"/>	
Other - please specify	<input type="checkbox"/>	<input type="text"/>

If you would like to contribute further to this research or would be interested in the results please leave your contact details below.

Thank you for completing this questionnaire.

Finish



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Appendix F: Practitioner interview schedule

Interview Schedule – Teacher/Headteacher

Part 1

Introduction:

So I'm interested in teachers/headteachers use of evidence or research in their practice or school. Where it comes from and how they use it in their practice (what is it for). What your practices/school practices are based on?

Background:

Name?

Date?

What do you teach?

Number on role at school?

What you highest qualification?

Questions

1. What do you think research/evidence is?
2. What are teachers uses for research/evidence?
 - 2a. Why would you use research/evidence?
 - 2b. How would you use research/evidence?
3. Do you think that your practice is evidence based/informed?
 - 3a. Do you think its important to use evidence in your practice?
4. Does your school encourage you to use research in your teaching?
 - 4a. Do they allow you to experiment with your practice?

Sources of knowledge/information/resources

5. What are your current sources of knowledge to support your practice?
 - 5a. Where do you get your information/knowledge/evidence from?
 - 5b. What sources do you use for gaining new knowledge
6. What strategies do you/your school use for beginning to use new research knowledge into your practice. For changing and developing classroom practice.

Advice

7. Who do you go to for advice?

7a. In your school?

7b. Outside of your school?

8. What new practices have you heard of recently that you think you may want to try in your classroom/school?

8a. Where did you hear about it from?

8b. Do you think there are fads in education? Brain Gym? VAK? Water?

9. When was the last time you changed your practice/changed school practice?

Organisation

10. How much support do you get as a teacher from your organisation with regard to

10a. the use of evidence in your practice? (I and O)

10b. changing your practice?

11. Where does the school get up to date information on practice from?

12. Who brings in new ideas about practice into the school/dept/classroom? (O)

12a. Is this anyone's job in particular?

Experiment/Change/Freedom

13. How much are you allowed to experiment with your practice in your school?

Part 2

Show the pilot value practice gap data and explain:

1. From your experience, what do you think is going on here?

2. From your experience why do you think there are gaps such as these?

Appendix G: Focus group schedule

Focus Groups - NQTs

“We are interested in ways that NQTs can be supported in their first years in schools. Thus this focus group is to give some idea of the ways in which you are supported at the moment and some of the ways you think you could be supported in the future. This session will be divided into two parts and should take no more than 45 minutes of your time. In the first part we are interested in your view and ideas about NQT support now and ways it could be supported in the future. In the second part we will present a specific approach to support NQTs and we would like your opinions, ideas and feedback. This may include some of the ways that it could be used by you and or ways that it could be developed to support the development of NQTs. ”

Part 1

Questions:

1. Do you feel supported by the university?
2. How are you supported at the moment
 - 2a. by the school?
 - 2b. by the university?
3. What is lacking from your support provision?
4. What more could be done to help support the development of NQTs now?
5. How can NQTs be supported in the future
 - 5a. by the school and in schools
 - 5b. by the university, in schools
6. In what ways could NQTs be supported in the future?
7. Is a probationary year worth doing?
 - 7a. What do you think you are getting out of it?
 - 7b. Waste of time?

Part 2

Laptop and projector needed here

Demo of the Map of Medicine? - what it does what its for.

Demo of RP's version of the educational pathways

Demo of DW's version of the educational pathways

Questions:

1. Content – What would you like to see on a resource like this?
2. Structure – How should this content be structured? Same as the MoM version, or something different? (Demo the three versions on ratio here, three of them)
3. Ease of use? What would make this more accessible to you
4. How can we make this easier to use?
5. How would you use these resources?
6. How can these resources fit in with your current support by school/university?
7. Where should a resource like this live?
 - 7a. Part of the universities BREO (or moodle) system or somewhere else?
 - 7b. Would you pay to use a resource like this?
8. How would you find what you are looking for?
 - 8a. Search strategies?
9. Who should be developing these online pathways?
 - 9a. Lecturers?
 - 9b. Teachers?
 - 9c. You?
 - 9d. Government?
10. Could you see yourself authoring an online pathway to support your work as a NQT?
11. Would you comment/edit some one's pathway

