# Overcoming the barriers to educational innovation

## A literature review

**Kieron Kirkland and Dan Sutch, Futurelab**
August 2009

# Contents

# About this review

By reviewing the literature in the field and interrogating data from a range of Futurelab projects, this publication aims to set out some of the challenges of promoting and supporting innovation, particularly concerning the effective sharing of innovative practices. The review builds on a wide range of literature about innovation and change with a particular focus upon innovations that aim to take advantage of the affordances of digital technologies. By doing this, the review aims to highlight some of the characteristics of successful shared innovation at different 'layers of influence' and attempts to portray how the enabling conditions for innovation can be understood and affected by a range of actors.

It must be noted that this publication aims to complement, rather than replicate a range of existing publications and current research. Becta's commissioned work[1] investigating innovation has delivered three particularly useful documents that help to situate this work. As such, it aims to provide policy makers and education leaders with an insight into the challenges of supporting shared innovation within education. The Becta publications are:

_  Knight, HK, Bryan, S, Filsner, G (2009). Harnessing Technology: Business practices which support risk-taking and innovation in schools and colleges

_  Chowcat et al (2008). Harnessing Technology: Preliminary identification of trends affecting the use of technology for learning

_  Kable (2009). Models for innovation in education[2]

This work also compliments the recommendations set out in Futurelab's Promoting Transformative Innovation in Schools handbook.

This review was written by Futurelab and commissioned by Becta as part of a research and development programme aimed at supporting the delivery of the Harnessing Technology Strategy.

We are grateful to all those organisations and individuals who gave their support and insight in helping to inform the development of this report.

# Executive summary

There is evidently a wide variety of innovative teaching and learning practices across the education sectors. This said, the education system hasn't yet managed to find the route to supporting the sharing of these practices to inspire and aid other teachers. Yet the imperative to support this innovation is clear. New approaches to teaching and learning need to be fostered to respond to, and shape, the changing context with which education interacts. In response to these dynamics, a model of change that requires national strategies to pass down new approaches to teaching and learning is too slow and blunt a mechanism.

It is becoming widely understood that end-user innovation is a crucial approach to developing new practices and approaches. This recognises that the practice of creating solutions to individual problems, on an individual level, is an act of innovation. But also that learning from these individual acts can support wider, system level innovation – not through rolling-out the innovation that occurred on the individual level, but by supporting greater numbers of local level 'end-user innovators'. This highlights two specific issues: first, that innovations are, by their very nature, defined by the context in which they are carried out; second, that the most effective method for sharing and adopting innovations is through a process of diffusion.

Existing studies have examined barriers to innovation for both institutions and the individuals who operate in them. Increasingly they have highlighted the interactivity of factors that are considered barriers to innovation. As some commentators have indicated, there is a significant body of research of what the barriers are affecting change, but not necessarily the process by which they happen.

At the core of successful innovation in schools is the relationship between the innovation: the capacity and disposition of the innovator, and the environment in which the innovation occurs. The relationship between each of these areas is unique to each school and each innovation. Presented in this review are two models to explore this the 'Distance and Dependence' model, and the 'Layers of Influence' model.

Initially the Distance and Dependence model gives clarity to understanding such educational innovations in context, by depicting how an innovation can be understood as its distance from current practice and dependence on available resources. One adaptation to this model that we are applying in this paper is that by having multiple authors mapping innovations using this approach, we can begin to understand the different perceptions of the necessary requirements for an innovation to succeed.

In identifying barriers to educational innovation, this paper draws on existing literature to identify a number of existing barriers to innovation in schools. As these barriers are frequently intertwined, rather than attempting to create strict categories, they are considered under seven key themes emerging from the literature:

1. Innovation
2. Informal and social support structures
3. Formal environment
4. Risk aversion
5. Leadership
6. Shared vision
7. Change management

Barriers within these themes are explored in relation to a second model, the 'layers of influence' that affect and construct classroom practice. These are:

_ **Innovation:** These are factors associated with the innovation itself

_ **Micro level influences:** This concerns the influence directly relevant to the innovator themselves, such as their capacity and disposition to act as an innovator. This layer also relates to highly personal relationships, such as those with students and peers

_ **Messo level influences:** These factors can include local level influences such as school cultures, school management structures, and school infrastructure; and 'local' influences from the wider community and local authority

_ **Macro level influences:** These include government led initiatives, national policy and national curricula and wider research[1]

By examining how each of these layers can influence each theme, it is possible to explore how each of these layers can affect the enabling conditions for an innovation.

In exploring factors associated with the innovation itself, core points this paper identifies are:

_ The perception of an innovation can be crucial to its success.

_ This perception can be constructed from all the layers of influence.

_ Successful implementation of an innovation requires a joint understanding of its distance from current practice and dependence on resources from relevant layers of the Layers of Influence model.

_ Innovation that can be widely disseminated and shared have three core properties:
  _ Longevity: the innovation can be sustained over time
  _ Fecundity: the innovation can be applied by different practitioners
  _ Copy Fidelity: that the innovation can be replicated in local conditions

The immediate context of the innovation and the innovator is the informal social support system. Overall findings from this review suggest that:

_ A supportive informal social environment is crucial to the success of innovations.

_ A supportive atmosphere for innovation can encourage people to try new practice.

_ A supportive social environment can develop capacity for innovative practice through informal training.

_ Being able to create strong social networks is an important skill for teachers' realising innovations, both inside school and outside through their PLNs.

_ Social capital is unique to each school. Its presence can support innovations and offers an explanation as to why innovations work in some contexts but not others.

The formal environment can be seen as the organisational infrastructure of a school. This includes its formal policies and structures. This paper argues that:

_ The formal environment is key to making resources for innovations accessible through:
  _ technical support
  _ procurement
  _ supportive access policies

_ It has a key role in creating formal systems and space for sharing innovative practice.

_ It can support partnerships both in and across disciplines, internally and externally through team teaching and partnering, and working with external organisations.

_ It has a core role in identifying support and training for staff.

_ It can create or impede staff capacity on every level, whether through wider initiatives that impact on time such as national assessment, or on a local level through working conditions.

Core findings under risk-taking include:

_ Innovation inherently engages in some degree of risk which can make individuals reluctant to innovate.

_ Iterative change management cycles can mitigate some fears which impede innovation, such as fear of failure.

[1] These descriptors could be broken down further and interrogated to a greater extent, but that would be beyond the scope of this particular piece of work.

_ To overcome risk aversion there needs to be motivation to innovate – this can be internal motivations, such as teachers wishing to improve the learning experience for pupils, or external motivations, such as pressure from above.

_ Management style is core to supporting risk-taking behaviours, through encouragement and creating a sense of permission to engage in appropriate risk-taking. This can be applied on a local level or on a wider national level.

_ Institutional level practices have an important role in mitigating risk-taking, e.g. running pilot programmes and sound evaluation procedures.

_ National level funding has a significant impact of risk-taking behaviour.

In identifying the importance of a shared vision this report argues that:

_ A teacher's perception of pedagogical practices associated with an innovation can influence the success of an innovation.

_ A shared perception of the requirements of an innovation underpins its effective resourcing. Appropriate support requires that all the layers of the influence model (macro, messo, micro) have a mutual vision of its requirements both in terms of shifts in practice, and dependence on resources.

_ A shared vision for an innovation provides a crucial clarity of purpose and direction for those managing innovations.

_ Co-constructing this shared vision engenders a sense of ownership and understanding for all individuals engaging in innovations which can support wider innovative practice.

_ Linking visions from a local and national perspective can be supported through policies which acknowledge the national level policy on a local level and through sharing knowledge such as research and initiatives.

Key points associated with leadership include:

_ Leadership has a significant role in creating a culture conducive to innovation and enabling staff to innovate.

_ Distributed leadership plays a vital role in supporting innovation. It can enable and empower staff at all levels, can support team morale and create a shared responsibility for innovation.

_ Outward looking practice is important to support innovations. For school leaders this may be conferences or working with other schools, for practitioners this is frequently enabled by their PLN.

_ There are core qualities that have been identified in leadership style which can support innovative practice.

_ Macro level leadership has an impact on innovation, through ensuring the longevity of policy direction, and through regulatory bodies supporting the innovations in context.

In examining change management processes in school this paper identifies that:

_ Innovation in schools works best when it is a continuous process that relies on the involvement of staff at all levels of the institution.

_ Flexible project management cycles are well placed to do this, for example the 'Innovation Cycle' (Sutch et al 2008).

_ Effective change management requires building an innovator's capacity through developing relevant skills and freeing up time.

_ Students' own comfort with innovations needs to be accounted for within a change management strategy.

_ Effectively managing innovative change requires a shared understanding of the organisation as a whole and a shared organisational vision.

_ To support coherent development, macro level policy change needs to be incorporated into the change management cycle of schools, and links to their existing core beliefs and values.

While these are brief extractions, crucially what is outlined below is how each 'layer of influence' has the capacity to affect each of these areas. Arising from these explorations are series of policy recommendations, and some suggestions of practical tools that can assist educational professionals at each layer to overcome barriers to educational innovation in schools.

There will be no single educational response that will prepare learners or educational institutions for all potential future developments. Rather than creating a template of 'a school for the future', then, to which all other schools might aspire, the education system needs to commit to creating a diverse ecology of educational institutions and practices. Only such diversity will ensure that, whatever changes come about, we have already begun to respond and prepare for them.

Such diversity will emerge only if educators, researchers and communities are empowered to develop localised or novel responses to socio-technical change – including developing new approaches to curriculum, to assessment, to the workforce and governance, as well as to pedagogy.

This implies a new role for education policy, namely that it should be committed to promoting, encouraging, archiving and sharing the development of widely diverse educational responses in order to ensure that there is diversity in the system to allow adaptation whatever changes emerge, rather than seeking out and disseminating universal and uniform solutions.

Facer, K (2009). Educational, Social and Technological Futures: a report from the Beyond Current Horizons Programme

# 1. Context and introduction: the need to innovate and the need to share

We are seeing pockets of innovative and transformational practice developing. The concern is that it's not fast enough. The people in these pockets are embracing innovation and thinking about delivery of the curriculum in new and different ways using staff much more creatively and flexibly. This ensures that the materials for learning are available in schools, in the workplace and in homes. Although we see interest from these trail-blazers, we are concerned that across learning the pace isn't fast enough; there is actually a moral issue in a sense that we need all learners to benefit.

Tony Richardson, Executive Director, Strategy and Communications, Becta[3]

This work starts from the shared assumption that there is a wide variety of innovative teaching and learning practices. The recognition that there are many innovative teachers, the 'trail-blazers' that Tony Richardson describes, and yet despite these pockets of practice, the education system hasn't yet managed to find the route to supporting the sharing of these practices to inspire and aid other teachers.

And yet the imperative to support this innovation is clear. New approaches to teaching and learning need to be fostered to respond to, and shape, the changing context with which education interacts. Indeed, this context can be seen as being in a process of 'constant change'[4]. For example, the shifting economic landscape reinforces challenges[5] to the expectations and requirements of the knowledge economy, and with it some curricula aims that set out to prepare learners for these 'new times'[6]. The

discourses of learner voice[7] and personalisation[8], give rise to questions of the relationship between teacher and learner and challenge the roles of each in educational activities. Developments in digital technologies (the increasing computational power, the decreasing cost of hardware; and the proliferation of available applications and services) create a range of opportunities, but brings with it questions around issues of digital participation[9], digital divides[10] and the relationship between the use of digital tools in and outside of the classroom.

