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Full title - National models for CPD: the challenges of C21st knowledge management

Short title - National models for CPD

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Abstract (100-200 words)

Teacher quality is the most critical factor in improving educational outcomes (McKinsey, 2007). This paper proposes analytical frameworks for national models for continuing professional development (CPD). It examines the unacknowledged problem of the quality and extent of the evidence base underpinning teachers' CPD. In the 21C through the use of ICTs the research and evidence base underpinning educational practice surely could be made accessible to all teachers and all providers of initial teacher training and CPD. The evidence base available internationally appears to be patchy. Yet this is taken for granted in the literature, and is rarely if ever acknowledged in the discourse about school and system improvement. This lack of research based professional knowledge, is a particular problem for subject specialist issues and is further compounded by the fact that research published in journals is not generally designed around questions teachers want answered. In short, the knowledge that is produced and the management of it within the education sector is lacking systemic organisation and dissemination. The paper outlines opportunities which exist for low cost interlinked national and international e-infrastructures to be developed to support knowledge sharing, but such collaboration may pose an insurmountable challenge for national and international agencies.

National models for CPD: the challenges of C21st knowledge management

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Abstract

Teacher quality is the most critical factor in improving educational outcomes (McKinsey, 2007). This paper proposes analytical frameworks for national models for continuing professional development (CPD). It examines the unacknowledged problem of the quality and extent of the evidence base underpinning teachers' CPD. In the 21C through the use of ICTs the research and evidence base underpinning educational practice surely could be made accessible to all teachers and all providers of initial teacher training and CPD. The evidence base available internationally appears to be patchy. Yet this is taken for granted in the literature, and is rarely if ever acknowledged in the discourse about school and system improvement. This lack of research based professional knowledge, is a particular problem for subject specialist issues and is further compounded by the fact that research published in journals is not generally designed around questions teachers want answered. In short, the knowledge that is produced and the management of it within the education sector is lacking systemic organisation and dissemination. The paper outlines opportunities which exist for low cost interlinked national and international e-infrastructures to be developed to support knowledge sharing, but such collaboration may pose an insurmountable challenge for national and international agencies.

Keywords: CPD models, knowledge management, technology, networks

Introduction

Education reform is top of the agenda of almost every country in the world. Yet despite massive increases in spending ([in 2006], the world's governments spent \$2 trillion on education) and ambitious attempts at reform, the performance of many school systems has barely improved in decades. (McKinsey, 2007, p.2)

Barber and Mourshed, who surveyed top performing education systems around the world to produce this McKinsey Report (with the title “How the best performing schools come out on top”) found there was no direct link between the amount of funding and the quality of teaching.

This paper discusses the unacknowledged problem of how to improve the quality of teaching through improving the research and evidence base underpinning educational practice (Davies et al, 2000; Cochrane-Smith and Zeichner, 2005; Hammersley, 2002; Leask, 2004a and b). This evidence base provides the foundations for practice, but is rarely if ever acknowledged in the discourse about school and system improvement. Much published education research is small scale focused on the impact of government programmes and within school strategies for improvement or on generic issues of classroom pedagogy e.g. questioning, explaining, grouping and ability. Yet national assessment systems usually focus on knowledge and skills in **subject areas** (Leask, 2010a; Newman et al., 2004). This lack of research based professional knowledge

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on subject specialist issues is further compounded by the fact that research published in journals is not generally designed around questions teachers want answered. **In short, the knowledge that is produced and the management of it within the education sector is woefully lacking systemic organisation and coherence.**

The widespread availability of web 2.0 communications and collaboration technologies is leading in the private and public sectors to a situation where knowledge management (KM) is developing as a set of processes and tools linked with organisational improvement and effectiveness (Collison and Parcell 2006, Davenport and Prusak 1998, Davies et al 2000, IDeA 2006, 2008, 2009, Oakley 2003). KM approaches are having an increasing impact on the expectations of staff and in changing ways of working (Henley, 2008a and b). Education sectors appear to be lagging behind in an awareness of how these ways of working can improve quality of education.

This paper builds on findings from a series of research projects and seminars undertaken in the U.K, Australia, Hong Kong, Japan, the U.S, Mexico and across the European Union to propose a knowledge management (KM) model for the education sector.

In the UK an analysis of the content of five editions of the main text book used for teacher education in the UK from 1994 to 2009, (Capel, Leask and Turner, 2009) shows the development over the last ten years of an increasingly sophisticated shared pedagogical language. This may be linked with the ministry of education drive for consistency in core

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aspects of pedagogy through a 'National Strategies' initiative

(<http://nationalstrategies.standards.dcsf.gov.uk/>). In addition the development of ICT tools for schools, information on the internet and the increasing sophistication of pupil attainment monitoring software have all played a role in developing a shared professional understanding of what constitutes high quality teaching.