Appendix H: NQT online pathways questionnaire

University of Bedfordshire



NQT Survey: Online Pathways - Your Views

Following on from the demonstration you have seen, the image below, Figure 1, gives one example of how the Map of Medicine approach may look in supporting the field of education. Your feedback will give us some idea as to whether this approach should be explored further.

Knowledge pathway example – Assessment for Learning

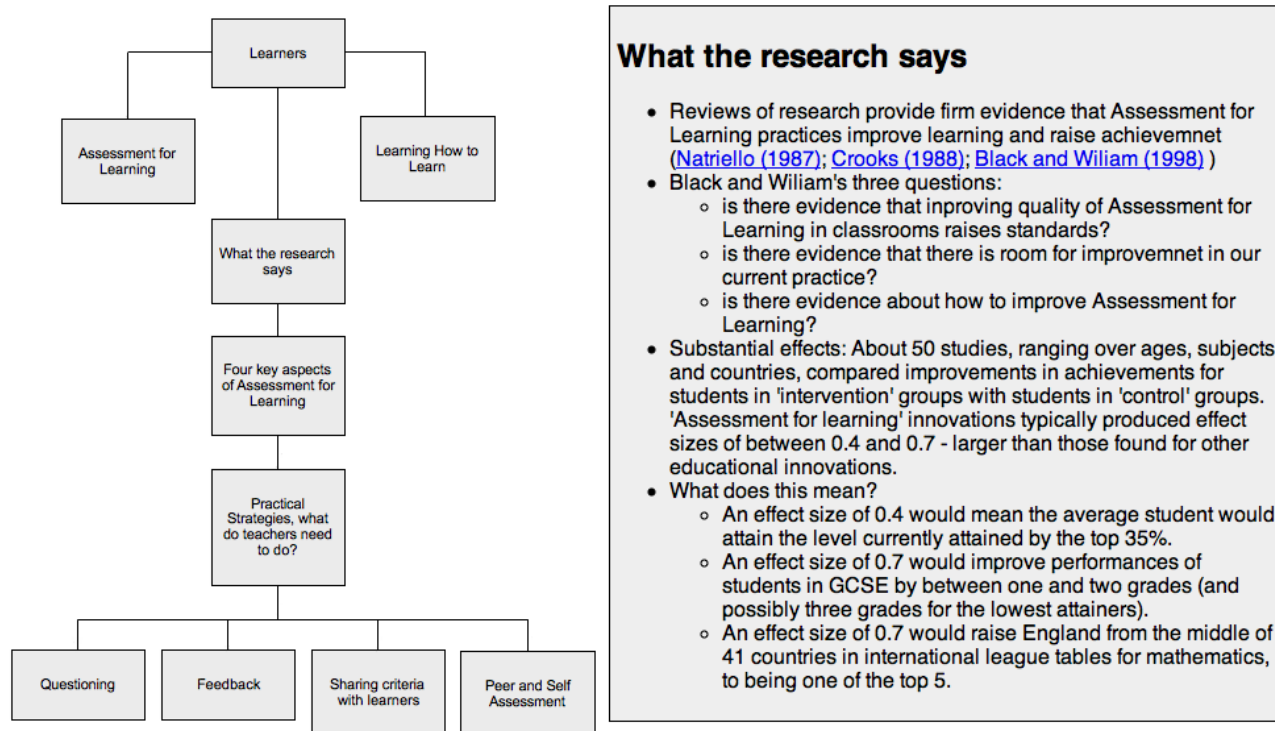


Figure 1: An example of an education based knowledge pathway

Please answer the following questions to give some feedback on this approach.

Read the following statements and then tick a category in the columns to the right.