Within the education system too, changes demand that we find ways to innovate towards new practices. Initiatives at national policy level, such as the introduction of the Children's Plan[11] and changes to the National Curriculum[12] call for modification to the traditional roles of the teacher[13], whilst changes to the organisation of Children's Services demand new interaction between education and health care professionals.

In response to these dynamics, a model of change that requires national strategies to pass down new approaches to teaching and learning is too slow and blunt a mechanism. "School change tends to be messy [and] complex"[14] and as such, mobilising innovative teachers and findings ways to share their innovations to support and inspire wider developments, affords the diverse range of responses needed to find appropriate practices for a wide range of educational contexts.

It is becoming widely understood that "end-user innovation [is], by far, the most important and critical" approach to developing new practices and approaches (von Hippel 1988). This perspective recognises that the practice of creating solutions to individual problems (on a micro-

3   In John, M (2009). www.futurelab.org.uk/resources/publications-reports-articles/web-articles/Web-Article1346
4   Futurelab Literature review: Teachers Learning with Digital Technologies: A review of research and projects www.futurelab.org.uk/resources/publications-reports-articles/literature-reviews/Literature-Review129
5   Facer, K (2009). Educational, social and technological futures: a report from the Beyond Current Horizons Programme www.beyondcurrenthorizons.org.uk/outcomes/reports/final-report-2009/
6   Morgan, J and Williamson, B (2006). Enquiring Minds: Context and Rationale www.enquiringminds.org.uk/pdfs/Enquiring_Minds_context_paper.pdf

7   www.futurelab.org.uk/resources/publications-reports-articles/handbooks/Handbook132
8   www.futurelab.org.uk/resources/documents/opening_education/Personalisation_report.pdf
9   www.futurelab.org.uk/projects/digital-participation
10  www.futurelab.org.uk/resources/publications-reports-articles/opening-education-reports/Opening-Education-Report548
11  www.dcsf.gov.uk/childrensplan/
12  curriculum.qca.org.uk/key-stages-3-and-4/developing-your-curriculum/what_has_changed_and_why/index.aspx
13  For example with schools taking on greater responsibility for health and wellbeing
14  Thomson, P (2007). Whole school change: A review of the literature: 12.

level) is an act of innovation, and that learning from these individual acts can support wider, system level innovation – not through **rolling out** the innovation that occurred on the individual level, but by supporting greater numbers of local level 'end-user innovators'. This relates to two specific issues: first, that innovations are, by their very nature, defined by the context in which they are carried out; second, that the most effective method for sharing and adopting innovations is through a process of **diffusion**.

Innovation diffusion is an important area of study in order to understand the ways in which innovations are shared, and from there what the barriers are to them being adopted. In his 'Diffusion of Innovation Theory' (Rogers 1995) Everett Rogers highlighted five characteristics that need to be taken into account when diffusing innovation:

1.  The relative advantage (the benefits over the old or existing practice)
2.  Compatibility (linking to organisational aims, cultures and values)
3.  Complexity (how difficult it is for others to adopt/ adapt these ideas)
4.  Triability (how easy it is to try these ideas, including understanding what risks are involved)
5.  Observability (how visible are the benefits to the potential adopters)[15]

These factors need to be taken into account when attempting to share an innovation, yet they become more complex to judge, the further the judgement is made from the site of practice. Rogers highlights the importance of the relationship between where the innovation originated and where it is to be adopted. Indeed Rogers argues that the more similar the context of the innovation to where it is to be applied, the faster it will be adopted. This supports the notion of policy makers finding ways for teachers to share innovations with teachers.

Research shows far less importance on the scientific or technical merits of the innovation itself than on how the potential adopter of the innovation views the person delivering the communication about the innovation

- the more similar the source of the information to the potential adopter, the faster the adoption of the innovation. (Lundblad 2003, p3)[16]

In 'Educational Epidemic' (2003), Roger Hargreaves sets out some of the conditions that can support such local level innovation, by ensuring that practitioners have:

_ the motivation to create new professional knowledge,

_ the opportunity to engage actively in innovation,

_ the skills for testing the validity of new knowledge,

_ the means of transferring the validated innovation rapidly within schools and into other schools.

From a policy perspective, meeting the first three of Hargreaves' points by fostering teachers and practitioners as lead innovators, can provide an insight into the problems that teachers are trying to overcome on a local level as well as the new opportunities for new practice that are being investigated.

Finding the mechanisms to meet Hargreaves' fourth point can ensure that local innovations support system wide change. Further, by fostering ways for teachers to share these practices "communities around policy responsibilities [can be built], a two way interaction that is particularly useful in early stages of policy development" (Head of Internet Communication, Government department)[17].

Two clear options emerge here: the first is to incentivise practitioners to make explicit these new practices so that they can be shared more widely (this has implications for cost, time and job descriptions of the teachers). The second approach is to find ways, most probably supported by digital technologies, to aggregate the resources and practices that are already being shared (at various levels), so to support the sharing of them across contexts.

[15]  Rogers (1995), reported in Ling (2002)

[16]  findarticles.com/p/articles/mi_qa5427/is_200301/ai_ n21341140/?tag=content;col1
[17]  Futurelab interview as part of the Map of Innovations project (2009)

# 2. Innovation in concept and context

The successful exploitation of ideas, generated at the intersection of invention and insight, which leads to the creation of social or economic value[18].

Innovation is a term used so frequently that it is becoming degraded from what it defines. Innovation is the **application** of a new resource or approach that changes social practice, creating some value. Within education, this can be the application of a new approach to questioning, the use of a new digital tool or a novel use of space – that brings about some value by altering the social practice of teaching and learning. Within this review we are particularly concerned with innovation that takes advantage of the affordances of digital technologies.

An important part of understanding innovation in this way is that the change to social practice and the measure of value are inherently context specific. An innovation is not something necessarily new to the education system as a whole, but, as Rogers describes it is an innovation if it is "perceived as new by an individual or other unit of adoption... If the idea seems new to the individual, it is an innovation" (Rogers 2005, p11). Each element of an innovation then is defined by the context within which it is practiced. The novelty, the change in practice and the perception of value of any innovation are all context specific. This context specificity can present clear barriers to sharing innovations as each of those elements may be perceived differently in different contexts.

Often attempts to understand the innovation process have led researchers to look at the private sector in order to identify how innovation, and the sharing of innovation, can best be facilitated to serve educational purposes. The research informing this publication has looked at examples of innovation from both the private and public sectors and from within and outside of education. Whilst this has afforded the opportunity to develop a broad picture of the processes of innovation, Ling (2002) reminds us that this approach brings three particular issues that are useful to be acknowledged:

_ That the primary assessment unit of innovation within the private sector is cost, whereas in the public realm,

the primary unit might be a complex system - such as educational practice.

_ The short term drive for innovation within the private sector is shareholder value, whereas in public it is a wider matrix of public benefit or better learning.

_ That legal requirements governing changes in practice are different between public and private sectors.

Whilst it is important to remind ourselves of the differences between public and private ventures, this clarification provides the opportunity to recognise that innovation within the education sector is both assessed and driven by a complex set of factors. Whilst it is not new to find that educational change is 'messy', it is important to recognise that attempts to successfully support innovation, and the sharing of innovations, will require a range of strategies for a range of complex contexts.

## Innovation in context

At the core of successful innovation in schools is the relationship between the innovation, the capacity and disposition of the innovator, and the environment in which the innovation occurs (Zhao et al 2002, Groff and Mouza 2008). The relationship between each of these areas is unique to each school and each innovation. Presented in this review are two models to explore this:

_ The first model (Distance and Dependence) aims to make explicit the context specific factors that affect an innovation and to help identify the likely success of an innovation by depicting its difference from existing practice and resources.

_ The second model (Layers of Influence) separates the influences that go to make up classroom context into micro, messo, and macro layers. By doing this it explores how each of these layers can affect the enabling conditions for an innovation.

[18]   In Sutch et al. (2008) p5

## Model 1 – Distance and Dependence

Zhao et al (2002) argue that a two-axis scale can be used to understand the potential success of an innovation through the capacity of an organisation or individual to engage with change. On the vertical axis is the distance of the innovation from existing practice. They suggest that the closer the innovation is to existing practice, the easier it will be to adopt. Here practice can relate to classroom practice, pedagogy, school culture or structures within the school depending on the nature of the innovation. Indeed the definition of the 'change to practice' is context bound by those who use this model.

**Distance from practice**

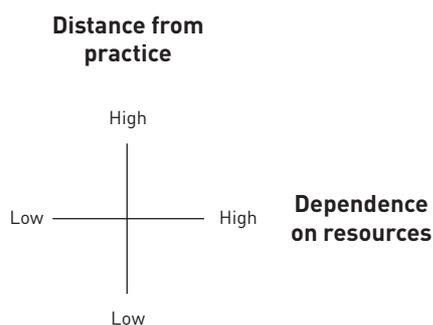High

Low —————— High     **Dependence on resources**

Low

Diagram 1: Distance and Dependence model

The horizontal axis shows the degree to which the innovation is dependent on resources for success. This relates to the resources needed for the innovation and the extent to which they differ from existing school resources. Resources can be a broad category including technical resources such as equipment or web access, human resources such as extra staff to support activities and planning time, or physical resources such as classroom space. The less demand the innovation puts on extra school resource levels the more likely it is to succeed.

As such, if an innovation requires a significant change in teaching practice and a significant increase in resources, then it will need a greater amount of support to succeed than an innovation which requires fewer resources and demands little change from the teacher's existing practice.

Within the context of technology-based innovation this model offers a different reflection on the traditional 'pedagogy before practice' debate by suggesting that

the realisation of a technology-based innovation frequently consists of an intertwining of practice and technology issues.

While the model is drawn from a study relating to technology-based innovation, it can also be used to interrogate other non-technology-based innovations in schools. As indicated above, the factors included in the resourcing axis include time, cost of teaching materials and space, which can relate to many innovative initiatives. Equally, shifts in teaching practice can be present in any innovation, such as curriculum reforms that develop more enquiry based learning.

A key function of the model is to support an understanding of educational innovations in context by depicting how an innovation can be understood as its distance from current practice and dependence on available resources. As such, implementing a 'single' innovation in a school may involve a school undergoing multiple innovations to cater for the resource and pedagogical demands of the innovation.

This variance in the received complexity of an innovation is mirrored on a school level. For one school which already has in place strong infrastructure and technical support and positive formal and informal staff structures, it may be a relatively minor disruption to buy in and incorporate necessary technical equipment. For another school, which has none of these factors in place, an innovation may require transformation across the school to be effectively implemented. The success of an innovation then depends on the extent to which the scale of change is understood and appropriately resourced. Zhao and Frank, in reflecting on the model of a school as an ecosystem, further argue that an innovation will compete for the limited resources in an environment. As such, large scale innovations which are not supplemented with resources from outside of the environment are unlikely to succeed (Zhao and Frank 2003).

One adaptation to this model that we are applying in this paper is that by having multiple authors mapping innovations using this approach, we can begin to understand the different perceptions of the necessary requirements for an innovation to succeed. This shared-

mapping provides an opportunity to create a collective understanding of the innovation, or indeed to highlight the disjuncture between perceptions of the necessary support or resources required. Adapting Zhao's model in this way provides one mechanism to explore the immediate barriers and resistances to an innovation within a given context: that of competing views of the change. However, there are other resistances to innovation that are set beyond the immediate context. These also need to be understood in order to find the most appropriate approaches to fostering innovation.