However, evidence from research undertaken in the UK with teachers and teacher educators indicates that access to much of this new knowledge is patchy (Becta, 2010; Leask and Younie, 2009; Leask, 2002). In national research on ICT tools for future teachers (Becta 2010) U.K teachers requested an e-infrastructure to provide access to validated knowledge and the means of collaborative creation of new knowledge. This vision went beyond the current private and unconnected networks supplied by universities, local authorities and schools and free software to a national e-infrastructure with open access linking educators nationwide. Educators find themselves with communications difficulties similar to those experienced by disparate communities during the early stage of development of the road infrastructure - where only rough tracks connected settlements, where signposts and maps didn't exist and where local knowledge passed by word of mouth was needed to navigate around the country. **Currently e-resources supporting KM in education are scattered, inaccessible and incoherent.** This paper proposes that responsibility needs to be taken at the national and international levels for the provision of an e-infrastructure providing signposts, validation of content and meeting places for work dedicated to the development of professional knowledge.

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The internet has revolutionised knowledge sharing and knowledge building across the education profession and there is potential for these ways of working to improve the quality of access to knowledge eg a simple education specific search tool searching across all ministries of education which could be made available through OECD or the World Bank would facilitate knowledge sharing. With a few exceptions, information about useful pedagogical tools and about research and evidence to underpin teaching is currently shared informally through multiple networks such as those supported by subject associations. However, in comparison with health and local government, e.g. the Cochrane Collaboration (www.cochranecollaboration.org) and IDeA (www.communities.idea.gov.uk) the education sector is considerably behind in harnessing the power of technology to support ongoing professional development, knowledge sharing and evidence building (Younie and Leask, 2009).

National models for CPD: analytical frameworks

The McKinsey report identifies teacher quality as the key component in system improvement:

The quality of teaching is the single most important factor in improving outcomes for pupils.

The experiences of ... top school systems suggests that three things matter most:

- getting the right people to become teachers,
- developing them into effective instructors; and,
- ensuring that the system is able to deliver the best possible instruction for every child.

(McKinsey, 2007, p.3)

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Yet in the research around improving outcomes for students, including the McKinsey report , how teachers access up to date knowledge, information and resources and forms of effective CPD and the knowledge base of teacher educators are largely ignored. An examination of policy documents (Australian Government, 2005, 2007, 2010; China Education Research Network, 2000; Indian Government, 2010a and b; Leask, 2010; Ming-yuan, 2006; OECD 2009a and b; 2007b and c; 2003; Proton Europe, 2007; Research Councils, 2010; UNESCO 2010a and b; US Department of Education 2006; UK DCSF, 2006) related to the improvement of education systems indicates there is an assumption that there is the existence of an up-to-date professional knowledge base for the content of initial and continuing teacher training and for teacher educators in HEIs, LAs and schools. The literature around effective forms of CPD also generally seems to take the professional knowledge base as static and as a given. However, **this presumption is one that the authors challenge as fallacious and wishful thinking on the part of policy makers, as research with teacher practitioners indicates otherwise** (Leask and Younie, 2009). The two examples are given below illustrate this point that the existence of a high quality knowledge base is taken for granted. No mention is made of the quality or source of the knowledge underpinning the CPD.

In England, research commissioned by the General Teaching Council for England (GTCE, 2006, 2007) identified four key components of effective CPD see Table 1.

Table 1: Four key components of effective CPD (adapted from GTCE, 2006, 2007)

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<p>Broader and deeper CPD</p>	<p>Sustained interactions and interventions give more breadth and depth than short or one-off courses.</p> <p>However, unless this richer conception of CPD is more widely and consistently promoted, the majority of teachers may continue to equate professional development with Inset (in-service training).</p>
<p>Teacher influence</p>	<p>The more influence teachers have over their professional development – and especially in tailoring CPD to meet their needs – the more likely they are to find it effective.</p> <p>More generally, the research lends support to the importance of designing CPD that holds teachers’ professionalism and individual expertise as a central value.</p>
<p>Awareness of teachers’ career needs</p>	<p>Professional development programmes and opportunities should be designed to take account of the needs and priorities of teachers at different stages of their professional lives and careers. They should build consciously on what teachers have previously learnt, including during initial teacher training, and support them to progress in different ways in their accomplishments and careers. They might secure this, for example, by achieving advanced or excellent teacher status, by fulfilling more specialised roles or by taking on management responsibilities.</p>
<p>Developing</p>	<p>Teachers increasingly work alongside many other adults in classroom,</p>

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professional learning communities	school and other education contexts. Schools should aim to become 'professional learning communities' in which there are opportunities for support staff and non-teaching professionals to learn alongside teachers in CPD and similar activities. This could help strengthen workforce re-modelling.
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Barber & Mourshed who wrote the McKinsey report (op.cit. 2007, p. 41) identify a number of key indicators for effective CPD as set out in Table 2 below. Again, the existence of the knowledge base for improvement is largely taken for granted, although there is some acknowledgement of the need for research in the last row.