	Strongly Agree				Strongly Disagree
1. This approach will be useful for me					
2. This would fit in with my lesson planning					
3. I would use this on a regular basis					
4. I understand this approach					
5. I see no benefit to this approach at all					
6. I would use this with colleagues					
7. I would use this with my mentor					
8. This as already been done					

9. What sources of information do you use at the moment to help develop your practice?

10. What would prevent you from using this approach?

11. What topics would you like to see covered by this approach?

12. Any further comments/thoughts on this approach?

All responses will be treated as strictly confidential and will be kept anonymous. This data is part of a pilot study to gauge whether the approach may be worth further investment.

For more information on this project please email richard.procter@beds.ac.uk

If you are interested in the results of this study or would be happy to help further please give your email contact in the box below:

Thank you for completing this survey

Appendix I: Online pathways questionnaire

Teacher Questionnaire

This questionnaire asks for your opinion of a web resource for teachers. The resource is designed to help teachers gain access to research evidence in a novel way. The link in the red box below provides an example of the web resource.

The questionnaire is designed so that it can be completed by teachers of any school phase and any subject speciality.

All personal information shall be kept anonymous and all responses will be treated as strictly confidential.

The questionnaire takes 5 to 8 minutes to complete.

Please read the instructions carefully

- Please click on the link in the red box below.
- Have a good look at the resource and complete the questions below.
- The resource opens in another window, so you can click between the resource and the questionnaire windows.

If you have any questions or feedback about this questionnaire please email [Richard Procter](mailto:Richard.Procter).

Thank you for your time in helping with this research.

[Click here to access the resource \(Opens in a new window\)](#)

Read the following statements and then tick a category in the columns to the right.

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. This resource would be useful for me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I would use this on a regular basis.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. This resource would fit in with my planning and current practice.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. The flowchart approach makes sense to me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I would use this with colleagues.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. I see no benefit to this resource at all.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. This resource is easy to understand.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. This has already been done.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

9. How would you use this resource?

10. How would you fit the use of this resource into your current practice?

11. What topics would you like to see covered by this resource?

12. What would prevent you from using this resource?

13. How could this resource be improved?

14. What sources of information do you use at the moment to help you develop your teaching?

15. Any further comments/thoughts?

Your Background Information

1. Gender

Female Male

2. Name of school (optional)

3. Years of teaching experience

Less than 2	<input type="radio"/>
2-4 years	<input type="radio"/>
5-10 years	<input type="radio"/>
11-20 years	<input type="radio"/>
21+ years	<input type="radio"/>

4. Years at this school

Less than 2	<input type="radio"/>
2-4 years	<input type="radio"/>
5-10 years	<input type="radio"/>
11-20 years	<input type="radio"/>
21+ years	<input type="radio"/>

5. Main educational phase

Primary	<input type="radio"/>
Middle	<input type="radio"/>
Secondary	<input type="radio"/>

6. Post and responsibility (please read all categories before ticking one box)

Nurse teacher	<input type="radio"/>	
Class teacher	<input type="radio"/>	
Head of Department	<input type="radio"/>	
Deputy headteacher	<input type="radio"/>	
Headteacher	<input type="radio"/>	
Learning support teacher	<input type="radio"/>	
Other - please specify	<input type="radio"/>	<input type="text"/>

7. Highest level of education (please tick all that you have to date)

Bachelor's Degree	<input type="checkbox"/>	
Bachelor's of Education Degree	<input type="checkbox"/>	
PGCE	<input type="checkbox"/>	
Master's Degree (in progress)	<input type="checkbox"/>	
Master's Degree (completed)	<input type="checkbox"/>	
Doctorate (in progress)	<input type="checkbox"/>	
Doctorate (completed)	<input type="checkbox"/>	
Other - please specify	<input type="checkbox"/>	<input type="text"/>

If you would like to contribute further to this research or would be interested in the results please leave your contact details below.

Thank you for completing this questionnaire.

Finish

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