# 3. Barriers to innovation

If school is a holistic web, where everything is interdependent and interconnected, then a change to one part of the school will not only rely on other parts of the school to support it, but it might also have an unanticipated, positive or negative, effect on the whole. It is difficult to separate out the major influences in an ecological web, and this can make planning difficult, as well as evaluation. The best known organisation application of [this] ecology metaphor is that of Bronfenbrenner (1979; 1989) who theorises layers of influence which connect the school to wider contexts. (Thomson 2007, p15)

There have been a number of attempts to understand the barriers and resistances to change in educational practice; it is a complex area particularly if the aim of such a process is to inform how change can be better fostered or implemented. As Thomson reminds us, the school can be seen as a complex set of interrelationships and as such the implementation of an innovation, and therefore the barriers and resistances to that innovation, must be investigated at a range of levels.

The reform sets out to change School but in the end School changes the reform. One may at first blush to see a tautology in using this proposition to explain failures of reform. But to say that School changes the reform is very different from simply saying that School resists or rejects the reform. It resists the reform in a particular way - by appropriating or assimilating it to its own structures. By doing so, it defuses the reformers and sometimes manages to take in something of what they are proposing. (Papert 1997)

Papert observes a broad yet insightful view of the relationship between adopting an innovation and resistances to change. This view highlights that as innovations are introduced to schools they are changed – contextualised against the needs, interests, resources and purposes of the school or classroom. Papert does not suggest that this is a school 'resisting' an innovation, nor that the model of sharing has broken down, but that the process by which schools adopt new practices is through adaptation to local contexts. Attempting to understand the most effective ways of sharing innovations and ideas to inform new teaching and learning practices is more than highlighting and overcoming barriers, but about working with context specific resistances.

By understanding this localisation process and the factors that shape the way in which an innovation can be received, the processes of sharing innovations can be amended to take account of the context specific resistances, and in doing so, improve the chance that the new idea (or part of it) will be successfully implemented.

Beyond this initial observation, many programmes of research that have undertaken to investigate the barriers to innovation have attempted to categorise those barriers in order to find ways to address them. Attempting to untangle these barriers is done to make them explicit – not so that they can be addressed on an individual category level - but so that they can be necessarily addressed in detail as a set of interrelated factors.

A number of authors refer to 'first order' and 'second order' barriers to change. 'First order' barriers (or external barriers) are the challenges to adoption of new practices that come about due to the environment in which the innovation is introduced, such as a lack of access to resources; a lack of time; a lack of effective training; or technical problems. These barriers are separated from internal or 'second order' barriers which are based more upon the perceptions and attitudes of the people involved. These second order barriers include resistances borne from a lack of confidence; of negative attitudes to the change; a lack of perceived benefits of the innovation. These 'orders' of barriers are highly interrelated with (for example) confidence in using new tools being dependent upon having access to use them; similarly taking advantage of that access is dependent upon being confident in its application (Ertmer 1999).

Innovation and the necessitated changes to social practices are subject to second order barriers that are deep rooted in the psychology of teachers. Teachers' folk pedagogies, their perceptions of their roles within schooling, and their identities as teachers and as learners are borne from their own personal developments over long periods of time. First order barriers (such as access to technology, poorly designed CPD courses, curricula and assessment systems) are more obvious

as barriers to change and historically have largely been the focus of national initiatives aiming to foster change. The implementation of e- Learning Credits and national targets for computer:pupil ratios are examples of these approaches. There have been more limited attempts to tackle the second order barriers, although developments in Masters level CPD is perhaps attempting to address this. However, research (Dawes 2000; Jones 2004; Cox et al 1999 etc) suggests that both types of barriers need to be addressed at the same time, with (if any) a stress upon second order barriers (Mumtaz 2000; Ertmer 1999) if changes to practice are to be enabled.

> ...if educational change is viewed as a complex system, it emphasizes the need to accompany change with a framework for long-term teacher learning because change is, in essence, learning to do something differently, involving adjustments to many elements of classroom practice. (Hoban 2002, p39)

Regardless of Papert's explanation of the way in which schools change the innovation, there are a number of research articles that suggest that schools and teachers are inherently resistant to change (for example Albaugh 1997; Jones 2004; Ertmer 1999; Mumtaz 2000). Albaugh (1997) argues that "teachers are often suspicious of new claims and the implementations of new ideas without proof of effectiveness ... teachers tend to adopt a new technology when that technology helps them to do what they are currently doing better". Veen (1993) labels this as 'persistence of beliefs', and this builds upon the importance of addressing the second order barriers to change, in seeing innovation as a process of personal change.

Mumtaz (2000) and Ertmer (1999) suggest that these deep-rooted barriers require the greatest changes and most immediate confrontation as they are borne from folk pedagogies; teachers' identities as 'teachers'; a deep-rooted understanding of what it is to be a teacher and teachers' perceptions of their own role as innovators. There are counter arguments to this position, for example Dawes (2000)[19] highlights the strong connection between teachers' attitudes and the tools to which they

---

[19]  Dawes, L (2000). The National Grid for Learning and the Professional Development of Teachers: Outcomes of an opportunity for dialogue. PhD thesis, in Jones (2004)

have access. Similarly, the context of the innovation and teachers' perceptions of change can be viewed as a symptom of change management approaches, the way in which new initiatives are introduced and the resources and support offered to teachers. The conflict between the two beliefs is controlled when understanding the need for co-dependent approaches to change.

A second approach to sorting barriers to innovation is through the development of overarching themes that bring together related 'groups' of resistances. This approach is useful in mapping the range of barriers that shape the capability of a context to adopt an innovation. Diagram 2 shows resistances from a range of research projects grouped according to overarching themes. Although it is useful in highlighting the interrelated nature of these barriers and resistances, this approach does not necessarily afford detailed investigation of the relationships between the factors.

Using this thematic sorting approach, existing studies have examined the barriers for both institutions and the individuals who operate in them. Increasingly they have highlighted the interactivity of factors that are considered barriers to innovation (Jones 2004, Scrimshaw 2004, Zhao et al 2002, Kable 2009, Becta 2009). However, as Zhao and Frank highlight, this approach has helped the research community to "come up with a list of what [the barriers are], but we are short on how [they operate and can be changed]" (2003, p810). Moving from these themes to understand how they interrelate and interact becomes the next challenge.

Overriding statements then about what hinders innovation are only partially useful, as barriers will be specific to each case. Instead, what is needed is a cohesive model of innovation in schools which can bring together these different factors to give a better understanding of the local conditions for innovation. This can then be used on a case-by-case basis to reflect on mitigating factors that need to be put in place to support the success of an innovation.

> We can see that whole school change is a slippery idea. To make matters even more complex, we also need to note that it operates on and through various levels and layers. (Thomson 2007, p16)

By reviewing the barriers highlighted within the literature and within a range of Futurelab projects, overarching themes have emerged that can be viewed atop a range of 'layers of influence'. These themes do not attempt to categorise the barriers into groups (as has been done in previous research) as this does not afford addressing such an interrelated set of factors. Instead, the emergent themes are set out to **cover** the barriers highlighted. The themes provide a set of overarching areas that cover a range of barriers so that they can be addressed on the basis of where the agency lies to control or affect them.

The next section then looks at the following themes against a model that helps articulate the 'layers of influence' on educational practice:

1. Innovation

2. Informal and social support structures

3. Formal environment

4. Risk aversion

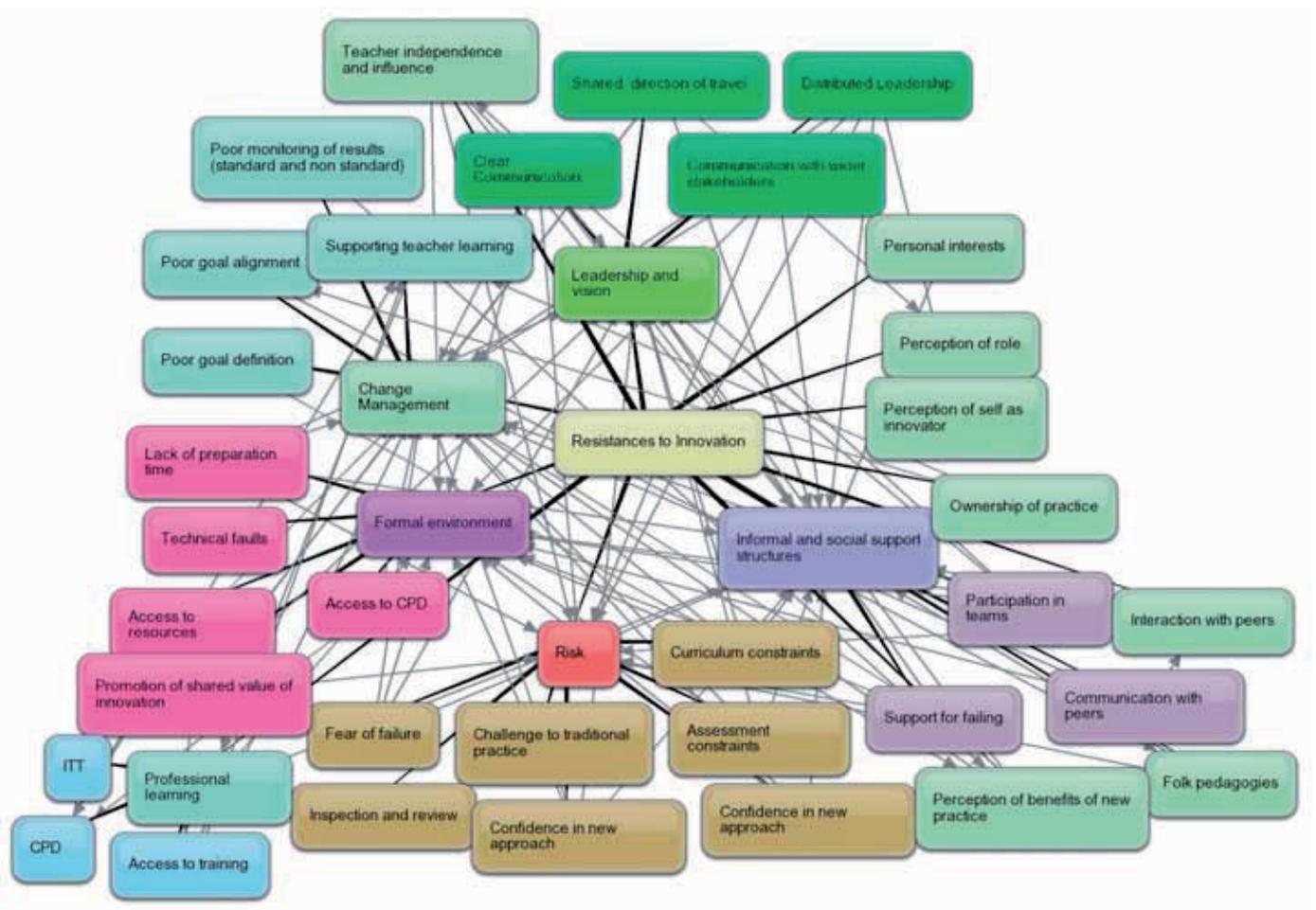5. Leadership

6. Shared vision

7. Change management



Diagram 2: Thematic resistances to change

## Model 2 – Layers of Influence

Zhao's Distance and Dependence model (model one) attempts to provide a framework to understand the likelihood of an innovation's success by placing it in relation to the institution and individual's current position. This model attempts to examine the influences that affect an innovator's capacity or disposition to realise an innovation. As indicated above, each school has its own individual existing culture and practice which makes it difficult to create a generalised model of innovation. However, this second model offers a way to conceptualise the layers of influence that affect the innovation and the innovator.