Table 2: Key indicators for effective CPD

Question	Best in World
What is the total amount of coaching new teachers receive in schools?	> 20 weeks
What proportion of each teacher's time is spent on professional development?	10% of working time is used for professional development
Does each teacher have exact knowledge of specific weaknesses in their practice?	Yes, as a result of everyday activities occurring in schools
Can teachers observe and understand better teaching practice in a school setting?	Yes, teachers regularly invite each other into each other's classrooms to observe

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	and coach
Do teachers reflect on and discuss practice?	Yes, through both formal and informal processes in schools
What role do school leaders play in developing effective instructors?	The best coaches and instructors are selected as leaders
How much focussed, systematic research is conducted into effective instruction and then fed back into policy and classroom practice?	Research budget equivalent to \$50 per student each year focussed on improving instruction

Another little discussed area in the literature on CPD is how the CPD on offer fits with the forms of knowledge required for teaching. These forms of teacher knowledge are set out in Table 3 and demonstrate the complexity, range and diversity of forms of knowledge a teacher requires. Different approaches to CPD are required depending on the form of knowledge to be developed. This highlights the urgent need for effective knowledge management processes to be developed in the education sector.

Table 3 Forms of professional knowledge for teaching (updated from Capel, Leask and Turner (2009:14) adapted from Shulman, 1987)

1. (Subject) Content knowledge, i.e. the subject material that is to be taught. Schwab (1964) identifies two components of content knowledge: substantive: knowing what are the important concepts, and skills in the subject, and syntactic: knowing how the concepts and skills are

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structured and organised within the subject.
2. General Pedagogic knowledge, i.e. the broad principles and strategies of classroom management and organisation that apply irrespective of the subject.
3. Curriculum Knowledge, i.e. the materials and programmes that serve as 'tools of the trade' for teachers.
4. Pedagogical content knowledge, i.e. 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 pupils to acquire.
5. Knowledge of learners and their characteristics: knowledge of learners of a particular age range (empirical or social knowledge); and, cognitive knowledge of learners, comprising knowledge of child development and knowledge of a particular group of learners.
6. Knowledge of educational contexts, i.e. including a specific school, catchment area and the wider community and including the national and international contexts of current and emergent issues for education e.g. globalisation, citizenship, use of ICT to support learning.
7. Knowledge of educational ends (aims), purposes, values and philosophical and historical influences: both short and long term goals of education and of a subject.

Retention of teachers is a problem in England. For example, the House of Commons select committee on retention of secondary teachers reported that "the proportion those qualified as [secondary] teachers who are teaching at any given point is little more than 50%," (House of Commons, Education and Skills Committee, 14 September 2004, p.15).

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However, effective CPD is considered to aid retention: “a key to retention of teachers is the reinforcement of the parts of the job that teachers enjoy and which keep them teaching ” (ibid, p16). It is here that Continuing Professional Development (CPD) has a key role to play.

According to the GTCE survey (2006), most teachers are looking for ‘appropriate support to be able to concentrate on teaching and learning’, and time for professional development. So the costs to a system of ineffective CPD can be considerable in terms of loss of staff; also, the costs to a country in terms of economic and human capital losses within a major public sector.

Neither the McKinsey, or GTCE reports challenge the quality of the 'explicit knowledge' in the knowledge base underpinning the CPD however they do identify networking with peers and experts as a valued and valuable form of CPD (Pickering et al, 2007; GTCE, 2006 and McKinsey, 2007). In knowledge management terms, sharing knowledge through networks is a way of accessing the 'tacit' as well as explicit (published) knowledge of a community or practitioners (IDeA, 2009; Lave and Wenger, 1991; Oakley, 2003).

In local government in the UK as part of a national knowledge management strategy for the local government sector, a national e-infrastructure to support professional networking has been developed to encourage sharing of both 'tacit' as well as 'explicit' knowledge across the whole of the UK. Recruitment and retention of staff through the provision of a 21st century professional working environment were also drivers behind the establishing of the initiative (IDeA, 2006); see www.communities.idea.gov.uk. In early 2010 the initiative had over 45,000 members of over 1000 communities.

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Research (IDeA, November 2009) undertaken with over 1300 members of the IDeA online communities shows the wide range of professional outcomes from engagement with these online communities. In a sample of more than 1300 employees 46% who made use this resource for more than two years said that their professional practice had been improved as a result of engaging online with colleagues elsewhere. The research also identified key benefits as:

1. Value through saving time
2. Keeping up to date with current thinking
3. Innovations
4. Sharing Good Practice / avoiding duplication of work
5. Developing Ideas
6. Carbon footprint reduction / environmental savings
7. Induction to new roles / staff development
8. Relationship Building.

(IDeA, November 2009, p.5)

Equivalents for the education sector are starting to emerge - Glow in Scotland, Ultranet in Victoria, Australia and the National College for School Leadership in England. But the range of specialism's in education means that for such networking to be effective in education a national inclusive approach open to all is most likely to meet the needs of users to find and work with

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people with similar interests. For those leading thinking and training of teachers, the authors argue the need for international collaborative networks. The support for these would need to come through UNESCO, the OECD or the World Bank. In the UK the range of government agencies in education seem to have meant that no single agency sees the provision of the required national e-infrastructure as part of their role, yet costs are low for an IDeA type national and internationally accessible environment - \$US100,000 for the initial environment and then low cost hosting and development costs with a couple of people required to manage applications, manage the help desk and ensure coherence across the system.

Depressingly, major national knowledge management initiatives undertaken by the numerous education agencies in the UK have resulted in a plethora of small networks with resulting huge management and development costs, lack of sustainability as the networks are linked with time limited projects and fragmentation of energies. Many institutions provide locked down networks; without any coherent, joined up 'portal' to access such networks. This could be easily redressed by providing a 'one point of entry' approach.

There are many virtual networks run by companies, teachers, academics, local authorities, professional associations, examination boards, universities, but the fragmented nature of what is available and the lack of interoperability means that the potential of e-networking to improve professional practice is not realised. Software called NING is commonly used as a Google search demonstrates. In the U.K there are at least three geography NING online networks, which don't link up because of software limitations so a teacher would have to go separately to each. For example, there is the Geographical Association network,

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(<http://geographical.ning.com/>); the Edexcel examination board environment for GCE

geography

<http://newedexcelgeog.ning.com/main/authorization/signIn?target=http%3A%2F%2Fnewedex>

celgeog.ning.com ; the Staffordshire geography network

(<http://www.learningnet.co.uk/ubb/Forum5/HTML/018484.html>) and there are a number of

other geography networks.

‘NING’ software currently does not appear to allow connections between NING environments or searching for people or projects across the NING environments. These last three functions are just a few of those identified by teachers in research (Becta, 2010) as necessary characteristics for an effective online environment. For this research teachers identified criteria for online professional networking environments suitable for educators. Individual teachers being able to:

- find peers interested in similar issues
- work online to share ideas, documents, information
- collaborate on projects with known colleagues rather than anonymous contributors,
and:
- where academics, teachers, LA staff and policy makers might work together.

The people being recruited to teacher training now will be for the most part familiar with “Facebook” type environments and networking technologies will expect professional web 2 provision.

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Examples from other sectors

Other public sector areas in the U.K have outlined the knowledge management behaviours expected of professionals. To illustrate, the Improvement and Development Agency for local government in the UK, (IDeA) identifies four key KM behaviours for public sector staff:

1. finding and using existing knowledge to inform practice
2. sharing knowledge
3. creating new knowledge
4. managing knowledge (IDeA, 2008)

Figure 1 shows how ICT tools might support development of these behaviours in the education sector and it highlights opportunities for improving KM in education to support CPD and updating of staff.

Insert Figure 1: A model for KM provision for national education systems

Finding and using knowledge

Online databases make access to published knowledge easier and facilitate professional knowledge and are leading to communal constructivist ways of learning (Leask and Pachler, 1997; Leask and White, 2004; Leask and Younie, 2001 and 2002; OECD, 2010). In England finding validated explicit knowledge is relatively easy. For example, the Education Evidence Portal (www.eep.ac.uk) and the Teacher Training Resource Bank (www.ttrb.ac.uk) complement the material on TeacherNet (www.teachernet.gov.uk) and the QCDA websites

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(www.qcda.gov.uk) with Teachers TV providing complementary video material (www.teachers.tv).

However, much of the material is published in an academic form not easily usable for problem solving by professionals. New developments in the structuring of knowledge in other sectors are demonstrated by for example, the Map of Medicine flow chart approach to providing practitioners with ways to access the knowledge they need in the form they need it (www.nhs.uk). This provides an alternative way of constructing knowledge and communicating this, which is not widely available in education. It was developed by doctors who were training doctors. Text mining software is also providing ways for practitioners to access more quickly, the knowledge they seek. A prototype being tested by EEP can be found on: <http://www.eep.ac.uk/dnn2/Abouteep/Portaldevelopment/tabid/151/Default.aspx>

Sharing knowledge

How are teachers to share knowledge with peers and researchers?

It is not enough for teachers to learn only from within their own schools... online communities of practice have great potential. I see real potential, for example, in the Victoria (Australia) Ultranet and developments in Colorado and New York City where social networking platforms are being used to spread pedagogical knowledge and recognise teachers who demonstrate pedagogical leadership. All this needs to be connected to really good data systems that connect

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individual teachers to individual students. The combination of the system improvement- and pedagogical knowledge we now have, with data and technology places on the brink of a breakthrough in improving education systems - but as yet not many systems have taken the courageous steps to cross the threshold. (Barber, 2009, p.1)

The vision that Barber (2009) and the teachers contributing to the Becta ICT Futures research (Becta, 2010) have for an e-communications infrastructure supporting the education sector to improve goes beyond what is currently available from any source (Younie and Leask, 2009). It is not difficult to imagine teacher networks set up to problem solve in particular areas, using benchmarking data to identify problem areas and using data to monitor improvements.