Influences which can support the individual to realise an innovation can be drawn from a variety of areas. By drawing on the structure of Bronfenbrenner's Ecological Systems Theory (1989) and Groff and Mouza's identification of critical factors affecting school change (2008), four core layers can be identified and their influence mapped out:

_ **Innovation:** These are factors associated with the innovation itself.

_ **Micro level influences:** This concerns the influence directly relevant to the innovator themselves, such as their capacity and disposition to act as an innovator. This layer also relates to highly personal relationships, such as those with students and peers.

_ **Messo level influences:** These factors can include local level influences such as school cultures, school management structures, and school infrastructure; and 'local' influences from the wider community and the local authority.

_ **Macro level influences:** These include government-led initiatives, national policy and national curricula, and wider research.[20]

By using this model in conjunction the themes that have emerged from reviewing the barriers, innovations can be seen within the context of the layers that influence its application. This affords the opportunity to discuss the barriers to innovation in a way that should generate a greater understanding of supporting innovation and the process of sharing innovations across contexts.

This model also highlights the way in which these layers traditionally interact. The innovation is surrounded by the environmental conditions of peers, staff and the immediate environment. This layer is in turn contextualised by school culture and infrastructure, which is routed in a national frame of reference.
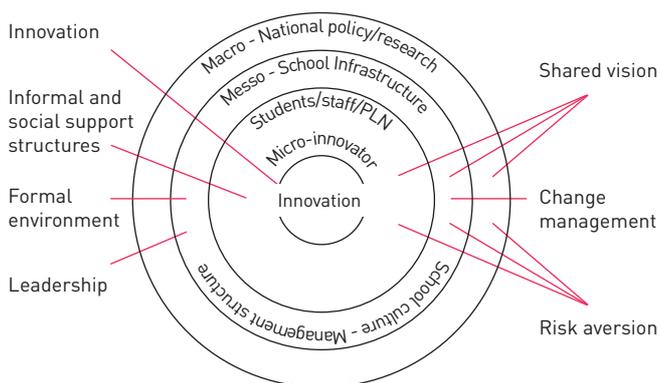


Diagram 3: Layers of Influence

---

[20]  These descriptors could be broken down further and interrogated to a greater extent, but that is beyond the scope of this particular piece of work.

# 4. Discussion

This section presents a discussion around the barriers to innovation, within a framework of the Layers of Influence model. The model helps to clarify how these emergent themes can be understood and affected at each successive level of influence – micro, messo and macro.

## 4.1 The innovation

For the sake of the discussion presented here, we are considering an innovation to be the introduction of something new that supports a change in social practice[21].

The perception of an innovation can be crucial to its success. Jones (2004) argues that several "...studies conclude that a willingness to use ICT depends heavily not only upon its usability, but also its perceived usefulness" (Scrimshaw 2004, p13, also Jones 2004). Frank et al (2004, p151) suggest that "in the literature on diffusion... the critical human factor that affects implementation is the individual's perceptions of the technology, particularly the perceived potential of the technology". This perceived value of an innovation is constructed by all of the layers represented within the Layers of Influence model (page 16).

Initially a teacher's existing set of internal beliefs and attitudes will affect the perceived value of innovation. These may range from a supportive attitude toward the innovation arising from a desire to meet students' needs or to reflect a changing world (see Diagram 3 and IU[22] 2008, p10) or portray a reluctance to engage with the innovation resulting from 'second order barriers', where, for example, a teacher's belief about their relationship with learners is not met with the pedagogic approach of the innovation (Ertmer 1999). As Frank et al (2004) assert however, these attitudes do not exist in isolation. A teacher's perception of the value of a particular innovation may be influenced from downward pressure from management, which in turn may result from downward pressure from higher level institutions

like central government, or policy initiatives. Equally a teacher will be influenced by the formal and informal pressures of their school environment. For example, the attitudes of other staff members to a particular innovation or type of technology. Teachers may also be influenced by their own personal learning networks (see page 19) which can offer knowledge and support from outside of the traditional school context. Finally, as Groff and Mouza (2008) suggest, students also play a role in influencing a teacher's perception of an innovation.

It becomes apparent that the different layers of influence affect the perceived potential of the innovation. Returning briefly to the Distance and Dependency model affords the opportunity to investigate how the different perceptions of an innovation can affect its successful implementation.
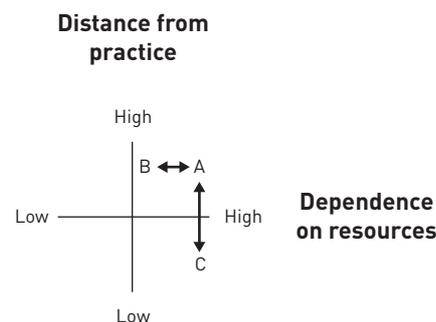


Diagram 4: Distance and Dependence model example

If point A represents a teacher's perception of the distance and dependence of an innovation, and point B represents a headteacher's perception of that same innovation then there is a disjuncture between the expected resources and support required for that innovation to be successfully applied. In this example, the school would not provide enough resourcing for the innovation.

Starting with the same representation at point A, with point C representing the headteacher's perception of the distance and dependency of the innovation, we see another disjuncture: this time there will not be enough support for the teacher's pedagogic shift.

The distance between these different points represents a space for negotiation between the teacher and the headteacher, if the innovation is to have a stronger chance to succeed. If these points are particularly distant, then

---

[21] This could be the implementation of Enquiring Minds activities; the application of a set of mobile technologies or new activities based upon the Big Picture Curriculum etc.
[22] Innovation Unit (IU)

they provide a space in which 'innovation intermediaries'[23] (Horne 2008) may be of particular use in supporting the introduction and application of the innovation.

In the context of understanding the perceptions of an innovation, some commentators have reflected on the extent to which some innovations lend themselves to be embedded in schools. In describing the school ecosystem Zhao and Frank (2003) considered three characteristics of innovations that can be shared: longevity, fecundity, copy fidelity.

The first factor, the longevity of an innovation, relates both to the innovation itself (for example if it is developed on a platform that will endure at least for teachers to develop the functional skills of using it), but also to the receptiveness of the context. This receptiveness is often set at macro and messo policy level by the durability of policy aims and interests. Yet equally the importance of consistency across policy departments goes to create the 'longevity' necessary for innovation to flourish. Morgan and Williamson[24] overview research that identifies where there is a disjuncture in message between government departments and Ofsted in relation to curriculum aims (for example from Buckingham and Jones 2001 and Hartley 2004): this is an example of where competing messages hinders the longevity, and therefore the opportunity for innovation to thrive.

The second factor is fecundity which relates to the ability of an innovation to propagate itself. In terms of computer use in schools, Zhao and Frank relate this to the variety of different uses which are spread throughout the school, as the innovation can be used in a number of ways by different people. In the context of computer use in schools this relates to the ways people from around the school chose to use it. This factor also takes into account the innovator's capacity, the resources needed and the cost of implementation. It pulls together the array of factors that determine whether an innovation is able to be practiced in different contexts.

The final factor is the copy fidelity of the innovation. An innovation with high copy fidelity is more likely to succeed as it affords new users to change it to suit their local context and needs. This relates directly to the research on end-user innovation which argues that this act of changing a practice or resource to suit the local need, is an act of innovation. A feature of this is that, as much as the originators of innovations want their idea to be "...implemented or replicated faithfully by others ... changes or variations on the idea are inevitable" Zhao and Frank (2003, p815). Innovations that have high copy fidelity then are those that are more flexible for the adopters to make them locally relevant. In order to support innovations that have high copy fidelity, the intention and aims of the innovation (or the intrinsic values of the innovation) must be made explicit: it is these that the innovator hopes to share, rather than the way in which they are put into practice.

> **Summary points**
>
> _ The perception of an innovation, including how new or different it is seen to be, can be crucial to its success.
>
> _ This perception can be constructed from all the layers of influence.
>
> _ Successful implementation of an innovation requires a joint understanding of its distance from current practice and dependence on resources from relevant layers of the Layers of Influence model.
>
> _ Innovation that can be widely disseminated and shared have three core properties:
>
> > _ Longevity: the innovation can be sustained over time
> >
> > _ Fecundity: the innovation can be applied by different practitioners
> >
> > _ Copy Fidelity: that innovation can be replicated in local conditions

[23] 'Innovation intermediaries, [are] firms that help companies of many different sizes participate in the emrging secondary markets of for innovation' Chesbrough, H (2006) in: Horne, M (2008).

[24] Morgan, M and Williamson, B (2005). Enquiring Mind Context and Rationale.

## Personal Learning Networks

The notion of what constitutes a professional community needs to come under closer investigation as developments in networked technologies meet with the reshaping of what it is to work as a learning professional – the definitions of who constitutes 'a colleague' and who 'from a different discipline' is becoming more blurred. Yet it is not only the notion of a professional community that is being redefined. What counts as an institution is also currently being brought into consideration.

The Beyond Current Horizons programme suggests that a 'weakening of institutional boundaries' will occur as

> the disaggregation of information from the institution, the capacity to interact easily at a distance … the creation of personal 'clouds' of information, people and resources … the increasing merging of public and private provision of public services; all of these different trends suggest that the next two decades will see an increased weakening of boundaries between institutions previously seen as separate. (Facer 2009, p4)

One element of this is already evidenced by the rise of the Personal Learning Network (PLN) as a dominant support group for innovative teachers. This group extends beyond immediate colleagues and traditional support groups (such as subject groups, key-stage groups etc), to create new networks of support. These groups have not yet been theorized within the research literature[25], although they are becoming far more evident as new digital networks are used for professional purposes.

In its report for Becta, Kable (2009) highlights a number of models that support innovation. One model within the institution is termed 'peer involvement', which supports innovation by (for example)

'encouraging peer reflection'. A model beyond the institution, posed by this paper, is termed 'Loose Networks' where institutions "collaborate informally, drawing on each others' ideas and information as and when they can" (Kable 2009, p4). Personal Learning Networks are where these two models combine: where individuals within institutions create informal networks with peers inside and outside of those networks. What is particularly powerful about these networks is that they cross geographical boundaries, but also institutional and disciplinary boundaries. Although these can be termed 'loose' networks, as their make-up can change on an informal basis, they are becoming very important as sources of ideas, resource sharing and support for innovators.

Personal Learning Networks are created by the person at the centre of them. As such, they are difficult to describe as each can vary greatly from others, yet they can be characterized as non-formal networks that take advantage of digital and physical tools to bring together the most useful and interesting sets of people to provide ideas, inspirations, resources and support systems. These networks are reciprocal, flexible and necessarily personal.

It is interesting that the reciprocity of PLNs comes by taking advantage of current social processes, rather than setting out to encourage new activities for people to share innovations. That is, by utilising existing sharing networks (Twitter, Facebook, Google Docs, TeachMeet) the single act of sharing becomes used for a variety of purposes which are contextualised by other parts of the PLN.

edtechpost.wikispaces.com/PLE+Diagrams provides a useful set of PLNs that shows the true diversity of them, based upon the preferences of the person at the centre of the PLN. It also offers practical examples which may stimulate teachers to explore how they can deepen and further develop their own PLNs.

---

[25]  Although they are being addressed in what Charles Crook refers to as 'community literature': blogs, website, microblogs etc. An example of 'community literature' on PLNs is edtechpost.wikispaces.com/PLE+Diagrams

## 4.2 Informal social support

*Information only becomes knowledge through a social process. (Becta 2009, p26)*

A significant part of the immediate context of the innovation and the innovator is the informal social support structure. This social environment plays an important role in the success of innovations, providing an existing context for innovations to engage with. Zhao and Frank assert that "...the informal social organization of the school filters many of the factors that affect technology use" (2003, p830). This social environment offers resources in the form of social capital to support innovative practice but equally presents pervasive beliefs and practices can act as barriers to innovation (Frank et al 2004).

The informal social support structure that is being characterised in this section goes to create the culture within which the innovator works and as such influences their ability to adopt and develop new practices. It takes into account such relationships as those between teachers and peers, friends, PLNs and learners.

### Micro layer

Initially, the atmosphere of a school has an influencing factor on the motivation to innovate. Frank et al (2004) identified that the informal social pressure that teachers exerted on each other affects their use of computers. In reviewing innovative practice in schools, Becta (2009) found that there may be an 'anti-keenie' culture which prevents people trying new things, equally the Innovation Unit's survey of teachers highlighted that teachers may be motivated to engage in change in response to peer encouragement (IU 2008). Although it then varies from context to context, it is clear that the social structures around an innovator are important in either encouraging or dissuading the application of a new idea.

A strong social infrastructure in an organisation can facilitate peer-to-peer approaches to training to develop new practices. Zhao and Frank argue that the informal support that teachers give to each other when engaging in the use of new technologies are 'commonly

recognized factors' (Zhao and Frank 2003, p830) in successful innovations. Kable too found that peer-to-peer approaches can be a successful way to disseminate information and that "...practitioners consistently cited opportunities for collaborative development and learning from their peers as being more effective than any other form of continuing professional development (CPD)" (Kable 2009, p9). One particular advantage in utilising these informal networks to support innovation is that they afford greater flexibility in providing time for training, experimentation and follow-up support that external and formal CPD materials rarely offer (Groff and Mouza 2008). For example, where expertise exists within these informal support structures, support can be offered to address emerging problems through less intense training over longer periods of time.

Sutch et al (2008, p15) underline the importance of the informal environment for teachers to discuss innovations. This is not only to share visions, reasons and motivations for innovation, but also to openly share successes and failures of particular initiatives. This may happen within the school environment or as part of learning networks away from the physical or geographical context of their school. PLNs offer engagement with practitioners with shared interests outside of the traditional context and can provide an opportunity to mitigate existing lack of social support. By seeing PLNs in this way, teachers can be seen as taking the role of 'brokers' (Wenger and Etienne, 1998) that are particularly important in developing new practices within, and across communities of practice. Whether these shared approaches happen in the school environment or out, they can be a vital means of motivating teachers to engage in innovation. The shared knowledge in social networks can mitigate risk assessment and provide technical support, as well as providing a sense of encouragement and motivation to engage in innovations.

A lack of access to resources is often seen as a factor largely controlled by the formal environment of an institution (see below). However, informal sharing of knowledge and practice within informal support networks is increasingly seen as an important mechanism for teachers to facilitate access to resources (Zhao et al 2002). Studies have begun to highlight that the capacity

to access information and existing social capital of an institution is a skill in its own right (Zhao et al 2002, Zhao and Frank 2003, Frank et al 2004). Zhao et al refers to teachers' social awareness in knowing what is possible and their "...understanding of, and ability to negotiate social aspects of school culture" (Zhao et al 2002, p494). As such, the teacher's capacity to know where and how to access such support contributes to their ability to carry out innovations. This capacity is seen to be increasingly important as technology developments become more complex, and newer technology-based innovations may require a more constant and prolonged involvement with technical support staff. Outside of directly accessing resources, teachers with capacities to access social capital reportedly find it easier to negotiate between parties outside the classroom. For example, they may more readily deal with parents and administrators to facilitate children's involvement in projects that take them out of school. Lastly 'savvy' teachers are more able to maintain social harmony among peers while negotiating for access to the limited resources to support their innovations (Zhao et al 2002, p494).

While these capacities may support teachers to access resources in school, the increasing impact of PLNs offer access to resources from outside of schools. One example is where innovative teachers were sharing solutions to accessing web content that is in some way restricted by existing formal school networks[26].

It is important then for schools to understand both the impact and opportunities the social environment offer in resourcing innovations, especially when prioritising what added value they can offer the innovation.

## Messo layer

While many of these factors exist on a 'person-person' level, the messo level factors influence the existence of social support within an organisation.

This sense of support resulting from a cohesive social network can be underpinned by a sense of feeling part of a team and being 'all in it together'. Scrimshaw (2004, p21) found that staff who felt part of a whole showed a willingness to learn from and support each other. Frank et al identified that teachers are more likely to help others (particularly those who they felt were close colleagues) when they felt part of a collective (Frank et al 2004).

In understanding the impact of a school's social environment on the generation and dissemination of innovative practice, it is also important to recognise the individuality of extant social capital for each school. Social capital can be seen as another resource in supporting educational change and whilst innovations which are not supplemented with resources from outside of the environment may be partially mitigated by social capital, innovations which place excessive demands on a school's social capital are unlikely to succeed (Zhao and Frank 2003).

When looking to understand the sharing of innovations, social capital suggests a reason as to why apparent under-resourced innovations may succeed in some schools but not in others (Frank et al 2004). This supports the need to foster the development of the social infrastructure, for example investing in social relationships (Becta 2009, Kable 2009), collaboration between teachers (Ertmer 1999) and promotion of cross-discipline working (Becta 2009). Investing in the development of micro and messo level informal support structures seems to be an important mechanism to foster innovation and the sharing of innovation. A balance must be struck, however, that affords these support structures to remain informal and personal.

---

[26] Futurelab interviews as part of the Teachers as Innovators project.

## Macro layer

While social context affects teachers in the immediate school environment, a teacher's PLN offers the opportunity to engage with support from outside of this context. If a teacher is in an environment which inhibits innovative practice, a supportive PLN can potentially mitigate some of these factors by providing encouragement, ideas and technical assistance. Supporting teachers to develop their own PLN may offer a model that balances the fostering of an important support structure for innovation (on a national scale), whilst affording the network to remain personal and informal.

### Summary points

_ Supportive informal social environment is crucial to the success of innovations.

_ A supportive atmosphere for innovation can encourage people to try new practice.

_ A supportive social environment can develop capacity for innovative practice through informal training.

_ Being able to create strong social networks is an important skill for teachers realising innovations, both inside and outside school.

_ Social Capital is unique to each school. Understanding it can support innovations and offers an explanation as to why innovations work in some contexts but not others.

## 4.3 Formal environment

The formal environment can be seen as the organisational infrastructure of a school. This includes its formal policies and structures. As well as its place in supporting teaching and learning practice, this formal environment plays an equally important role in supporting innovation, particularly through setting the formal context that gives permission for teachers to innovate. This 'permission giving' can be through the development of formal structures of support and mandates to innovate, but also through the inferred importance of particular elements of teaching practice.

### Micro layer

In terms of supporting innovation the formal environment is largely responsible for ensuring teachers' access to resources. The role of organisational infrastructure in supporting this is explored more fully in the 'messo' section, yet from a micro level, it is clear that teachers who do not have sufficient access to resources to support new approaches are unlikely to succeed (Jones 2004, Zhao et al 2002). A lack of technical support also inhibits teachers' capacity and disposition to engage in technological innovations (Jones 2004). Equally where an effective infrastructure ensures that technological problems and glitches are easily fixed, it results in increased teacher motivation to use technology (Jones 2004). Good access to technology-based resources has also been shown to enable teachers to innovatively develop their use of ICT in the classroom (Jones 2004). While access to resources and technical support is important, such access has to be balanced with effective policies to support the use of resources in the classroom (Zhao et al 2002). For example, a teacher may be inhibited in engaging with internet-based resources if the school has blocked access to them. School infrastructure can be seen to play a central role in ensuring that teachers are effectively resourced when implementing technology-based innovations.

Formal environments can provide a vital means for practitioners to share perceptions, motivations, and experiences to support innovation. Sutch et al (2008)

highlights that space for sharing practice in school supports the development of ideas and supports the sharing of knowledge across the school. The Innovation Unit found that a feature of innovative schools was having "systems and structures with a deliberate focus on sharing good practice and introducing new ways of tackling problems and improving existing practices" (IU 2008, p40).

> Innovations happen at the intersection of disciplines. The problem may reside in one domain of expertise and the solution may reside in another. (Karim Lakhani)[27]

Providing mechanisms to support teachers and learners to interact with ideas from across disciplines is often within the control of the formal structures. Providing timetabling opportunities to support cross-subject teaching affords the sharing of disciplines in this way, as does finding formal links to experts outside of the school grounds: experts in the local community, industry and academia. School level decisions can also release teachers to collaborate with professionals from other disciplines which can support the generation of transformative innovations (Sutch et al 2009, Becta 2009). These approaches are difficult for teachers to coordinate (beyond the personal level) without the support of the formal environment.

Formal institutional requirements place significant demands on a teacher's time and shape a teacher's ability to engage in innovative practice. Often these may result from macro level initiatives such as national targets and (perceptions of) curricula constraints. Yet where test results are considered a measure of teachers' practice, they are likely to be prioritised over innovative initiatives which require time and investment to bring to fruition. There is an important role then within the formal environment to make-evident the place of innovation and exploration, especially in relation to other activities that have perceived importance within the formal structure of the school.

Although limited by overall funding from a macro level, formal environment plays a role in managing the

[27]   p2pfoundation.net/Karim_Lakhani_on_Open_Source_Science

working conditions of teachers. Core factors like job stress, and workload and class sizes have been seen to influence a teacher's capacity and disposition to innovate. Frank et al (2004) in examining how these factors affect computer use by teachers found class size to be the most statistically significant factor. School management and organisation then directly affect the conditions for innovation.

New initiatives require appropriate training to effectively support their implementation. Despite evidence of the benefits of informal learning that occurs across organisations, (for example through PLNs) formally sanctioned and funded professional learning still plays an important part in fostering innovation. Effective external training however relies on training providers having a solid understanding of the needs of the staff realising the innovation. Sutch et al (2008) highlight frequent problems reported with externally led CPD.

> It is often reported, for example, that professional development can be dislocated from practice, be inappropriate, non-transferable, siloed, lacking in support from management, poorly financed, a one-off activity, with tools and opportunity to sustain the practice unavailable. (Sutch et al 2008, p13)

Formal environment has a place in understanding and delivering the requirements of new innovations based on their understanding of staff needs. The Distance and Dependence model offers a practical means to illustrate the perceived needs of support from the perspective of all involved in the innovation.

## Messo layer

> For a culture of transformative innovation to flourish, therefore, it needs to be allied with, or develop from, problems or ideas that are central to the core values and goals of a school, its community and the people within it. With the initiative and drive coming from within a school itself, external support is recast as an aid to innovation and the innovation is supported by the momentum of the organisation. (Sutch et al 2009, p9)

The messo layer has a vital role in administering and providing resources and in formalising the context for innovation. Co-authoring the core values and the goals of a school provides an opportunity to set a clear direction for innovators to pursue, whilst beginning the conversation around the necessary resourcing and support.

Effective resourcing plays an important part in overcoming the barriers to innovation. The Distance and Dependence model highlights that an innovation which is inappropriately resourced is unlikely to succeed and Jones (2004) reviewed a number of studies to illustrate that procurement of resources is vital, not only to provide the equipment for innovations but also to enable teachers to innovatively develop their use of ICT.