Creating knowledge

The professional knowledge base for teaching is not static, it needs to evolve with society. The improved e-communications which support collaborative working could produce significant improvements in quality of new professional practice and speed of dissemination. The introduction of ICT into educational practice provides a challenging example of the need for new professional knowledge to be produced rapidly. The lack of an infrastructure for sharing this new knowledge has undoubtedly contributed to the patchy implementation of new practice using ICTs in England (Becta, 2008; Kitchen et al 2006; Smith, et al., 2008; LSN, 2008) with corresponding lack of return on national investment.

Managing knowledge

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How are teachers to find out about the recent research on neuroscience? This provides a different sort of example (OECD, 2007a). In this case new practice in general pedagogic knowledge and in pedagogic content knowledge has needed to be developed, tested and then disseminated. The OECD found that their forums around this topic were very heavily used, but without an international e-infrastructure to support their continuance these forums ceased at the end of the OECD neuroscience project (Davis, 2010). How many countries have mechanisms to do this in any systematic way? What mechanisms need to exist to identify areas in which research is needed and to link university researchers with specialist expertise with system wide groups of school based teacher researchers so that synergies are developed rather than unnecessary replication. Major national research resources which are already funded are the staff in universities who have research as part of their contracts. Networking these university colleagues more effectively with teachers undertaking mini-research projects as part of their CPD could provide some substantial research outcomes for the education sectors in each country.

Reviews of current research show that there is considerable duplication, and that the research undertaken is small scale. It takes many years for outcomes to be published and for others in the sector to hear about new research findings. This whole cycle of creation of new knowledge, piloting new ideas, scaling up the research for further international e-communications infrastructure linked with national e-infrastructures created with the purpose of supporting communications between groups working on similar issues.

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In addition, in many countries Masters Level qualifications are being expected of the teaching profession. However, without investment in the knowledge base for educational practice and the means for accessing this, national funders of education systems are wasting considerable sums of money as professionals seek the knowledge needed for improvement through using the systems of yesteryear e.g. anecdotal evidence as illustrated in Figure 2.

Insert Figure 2 Increased codification of knowledge – moving from 19th C to 21st C professional practice (adapted from Leask, 2004)

Conclusions

The utilisation of new ways of working collaboratively and online to improve professional practice in education is still at an immature stage (Becta, 2010; OECD 2009a) with knowledge about the professional learning communities which exist being difficult to find.

Effective lifelong learning for professionals requires access to knowledge, information resources and appropriate learning processes which allow professionals to find, manage, create and share new knowledge through working with peers and experts (Pickering, 2007; GTCE, 2006).

Online services for knowledge sharing and evidence building for the education sector, which could support access to evidence to underpin practice and support both ITT and CPD should be at least equivalent to those now available for the private sector and for the health and local government sectors (Collison and Parcell, 2006; Davenport and Prusak, 1998; Newman and Holzman, 1997; Wenger, 1998; Wenger et al., 2002).

A test of whether sufficient and appropriate KM tools exist for the education sector is whether educators can

- keep up to date through accessing the knowledge they need to improve practice, at the time they need it and in the form they need it.
- work collaboratively with peers and experts to co-construct new knowledge as changing circumstances require.

Notes

Further details of the opportunities for improved e-communications to support improvement in the quality of education are developed in additional papers by the authors.

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Professor Marilyn Leask has a background in knowledge management for school based education, local government, central government and higher education. She has extensive experience in teaching and national and international research around the use of ICT. She has worked on innovative projects to harness the use of ICT to support professional development for more than twenty years and at the same time has been co-editing the most widely used textbooks for the training of secondary school teachers.

Dr Sarah Younie has experience in school teaching, higher education, national and international research. As chair of a national professional association ITTE (Information Technology in

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Teacher Education) she liaises with government agencies to support initial teacher education and use of ICT. She has published in the field of teacher professional development and technology.

References:

Acker, S. (1990) Teachers' Culture in an English Primary School: Continuity and Change, *British Journal of Sociology of Education*, **11**(3): 257-273.

Australian Government DEEW (Department of Education, Employment and Workplace relations) (2010) Quality Teaching Canberra, Australia: Australian Government
<http://www.deewr.gov.au/Schooling/QualityTeaching/Pages/Qualityteaching.aspx>

(Accessed 3 January 2010)

Australian Government (2007) Quality teaching. Curriculum Corporation. Canberra, Australia:

Australian Government

<http://www.deewr.gov.au/Schooling/QualityTeaching/AGQTP/Documents/QualityTeachers.pdf>

(Accessed 3 January 2010)

Australian Government DEST (Department of Education, Science and Training) (2005) The emerging business of knowledge transfer: creating value from intellectual products and services. Canberra, Australia: Australian Government.

*Corresponding author: marilynleask@brunel.ac.uk

Barber, M. (2009) Email exchange with M. Leask to clarify data on collaboration between teachers used for the report McKinsey (2007) *How the world's best-performing school systems came out on top*.

Barber, M. and Mourshed, M. (2007) *How the world's best-performing school systems came out on top*' McKinsey.

http://www.mckinsey.com/clientservice/Social_Sector/our_practices/Education/Knowledge_Highlights/Best_performing_school.aspx. (Accessed 4 December 2007)

Becta (2008) *Harnessing Technology Review*,

<http://publications.Becta.org.uk/display.cfm?resID=38751>. (Accessed 3 January 2010)

Becta (2010), see Leask, M. and Preston, C. (2010) *ICT tools for Future Teachers Report* (a series of six research reports). Coventry: Becta.

Bolam, R. and Weindling, D (2007) *Making CPD better - Bringing Together Research about CPD*:

Leaflet produced from the full report: Bolam, R. and Weindling, D. (May 2006) London: GTCE.

http://www.gtce.org.uk/publications/res_cpd/. (Accessed 3 January 2010)

Bolam, R. and Weindling, D. (May 2006) *Synthesis of research and evaluation projects*

concerned with capacity-building through teachers' professional development: Full research report. London: GTCE.

*Corresponding author: marilynleask@brunel.ac.uk

http://www.gtce.org.uk/research/commissioned_research/cpd/synthesis_cpd_projects/.

(Accessed 3 January 2010)

Capel, S., Turner, T. and Leask, M. (5th edition, 2009) **Learning to Teach in the Secondary School: a companion to school experience**. London: Routledge.

China Education and Research Network (2000) **Teacher Education In China(II)Remarkable Results of Reform and Development Of Teacher Education**.

<http://www.edu.cn/20010101/21924.shtml> (Accessed 3 January 2010)

Cochran-Smith, M., and Zeichner, K. (2005) **Studying Teacher Education: the Report of the AERA panel on research and teacher education**. Washington D. C.: American Educational Research Association in conjunction with Lawrence Erlbaum associates, Mahwah, New Jersey.

Collison, C. and Parcell, G., (2006) **Learning to Fly**. London, Wiley.

Davenport, T. and Prusak, L., (1998) **Working knowledge**, Boston, Mass, Harvard Business School Press.

Davies, H., Nutley, S. and Smith, P. (eds) (2000) **What works? Evidence-based policy and practice in public services**. Bristol, UK: The Policy Press.

*Corresponding author: marilynleask@brunel.ac.uk

Davis, C. (2010) Improving the quality of education: email exchange with Marilyn Leask, January 2010. London: Brunel University.

Fullan , M. and Hargreaves, A. (eds) (1992) *Teacher Development and Educational Change*.
London: Falmer Press.

GTCE (UK: General Teaching Council for England) (2007) Making CPD better - Bringing Together Research about CPD: Leaflet produced by Bolam, R. and Weindling, D from the full report GTCE, 2007b. London: GTCE. http://www.gtce.org.uk/publications/res_cpd/ (Accessed 4 December 2009)

GTCE (UK: General Teaching Council for England) (May 2006) Synthesis of research and evaluation projects concerned with capacity-building through teachers' professional development: Full research report. Report produced by Bolam, R. and Weindling, D..London: GTCE.

http://www.gtce.org.uk/research/commissioned_research/cpd/synthesis_cpd_projects/
(Accessed 4 December 2009)

Hammersley, M. (2002) **Educational Research: policy-making and practice**. London: Paul Chapman publishing

*Corresponding author: marilynleask@brunel.ac.uk

Henley Knowledge Management Forum (2008a) Building and sustaining communities of practice. Henley, UK: Knowledge in Action, issue 07. Henley Management College.

Henley Knowledge Management Forum (2008b) Sharing knowledge with other organisations. Henley, UK: Knowledge in Action, issue 08. Henley Management College.

House of Commons Education and Skills Committee, written evidence on the working group 14-19 reform (The Tomlinson Report), 14 September, 2004.

Howard Partners (2005) **The emerging business of Knowledge transfer: Creating value from intellectual produces and services**, Canberra, Commonwealth of Australia, Department of Education, Science and Training.

IDeA (UK: Improvement and Development Agency for local government) (2009) **Internal research report: Communities of Practice**. London: IDeA.

IDeA (UK: Improvement and Development Agency for local government) (2008) Knowledge Management Tools and Techniques: helping you find the right knowledge at the right time, London: Improvement and Development Agency for local government.

<http://www.idea.gov.uk/idk/aio/8595069> (Accessed 4 December 2009)

*Corresponding author: marilynleask@brunel.ac.uk

IDeA (UK: Improvement and Development Agency for local government) (2006) Knowledge management strategy: board paper. IDeA internal document. London: IDeA.

Indian Government National Council for teacher education: a statutory body of the government of India (2010a)

<http://www.ncte-india.org/> (Access 3 January 2010)

<http://www.ncte-india.org/publicnotice/invitation.pdf> (Accessed 3 January 2010)

Indian Government National Council for teacher education: a statutory body of the government of India (2010b) Awards to teacher educators in India

<http://www.ncte-india.org/teacheraward.htm> (Accessed 3 January 2010)

Kitchen, S., Dixon, J., McFarlane, A., Roche, N., Finch, S., 2006, *Curriculum Online Evaluation: Final Report* <http://partners.Becta.org.uk/index.php?section=rh&rid=13661>

Lave, J. and Wenger, E. (1991) **Situated Learning: legitimate peripheral participation,**

Cambridge, Cambridge University Press.