From a school perspective it is key that a school has an effective infrastructure and supporting policies to ensure that staff are adequately resourced to explore and realise innovations. Besides procurement, resourcing may include providing access to equipment, time, training and technical support (Jones 2004). Time to explore and develop innovative practices, particularly in making an innovation contextually appropriate is a particular resource 'controlled' between the messo and macro layers.

Appropriate systems need to be put in place to ensure access to existing resources. Organisational policies such as ICT suites have an effect on the degree to which teachers can access ICT, and the breakdown of ineffective administrative systems can frequently impede teacher's use of resources, such as ICT suites being double booked (Jones 2004). The pace of school infrastructure development equally can inhibit teachers engaging in innovative practice. Zhao et al cite an example where a teacher's innovation relied on computers connected to the internet. The innovation faced serious challenges as there was a miscommunication about the number of computers ordered and a significant delay in the computers being internet-enabled while the school was writing up an acceptable use policy (Zhao et al 2002, p505).

> Building relationship between innovators in different organisations and creating rules that make it safe to share, be open about problems and potential solutions is important. (Horne 2008, p31)

There can be a communication divide between technical specialists and teaching staff, which can be a further barrier in accessing and effectively using resources. While strong social networks can mitigate this, organisational infrastructure can also support this communication, such as providing staff who act as 'translators' to help teachers understand and use technologies in their classroom (Zhao et al 2002, p502). These 'translators' are often the champions of innovation who look to support both the changes in pedagogy and the use of new resources amongst other teachers.

The language challenge of speaking across disciplines may become a more notable concern at the messo layer as education professionals are asked to interact more with professionals from other areas of children's services, yet as part of the innovation process it is barrier that needs to be address more immediately.

Each constituent speaks a different language and has a different culture. (CEO, creative industry SME)

Creating the enabling conditions for innovation also includes resourcing the culture of innovation within the school. This relates to the school vision and ethos, so that those who take risks and try to innovate, do so knowing that they are in a supportive environment. Mintzberg (2002, p151) argues that organisational cultures of innovation flourish within institutions that are managed differently from the 'top-down' hierarchy of traditional organisations, which brings implications for understanding alternative management and leadership models at the messo layer.

One of the key lessons from our review and consultation is that innovations fail when they are perceived as not being aligned with the cultural values and beliefs of schools, when they are seen as externally imposed, or when there is a dependence upon external resources (including people) to enable the change to happen. (Sutch et al 2009, p9)

School infrastructure also plays a role in the creation and dissemination of innovation. Part of this relates to availability of resources from a national or local authority level which can affect the capacity and disposition of

staff to innovate. Overworked or overstressed staff, poor working conditions and the availability of innovation funds, for example, have all been seen to impact on the realisation of innovations in schools (Frank et al 2004, Becta 2009).

Whilst informal social structures can offer a conduit for the sharing of innovations, formal structures for internal sharing and reflection of innovative practice have an important place role to play in generating and disseminating innovative practice (IU 2008, Kable 2009, Earle 2002). From an organisational level, Sutch et al (2008) explore the importance of networks and hubs outside of the school to support innovation. They offer the chance to engage with mediating organisations "...to give an insight into cutting edge and future practice" (Sutch et al 2008, p15). "[Innovation intermediaries] transfer knowledge and learning from different organisations, sharing the lesson of innovation that have succeeded and failed elsewhere" (Horne 2008, p28) As such, they offer one support mechanism for sharing innovations between organisations and across the wider education system.

## Macro layer

As indicated above, appropriate resourcing of schools is vital to achieve realisation of innovations. National level funding plays a significant role in the availability of resources on the level of equipment and technical resources. Equally national level core funding to support school infrastructure impacts on teachers' ability to innovate.

Becta (2009) highlights the importance of dedicated funding for projects that stimulated innovation across the education sectors. Such funding encouraged the dedication of resources to develop new projects and allowed institutions to mitigate the financial implications of allowing staff time to engage in developing projects.

One of the recommendations that Hargreaves proposes in 'Education Epidemic' (Hargreaves 2003) is for policy makers to 'identify the main areas of transformation'. In doing this, along with incentives (such as rewards) for addressing these challenges, policy makers can set

clear system level objectives that local level innovators can attempt to address. This requires policy makers to trust the professionalism of practitioners (or invest in the professionalism until they can trust it) and then put in place the mechanisms to aggregate the range of practices that can emerge to address the key challenge. To take the language from Computer Science[28], policy makers need to set out the 'Grand Challenges' for educational innovators to address. Perhaps within education we need to look, not only at the 'Grand Challenges' but also the 'Grand Opportunities' that we face.

Equally, however, the macro layer needs to make a clear distinction in its expectation of teachers as innovators. Asking hard questions about the percentage of time teachers are expected to create contextually relevant innovation and how much time should be spent following national strategies or recommendations is an important step in signalling a serious intent in fostering innovation at local level. If this intent is real, then following that message with action around teachers' professional roles, their job descriptions, time allocations and reward structures can ensure that innovation is embedded within the formal education infrastructure.

**Summary points**

Formal environment is key to making resources for innovations accessible through procurement, technical support and supportive access policies.

_ It has a key role in creating formal systems and spaces for sharing innovative practice.

_ It can support partnerships both in and across disciplines, internally and externally through team teaching and partnering and working with external organisations.

_ It has a core role in identifying support and training for staff.

_ National level funding can create or impede staff capacity for innovation on every level, whether through wider initiatives that impact on time on a local level through working conditions.

---

[28]  Computer Science has set out a number of Grand Challenges www.ukcrc.org.uk/grand_challenges/index.cfm. The Grand Challenges in Computing Education are here: www.ukcrc.org.uk/gceducation.pdf

## 4.4 Risk aversion

A number of research programmes have attempted to identify the capacities and dispositions of an innovator[29] in order to understand how these qualities can best be fostered. Across the literature risk aversion is a key factor that inhibits the ability to innovate and as such has implications for the extent to which any educational setting has the appropriate enabling conditions for innovation.

### Micro layer

> Teachers need to feel they are permitted to innovate. This is not because they are particularly timid or lack confidence in their ability, but because there is a risk involved and all effective innovators understand this. (IU 2008, p15).

Sutch et al present a broad range of concerns which inhibit teachers from engaging in educational innovations, including: risk of failure, risk of wasting time, risk of expenditure that couldn't be justified, and risk of criticism from parents, inspectors, governors or students (Sutch et al 2008, p17). While each is drawn from a teacher perspective, they are reinforced by the practices across the messo and macro levels.

Iterative change management cycles are seen as central to supporting risk-taking on a micro level for a variety of reasons. While they acknowledge risk-taking and 'failure' as part of ongoing cycle of innovation and so remove some of the fear of ending with failure, they also offer clear stages to reflect on and evaluate risk. This is crucial to support teachers to make informed judgments about the risk involved in an innovation.

> If you are evaluating, learning from mistakes, negotiating, listening – and you have an exit strategy – then risks are calculated ones. Even when the stakes are high, you use the resources to learn and move the organisation forward. Risk cannot be avoided and

shouldn't be. It is risks that arise from work that has not been properly thought through and shared that should be avoided. (Teacher reporting approaches to risk management)

Equally the stages of these change management cycles establish space for discussion and debate of ideas, seen to be key in supporting staff to innovate (Becta 2009). There are a number of other enabling conditions that support teachers in recognising and managing risk at a local level. Involvement with hubs of innovation and PLNs gives teachers access to a wider network that may be able to inform the assessment of risk, as well as strategies to overcome others' risk aversion (Sutch et al 2008).

Becta (2009) highlights that attitudes to risk-taking are not entirely logical and rely heavily on perception. That is "...if a situation is described in a negative sense, emphasising the potential loss, a more risk-averse decision is likely to be made than if the situation had been presented in terms of possible gains" (Becta 2009, p7) As such, one way to support teachers to engage in the risk-taking behaviours associated with innovations is to communicate them in terms of their potential benefits. This can be through personal gains to the innovator, such as one Australian initiative that linked skills development in ICT to salary awards and external certification (Scrimshaw 2004). However, commentators have also highlighted that the importance of the 'teacher ethic' in driving educational innovation. Becta (2009) emphasises the 'moral purpose' of education while an Innovation Unit review (2008) suggests that core motivations for teachers to innovate are "...to respond to the needs of their pupils – as part of maintaining their own interest and increasing their job satisfaction" (IU 2008, p10) and "..because meeting pupils' needs and producing interesting, successful lessons inspires and motivates them" (IU 2008, p10). As such, presenting risk against the potential benefit to learners may support teacher's engagement with innovations.

---

[29]  For example Davies, T (2006). Creative teaching and learning in Europe: promoting a new paradigm Curriculum Journal, 17, 37 and www.nesta.org.uk/young-people-and-innovation.

## Messo layer

As with the micro layer, risk aversion on a messo level balances managing tangible risks, (for example financial expenditure) with the barrier that perceived risk presents to innovation. To overcome this barrier staff need to be supported and feel permitted to take appropriate risks inherent in innovative practice (IU 2008, Becta 2009). Management style is vital to support this, in terms of creating a positive culture where failure is part of a learning process (IU 2008), but also in contextualising risk, for example by making visible the risk of 'doing nothing' (Sutch et al 2008, p18). While such an atmosphere can support risk-taking through helping to support workers, it can also help to mitigate other risks. Workers who felt supported were more likely to report problems with innovations and so weed out ineffective innovations earlier (Becta 2009).

There are institutional level practices which can mitigate risk, summarised in the table below. Some of these are particularly identifiable in the literature of risk management in education, such as running pilot programmes to explore risks associated with innovations and also highlight their success to other staff members (Becta 2009). Sutch el al also underline the importance of buy–in from a range of stakeholders. This is seen to offer more solutions, spread some of the risk, widen investment and increase the likelihood of innovation diffusion (Sutch et al 2008). To overcome external accountability other commentators have suggested trialling innovations with groups who have less external accountability (IU 2008, Zhao and Frank 2003) – it should be noted that this is not to downplay the importance of work done without explicit accountability, but that activities undertaken by 'reprofessionalised teachers' (Sutch et al 2008) may be more easily placed with these groups.

A review of the literature also highlights the importance of evaluation of innovative initiatives, both to understand the impact of innovations at an institutional level, but also to support the sharing of innovative practice (Becta 2009). Further, being clear about the (intended) benefits of any innovation provides a mechanism to make judgements about the levels of risk involved. This relates to the need to identify appropriate measure of success for the innovation, taking account of current standard measures (for example national test and measures of participation and engagement) and also non-standard measures that are specifically designed for the innovation itself.

| Barriers | Incentives |
|---|---|
| Risk-averse organisation – "It is not in our culture" | Senior management support of risk-taking and innovation even where it is not fully successful (shift away from blame culture) |
| Lack of expertise in risk management | Provision of training in risk management |
| Little information about risk faced by departments and what is appropriate risk-taking | Improved communication about risks and the department's approach to risk-taking (risks staff can take in practice) |
| Lack of formal systems, processes and procedures for managing business risks | Provision of guidance and advice on risk management |
| Unclear responsibilities for the management of risks | Clarification of individual responsibilities and accountabilities for key risks |
| The status and activities of public bodies limits the risk departments can take with public services | Dissemination of good practice on business risk management with examples where it has added value |
| Time, funding constraints and fear of project failure reduce scope for innovation | Greater use of pilot projects to test innovative solutions |

Source: NAO/PwC risk survey and focus groups

Table 1 – Barrier and incentives for risk-taking (Becta 2009, p11)

## Macro layer

The attempt to reconcile the necessity of risk for innovation with the focus on maintaining standards within current performance criteria provides an interesting juxtaposition. It provides a challenge to how macro level 'permission' can be given to validate risk-taking on the messo and micro layers. For example, there is a recognition that assessment systems shape classroom practice and as such act as a macro-level endorsement for teaching particular aspects of curricula in particular ways. There is a need to investigate how the innovation process, including risk-taking and managed failure, can be given such a macro level endorsement.