Leask, M. (2010a) Occasional paper No. 8 A national and international model for scaling up small scale educational research: country wide HEI/school Collaborative Research Networks?

London: Brunel University.

*Corresponding author: marilynleask@brunel.ac.uk

<http://www.brunel.ac.uk/about/acad/sse/ssestaff/educationstaff/marilynleask> (Accessed 7 February 2010)

Leask, M (2010b) Occasional paper No. 5 Networking the education workforce – getting order from anarchy. London: Brunel University.

<http://www.brunel.ac.uk/about/acad/sse/ssestaff/educationstaff/marilynleask>
(Accessed 7 February 2010)

Leask, M. (2010c in press). Improving the professional knowledge base for education: using Knowledge Management (KM) and Web 2.0ⁱ tools. *Policy Futures*. to be published Autumn 2010

Leask, M. (2004a) Using research and evidence to improve teaching and learning in the training of professionals - an example from teacher training in England. Paper presented at the British Educational Research Association Annual Conference, University of Manchester, UK. 16-18 September 2004.

<http://www.leeds.ac.uk/educol/documents/00003666.htm>
(Accessed 3 January 2010)

*Corresponding author: marilynleask@brunel.ac.uk

Leask, M. (2004b) Accumulating the evidence base for educational practice: our respective responsibilities. Paper presented at the British Educational Research Association Annual Conference, University of Manchester, UK. 16-18 September 2004.

<http://www.leeds.ac.uk/educol/documents/00003665.htm>

accessed 3 January 2010

Leask, M. and Pachler, N. (1997) The Background & Rationale for the TeacherNet UK Initiative – harnessing the potential of the Internet for improving teachers’ professional development & pupil learning. **Open Classroom II Conference Papers & Presentations**. Athens: European Distance Education Network/Lambrakis Foundation.

Leask, M. and White, C. (2004) Initial Teacher Training (ITT) Professional Resource Networks (IPRNs) - rationale and development . Paper presented at the British Educational Research Association Annual Conference, University of Manchester, UK. 16-18 September 2004.

<http://www.leeds.ac.uk/educol/documents/00003667.htm>

accessed 3 January 2010

Leask, M. (2010) Improving the professional knowledge base for education: using knowledge management (KM) and web 2.0 tools, Policy Futures (forth coming).

*Corresponding author: marilynleask@brunel.ac.uk

Leask, M. and Preston, C. (2010) *ICT tools for Future Teachers Report* (a series of six research reports). Coventry, Becta.

Leask, M. and Younie, S. (January, 2009) Written Evidence submitted by Younie on behalf of the IT in Teacher Education professional association and Brunel University. London: House of Commons Children, Schools and Families Select Committee.

<http://www.publications.parliament.uk/pa/cm200809/cmselect/cmchilsh/memo/teactrai/tetr3702.htm> (Accessed 3 January 2010)

Leask, M. and Younie, S. (2001) Communal Constructivist Theory: pedagogy of information and communications technology and internationalisation of the curriculum' *Journal of Information Technology for Teacher Education*, Vol.10, Nos 1 and 2, pp.117-134.

Leask, M. (2002) *Evaluation of New Opportunities Fund ICT training for teachers and librarians*. London: Training and Development Agency for Schools.

LSN, 2008, *Measuring e-maturity in Further Education*. Coventry: Learning and Skills Network
http://partners.Becta.org.uk/index.php?section=rh&catcode=re_rp_02&rid=14533

McKinsey (2007) *How the world's best-performing school systems came out on top* . Report produced by Barber, M. and Mourshed, M.

*Corresponding author: marilynleask@brunel.ac.uk

[http://www.mckinsey.com/clientservice/Social_Sector/our_practices/Education/Knowledge Highlights/Best_performing_school.aspx](http://www.mckinsey.com/clientservice/Social_Sector/our_practices/Education/Knowledge_Highlights/Best_performing_school.aspx) (Accessed 4 December 2009)

Ming-yuan, G. (2006) *The Reform and Development in Teacher Education in China* Beijing Normal University <http://www.icte.ecnu.edu.cn/EN/show.asp?id=547> (Accessed 3 January 2010)

Newman, F. and Holzman, L., (1997) **The End of Knowing**. London, Routledge.

Newman, M., Elbourne, D., and Leask, M. (2004) Improving the usability of educational research: guidelines for the reporting of empirical primary research studies in education. Roundtable discussion paper presented at the 5th Annual Conference of the Teaching and Learning Research Programme, Cardiff, 22-24 November 2004.

http://brs.leeds.ac.uk/cgi-bin/brs_engine

accessed 3 January 2010

Oakley, A., (2003) 'Research Evidence, Knowledge Management and Educational Practice: early lessons from a systematic approach', **London Review of Education**, Vol.1, No.1, pp 21-34.

*Corresponding author: marilynleask@brunel.ac.uk

OECD (2010) (Organisation for Economic Cooperation and Development) (2010) Education
Lighthouse website

http://www.oecd.org/document/61/0,3343,en_2649_33723_42992189_1_1_1_1,00.html

(Accessed 3 January 2010)

OECD (2009a) Creating Effective Teaching and learning environments: first results from
teaching and learning international survey (TALIS).

http://www.oecd.org/document/54/0,3343,en_2649_39263231_42980662_1_1_1_1,00.html.

(Accessed 1 February 2010)

OECD (2009b) Education at a Glance 2009: OECD Indicators

http://www.oecd.org/document/24/0,3343,en_2649_39263238_43586328_1_1_1_1,00.html

(Accessed 1 February 2010)

OECD (2007a) Understanding the Brain the Birth of new learning science. Paris. OECD/CERI

http://www.oecd.org/document/60/0,3343,en_2649_35845581_38811388_1_1_1_1,00.html

(Accessed 1 February 2010)

OECD (2007b) Taking Stock of Educational R&D: Joint OECD-CORECHED International Expert
Meeting

http://www.oecd.org/document/36/0,3343,en_2649_35845581_39379876_1_1_1_1,00.html

(Accessed 3 January 2010)

*Corresponding author: marilynleask@brunel.ac.uk

OECD (2007c) Evidence in Education: Linking Research and Policy

http://www.oecd.org/document/56/0,3343,en_2649_35845581_38796344_1_1_1_1,00.html

(Accessed 3 January 2010)

OECD (2003) New Challenges for Educational Research

This report has two of the five reviews of educational R&D which CERI conducted in five countries: New Zealand, England, Mexico, Denmark and Switzerland.

Pickering, J., Daly, C. And Pachler, N. (eds)(2007) New designs for Teachers' professional learning. Bedford Way Papers, London: Institute of Education, University of London.

Proton Europe (2007) Experiences on the US knowledge transfer and innovation system.

Proton Europe Innovation from Public Research

[http://www.proinno-europe.eu/NWEV/uploaded_documents/US-knowledge-transfer-](http://www.proinno-europe.eu/NWEV/uploaded_documents/US-knowledge-transfer-innovation-system.pdf)

[innovation-system.pdf](http://www.proinno-europe.eu/NWEV/uploaded_documents/US-knowledge-transfer-innovation-system.pdf) (Accessed 3 January 2010)

Research Councils UK (2010) Knowledge Transfer Portal. Swindon UK: Research Councils.

<http://www.rcuk.ac.uk/innovation/ktportal/default.htm>

(Accessed 3 January 2010)

Smith, P., Rudd, P. and Coghlan, M. (NFER) (2008), *Harnessing Technology: Schools Survey 2008*

Report 1: Analysis. Coventry, Becta.

http://partners.Becta.org.uk/index.php?section=rh&catcode=re_rp_02&rid=15952

*Corresponding author: marilynleask@brunel.ac.uk

Shulman, L. (1987) 'Knowledge and teaching: Foundation of a new reform', **Harvard Review**, 57: 1-22.

UK DCSF (2006) 2020 Vision: Report of the Teaching and Learning in 2020 Review Group chaired by Christine Gilbert, Chief HMI. London: DCSF.

accessed 3 January 2010

UNESCO (2010a) Qualifying and training teachers in Brazil

<http://www.unesco.org/en/brasilia/education/other-education-themes/teacher-education-and-training/>

accessed 3 January 2010

UNESCO (2010b) The Teacher Training Initiative for Sub-Saharan Africa (TTISSA)

<http://www.unesco.org/en/teacher-education/>

Accessed 3 January 2010

U.S. Department of Education (2006) The Secretary's Fifth Annual Report on Teacher Quality: A Highly Qualified Teacher in Every Classroom. Washington DC: U.S. Department of Education

<http://www.ed.gov/about/reports/annual/teachprep/index.html>

<http://www.ed.gov/teachers/nclbguide/improve-quality.html>

accessed 3 January 2010

*Corresponding author: marilynleask@brunel.ac.uk

Wenger, E. (1998). [Communities of Practice: Learning, Meaning, and Identity](#). Cambridge, Mass: Cambridge University Press.

Wenger, E., McDermott, R. and Snyder, W. (2002) **Cultivating communities of practice: a guide to managing knowledge**. Cambridge, Mass: Harvard Business School Press.

Younie, S. and Leask, M. (2009) *Use Of Learning Platforms to Support Continuing Professional Development in Universities and Schools*, London: ITTE

Younie, S. (2007) *The Integration of ICT into Teachers' Professional Practice: the cultural dynamics of change*, PhD Thesis, Leicester: De Montfort University.

[1] The Improvement and Development Agency for local government, the IDeA, is the improvement arm of the Local Government Association (LGA) -- a national body, funded by subscription from local authorities and representing the interests of local authorities to central government.

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ⁱ Web 2.0 websites allow users to read and to write to the web site e.g. to post documents and comments and to work collaboratively with others. Web 1.0 websites are read only.

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