The creative force encourages people to be innovative and exploratory in their behaviour. The entropic force encourages people to relax and to conserve energy. If one accepts the benefits of creative approaches and one accepts that all people are capable of creativity and one wishes to develop creativity in teachers and their students, then one should affect the environment to favour creativity over entropy. A teacher can do this in his or her classroom by creating a safe learning environment for his or her pupils to explore ideas. A Headteacher can do this in his or her school by creating an ethos that is supportive of creativity and ultimately the government can do this through recommendations emanating from the DfES and other public bodies, appropriate educational legislation and an inspection regime which reports on and recommends good practice. (Brant 2006, p27-28)

As would be expected, levels of funding have a significant impact in risk-taking behaviours. In public bodies where risk aversion may be more prevalent, the removal of funding, or the threat of its removal can be seen to have a strong impact that inhibits organisations from engaging in risk (Becta 2009). However, Sutch et al highlight how national level initiatives have been seen to apply creative approaches to managing costs as is seen in Opening Mind, Enquiring Minds, and work undertaken within the QCA's co-development network (Sutch et al 2008, p18). These models mitigate some risk by ensuring that the innovations have high copy fidelity and support for teachers' trial and error.

Similarly though, the threat of removing support for an initiative, or indeed the threat of applying new constraints (such as 'special measures') also reinforces the risk of changing practice. Providing a clear mandate for the place of local innovation may mitigate risks that emerge from uncertainty of the implications of failure.

For a more detailed review of supporting risk-taking, see Becta (2009) Harnessing Technology: Business practices which support risk-taking and innovation in schools and colleges.

**Summary points**

_ Innovation inherently engages in some degree of risk which can make individuals reluctant to innovate.

_ Iterative change management cycles can mitigate some fears which impede innovation, such as fear of failure.

_ To overcome risk aversion there needs to be motivation to innovate – this can be internal motivations, such as teachers wishing to improve the learning experience for pupils, or external motivations, such as reward initiatives.

_ Management style is core to supporting risk-taking behaviours, through encouragement and creating a sense of permission to engage in appropriate risk-taking. This can be applied on a local level or on a wider national level.

_ Institutional level practices have an important role in mitigating risk-taking, eg running pilot programmes and sound evaluation procedures.

_ National funding and consistent areas of focus have a significant impact of risk taking behaviour.

## 4.5 Shared vision

> The starting point of all efforts to transfer practice and take it to scale is the purpose or aim of the intervention. In education the starting point – and the end point – are connected. (Cordingley and Bell 2007)

### Micro

Shared perceptions of the aims and requirements of an innovation are important aspects of innovation in education. The Distance and Dependence model can support leaders and practitioners to communicate the perceived needs for the success of an innovation. Both from a resource and practice perspective, yet equally important, is a shared understanding of the aims of the innovation: the creation of a shared vision.

A teacher's perception of pedagogical practices associated with an innovation can influence the success of an innovation. Zhao et al (2002) found that teachers who were more reflective and aware of their pedagogical beliefs were more successful in implementing their own innovations. Core to this was that they used technology in a way that was consistent with their teaching practice. Teachers who attempted to use an innovative technology that required them to teach in a way that was significantly different to their normal classroom practice were less successful. Rather than this being an inherent quality of innovation however, this suggests that when attempting to implement innovations that vary from existing practice, teachers may require more support (for example in the form of professional learning) to realise them.

This is particularly important when considering externally led innovations. By their nature of being generated outside of the local context, such innovations may require a significant change of practice. Some commentators have suggested that many technology-based innovations require a shift from a traditional teacher student transmission model of education to a more student centred approach (Groff and Mouza 2008, Ertmer 1999). While it is not possible to say that all technology-based innovations have to occur in a student centred model of learning, the examples do illustrate how teachers

may be compelled to change their practice to realise an innovation.

Appropriate support of such a pedagogic shift requires that all the layers of the influence model (macro, messo, micro) have a shared perception about the extent to which an innovation requires different practice from the teacher. If, from a national perspective it is felt that an innovation requires a minor shift in practice, but on micro level it results in substantial shift in classroom management, there will be an inconsistency in support for the innovation (Groff and Mouza 2008). As such, a shared vision of the support required for an innovation is paramount. This need for a shared vision resonates with arguments that an understanding of an innovation must be socially constructed by an organisation, rather than an individual (Rogers 1995, Kenny 2003).

> Champions of innovation are critical to the success of transformative innovation, as they have the passion and desire to overcome resistances because they are strongly motivated to share their approaches. In practice, champions play diverse roles in mobilising and enabling transformative innovation. (Sutch et al 2008, p12)

Teachers' involvement in developing shared visions for the school supports their understanding of the aims of the school, the 'direction of travel' and the reasons for change. These three combined support the affordance of teacher ownership of the reasons to change practice and from there a greater involvement in owning the process of change. 'Champions of Innovation' (Sutch et al 2008), teachers who are highly motivated to try out new practices and to seek out new resources and support structures, can be characterised by their ownership of the change process and their internal motivations to innovate towards their goals. By providing teachers with the opportunity to co-construct a vision for the school, multiple innovations can be fostered to move towards those aims.

### Messo

A shared perception of the requirements of an innovation underpins its effective resourcing. However, Leadbeater (2008) and Kenny (2003) have also highlighted that a

sense of a shared vision is central to effective leadership. A shared perception of the need for and direction of an innovation provides a crucial clarity of purpose and direction for leaders, helping them to keep change focussed (Becta 2009). Such a shared vision also supports the development of an 'Igniting Purpose' which can provide shared drive to innovation. This can motivate change and helps mobilise the 'moral purpose' of educational projects, seen to be core to their success (Becta 2009).

A practical function of creating a shared vision is when engaging in collaborative innovation with different agencies and disciplines. The creation of a shared vision can support communication and purpose of a project, especially when parties may not share a common discourse. The process of constructing this vision with these other parties supports the development of a shared language and affirms the shared objectives and goals of the process.

> 'Vision Exploration' is an informal exercise as part of the Vision Mapper toolkit. The activity helps to explore a group's aspirations and opinions of current educational activities, share understanding, and agree focused ways to make changes now and for the future.[30]

**Case Study – How Sunderland Local Authority worked to create an integrated Shared Vision across the layers of an education authority**

visionmapper.org.uk/ideas/learnervision.php

The heads from across the authority - primary, secondary and from further education, meet monthly. The Buliding Schools for the Future (BSF) project team of surveyors, architects, and local authority staff deal with the technical side. The Education and Improvement partnership - a group of heads and local authority staff - look into the future of curriculum design and support a local approach to transition, behaviour management and teacher development.

These groups created a shared vision addressing subjects such as: personalisation, student voice, appropriate learning spaces, where ICT is going, plus more general questions surrounding culture, social justice and the curriculum. By agreeing priorities they came up with a vision that could be translated into curriculum goals.

## Macro

This need for a shared purpose is also important from a national to local level. What is considered innovative on a national level may not be perceived that way on a local level and vice versa. Communicating a shared sense then from a national and local perspective is also important for supporting nationally driven innovative initiatives across schools.

The clarity and consistency of vision from the macro layer also has implications for the innovations undertaken within the messo and micro layers. Groff and Mouza (2008) suggest that differing expert opinions and a lack of quality research results presented within a framework of unclear goals for policies can be a barrier to micro layer innovators. This problem can be compounded by national policy documents that rarely make concrete recommendations for practice, making it hard for staff to translate policy into practice (Groff & Mouza 2008).

A lack of communication of well evidenced research and successful initiatives can also be a barrier to schools who are keen to promote innovative cultures in their schools (IU 2008). The availability of research supports schools' and local authorities' decision making process. As such, the Innovation Unit suggests that it is key that national bodies communicate these (IU 2008). Innovation intermediaries also have a clear role to play here, joining schools up with research and initiatives to support their development.

[30] www.visionmapper.org.uk/activities/visionexploration.php

**Summary points**

_ A teacher's perception of pedagogical practices associated with an innovation can influence the success of an innovation.

_ A shared perception of the requirements of an innovation underpins its effective resourcing. Appropriate support requires that all the layers of the influence model (macro, messo, micro) have a mutual vision of its requirements both in terms of shifts in practice, and dependence on resources.

_ A shared vision for an innovation provides a crucial clarity of purpose and direction for those managing innovations.

_ Co-constructing this shared vision engenders a sense of ownership and understanding for all individuals engaging in innovations which can support wider innovative practice.

_ Linking visions from a local and national perspective can be supported through policies which acknowledge the national level policy on a local level.

## 4.6 Leadership

### Micro

Leadership can have a significant impact on a teacher's motivation to innovate. From a micro perspective, management style has been shown to support individual creativity, which is important in generating innovative approaches (Becta 2009). It is also important in supporting teachers to engage in innovative practice. This can be through creating an atmosphere conducive to innovation, characterised by distributed leadership, supportive and inclusive management, and a culture where failure is accepted as part of the innovation process (IU 2008).

> Building a culture of transformative innovation premised upon creativity is not, clearly, simply about 'letting go' and waiting to see what ideas bubble up. Instead, it requires significant hard work, team building and leadership. Indeed, our review and consultation suggested a need for a fresh perspective on leadership, what it means, and how it might operate in schools to promote transformative innovation. (Sutch et al 2008, p11)

The motivational role of leadership is also highlighted by the Innovation Unit who found that one of the core reasons why teachers innovate is to meet the expectations of their head or senior manager, and that teachers were encouraged by high levels of trust in their professionalism (IU 2008).

Building from the work on developing a shared reason for innovation, the Innovation Unit research indicates that a common trend behind teacher and headteacher innovation is responding to a perceived direction in the wider world. Being able to find ways to look at challenges and opportunities beyond the classroom then, is a useful way for developing an understanding of reasons to innovate, but also to interact with ideas from different domains. Again, PLNs offer some interesting opportunities here for teachers.

PLNs offer connections to practitioners outside of the traditional school context. They may connect with other classroom teachers from across the country, or in some cases globally. On the messo level they may have access to county level leaders such as e-learning coordinators, while on the macro level they may be able to connect more easily to policy or research than ever before, meaning that their classroom practice may be more informed by wider influences. Sutch et al (2008) identify that 'Champions of Innovation' engage more readily with stakeholders and share findings with practitioners outside of the schools context, bringing external influences into the classroom. Supporting teachers to develop this aspect of the activities undertaken by 'Champions of Innovation' may support teacher's own capacities as innovators.

As such, local level initiatives that link up to wider national strategies to promote innovation mean that staff will have access to better support (Scrimshaw 2004).

### Messo

Leadership at an organisational level supports two important sides of innovation: the creation of ideas and effective management processes of testing and turning innovative ideas into reality (Becta 2009). Management style has been shown to support individual creativity, which plays an important role in sparking innovation (Becta 2009). Equally leadership also has strong responsibility for leading and ensuring the effective change management processes detailed below are in place and successful.

Leadership style plays an important role in overcoming barriers to innovation in schools. As Hoyle (1976) suggested polarised leaderships in an organisation, whether excessively bureaucratic or too flexible, can be equally damaging. Rather Sutch et al (2008) suggest that a clear sense of central management is needed for transformative innovation, but one which develops 'distribution of autonomy to diverse groups and individuals' (Sutch et al 2008, p10). Such distributed leadership plays a vital role in establishing an atmosphere conducive to innovation. It can enable and empower staff at all levels (Becta 2009, Kable 2009), can support team morale (Scrimshaw 2004) and create a shared responsibility for innovation (Becta 2009).

Becta (2009) identify characteristics of leaders enabling innovation:

a. They were comfortable with change, at ease with ambiguity and saw problems as opportunities.

b. Clarity of direction: they chose projects carefully and looked to the future. Setbacks were short-term glitches: their focus was on the final objective.

c. Thoroughness: they were effective in planning and organising, prepared well to make their case and had good insights in to organisational politics. They also knew the stakeholders and champions who would support them.

d. Participative management style: they included direct reports as part of the team and involved them in the work, giving them rewards and recognition. They also delivered on their promises.

e. Persuasiveness, persistence, and discretion: they were tolerant and patient in achieving their goals.

(Becta 2009, p9)

While it is important that school leaders develop shared approaches to defining and implementing innovations, it is also key that they look outside their immediate environment. For headteachers and deputies this is frequently found outside of the school context. The Innovation Unit found that successful headteachers and deputies "...were generally more likely than classroom teachers to draw inspiration from attending external conferences, networking and observing practices within other schools. Those from our case study schools in particular tended to be highly knowledgeable about current good practice and emerging thinking" (IU 2008 p13-14). Part of this value of outward facing practice allows education professionals greater access to resources and training to support the realisation of innovations in schools. Innovative schools are able to pick up on national initiatives and other schemes and adapt them for their own purposes quicker than other schools (IU 2008). Becta draws on evidence from 2002 and 2000 to suggest that national level ICT policies and initiatives support ICT leaders to gain significant knowledge from "the multiple formal and informal

training and educational experiences provided by such [national] initiatives" (Scrimshaw 2004, p28).

## Macro

At a macro level there is a need for national level institutions such as Ofsted to support the aims of innovative practice. As identified above, frequently innovative practice is locally defined. As such, it is more difficult to identify specific innovative 'practice', rather it needs a recognition of the principles of innovation relevant to the local context.

As indicated on page 18, longevity of national level policy has a strong role in supporting innovation in the classrooms. Where conflicting macro level ideologies change the direction of education practice, this inhibits the development of innovations through a disjuncture in a shared vision.

### Summary points

_ Leadership has a significant role in creating a culture conducive to innovation and enabling staff to innovate.

_ Distributed leadership plays a vital role in supporting innovation. It can enable and empower staff at all levels, can support team morale and create a shared responsibility for change and development.

_ Outward looking practice is important to support innovations. For school leaders this may be attending conferences or working with other schools, for practitioners this is frequently enabled by their PLN.

_ Macro level leadership has an impact on innovation, through ensuring the longevity of policy direction, and through regulatory bodies supporting the innovations in context.

**Case study – How Queensbridge School developed outward facing practice to support innovation, connecting across the school and externally**

www.visionmapper.org.uk/ideas/enterprise curriculum.php

The concept of Creative Agents was introduced by the Head. Creative Agents liaise with teachers to help initiate sustainable projects that enhance the curriculum and develop both staff and students. They also work with teachers to discover innovative approaches to learning. As a result students gain more understanding of the outside world and its impact on their lives, helping them make sense of their place in the world.

Creative Agents make links with local organisations that can support the school through partnerships, sponsorship and first-hand delivery. With colleagues from the South Collegiate (Birmingham) the school has leased a floor of a neutral office block on the High Street, housing small businesses. Queensbridge hopes to use the floor over the long term, particularly for pupils who find it difficult to fit into school. And there's potential for an enterprise that pupils could run or be part of - helping them to develop enterprise skills useful both in education and in work.

## Change management strategies

### Micro

Research suggests that innovation in schools works best when it is a continuous process that relies on the involvement of staff at all levels of the institution (Rogers 1995, Sutch et al 2008). Becta suggests that an "...institution's members need to understand why change is necessary to be motivated to embrace it. Ideally they also need to feel involved in developing the solution" (Becta 2009, p13).

To involve members requires an effective system of change management that is capable of supporting institutional level change, while enabling innovators on a micro level. Kenny argues that flexible project management cycles are well placed to manage innovation in schools. He suggests a cycle of development akin to an action research cycle, highlighting the importance of evaluation, documentation of learning and disseminating progress to the rest of the organisation (Kenny 2003). Sutch et al go further to articulate a specific model of change management described as an 'innovation cycle', which is an iterative, cyclical and reflective process (Sutch et al 2008, p8). Their model is based on the cycles of Insight, Invention, Application, and Reflection and Communication. This cycle is seen to treat change management as a problem solving process, enabling a shift towards a more proactive approach to change.
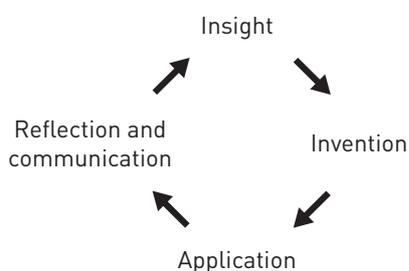


Diagram 5: Innovation cycle from Sutch et al (2008)

Such approaches are also seen to support the enabling of individuals to engage in innovation within an organisation in several ways. By perceiving failure as an integral part of the cycle they address existing fears of failure (IU 2008, Sutch et al 2008). The processes at the different stages of development in the cycle both offer opportunity to develop a shared vision of the innovation and support the individual's creative input into the development of the innovation. The cycle also supports distributed models of leadership and support, and participative management practices which are seen as important in supporting individuals to overcome reticence to engage with risk-taking (Becta 2009).

Effective change management also has a role to play in supporting the staff in the adoption of innovations, particularly when they originate outside of the school context. An important factor in the success of an innovation is the degree to which it is aligned with the school culture and value of a school (Zhao 2002, Sutch et al 2008). When they correspond they can be seen to be more easily adopted by practitioners on the micro level. Rogers (1995) cites five specific stages that individuals go though in the adoption processes and argues that when innovations are brought in from a different context, adoption processes are more difficult, as they differ from the local conditions (Rogers 1995). As such, effective change management has to understand and allow sufficient time and support for these stages of adoption for teachers.

As indicated above, innovation frequently requires teachers to have the appropriate dispositions and capacities to generate internal innovations and to realise externally led ones. The Innovation Unit (2008), for example, found that teachers who were skilled and confident were more likely to independently generate innovations.

Building capacity for teachers to realise technology-based innovations may require functional skills in the use of technology. It is apparent however that modern technical training needs to be individualised to reflect teachers' different capabilities with technology (Jones 2004). This is increasingly pertinent at a time where there may be an expectation, based on home use of technology, that teachers can easily adapt to technology-based innovations.

As well as skills to facilitate the use of technology to support innovation, it is important for teachers to have awareness of the enabling conditions for technology as much as knowledge of the technology itself. Zhao et al (2002) give an example of a teacher who had planned an innovation that used video-conferencing to improve her student's oral literacy. However her planning time was used up on finding out the enabling conditions to make the project work and she was unable to develop the project (Zhao 2002). Increasingly commentators have indicated the need to focus on the use of technology for teaching and the need for training to incorporate ways to develop alternative pedagogies and teaching practices. (Jones 2004, Zhao et al 2002, Earle 2002, Groff and Mouza 2008). As such, change management processes need to be able to draw from a shared vision of the requirements of an innovation to support the pedagogical and practical requirements of different ways of working.

> Whole school change is a complex and somewhat unstable notion. There are debates about what it is, why it might be done, and how it is effected [sic]. However, there is widespread agreement that: there is no single recipe for change; it requires action at the local level, but also support from outside, and it takes time, usually longer than anticipated. (Thomson 2007, p56)

A core factor that underpins teachers' capacity to innovate is the time they have. Effective change management to support the implementation of innovations requires allocating time in several key areas: teachers' time in planning the creation and implementation of the innovation (Jones 2004, IU 2008); for lesson preparation (Jones 2004); for sharing innovations between teachers (Frank et al 2004), and for planning and reflection (Becta 2009, Earle 2002). If technology forms a core part of the innovation there also needs to be time for teachers to familiarise themselves with the new tools (Jones 2004, Zhao and Frank 2003, Groff and Mouza 2008, Becta 2009)

Students' own comfort with innovations also needs to be accounted for within a change management strategy. Changes to the pedagogic approaches or the use of resources can be seen to cause anxiety in students (Akerlind and Trevit 1999) and impede on the success of an innovation. Moreover Groff and Mouza (2008) suggest

that educators who face negative reactions from students may be discouraged from engaging in innovative projects in the future. Groff and Mouza 2008 highlight three factors that need to be addressed in realising a technology-based innovation with students: experience and background, technical proficiency, and attitudes and beliefs.

First, where an innovation includes a shift in teaching style, for example toward a student centred model, this can involve a shift in workload and focus away from students' experiences and expectations. As such, this may require a need for them to adjust. Second, as with teachers, students may need time to be trained and become accustomed to using new resources. Finally, student attitudes and beliefs will affect the use of technology-based innovations; Groff and Mouza suggest students' attitudes towards an innovation can be broken down into:

a.  Enjoyment of computer use

b.  Motivation toward computer use

c.  Level of importance students assign to learning computer skills

d.  Anxiety toward computer use

(Groff and Mouza 2008)

Scrimshaw (2004 p26-28) offers a variety of practical ways of supporting students to be accustomed to using technology and working within a different pedagogical framework, which can help to support these factors.

## Messo

Effective change management can be seen to be supported by a shared sense of purpose. Becta (2009) highlights the importance of maintaining a sense of focus when implementing innovations, reflecting both a sense of direction and appropriate prioritisation. Such an approach forms an important starting point for 'disciplined innovation' (Hargreaves 2003).

Equally, managing innovative change requires a shared understanding of the organisation as a whole.

Becta highlights that "successful initiatives reflect an understanding of the interlocking mechanisms which must be taken into account" (Becta 2009, p23), illustrating that innovations need to be planned and coordinated with the whole school. This may be, for example, identifying times in the year that are effective times to implement large scale changes such as the beginning of the school year.

The management structure can be seen to be a core part of implementing effective change. A too fixed or uncoordinated management structure can be a barrier to innovation. This can be characterised by fixed top-down plans or lack of integrated planning. Kenny (2003) shows that although shared vision statements are important, a rigid or extensive use of predetermined goals and objectives are an inhibiting factor. In order to create a structure that can reflect a responsive and more iterative approach to change management a different process is needed such as the innovation cycle described above. These cycles are core to promoting an ongoing process of innovation in an organisation, rather than short-lived changes.

## Macro

Where initiatives are led from a macro perspective they can disrupt these cycles of change that are necessary for the deep integration of new practices into schools. This is exemplified in the research literature where 'top-down' pressure is seen to promote the use technology as part of a return on an 'investment' rather than building it into practice as a selected pedagogical tool. This is reported to have a negative impact on the use of technology which can inhibit the development of innovative practice around technology in schools as the focus becomes of the quantity rather than quality of use (Groff and Mouza 2008, Earle 2002). It is important to note too that national level initiatives take up the capacity of institutions and therefore reduce their capacity to integrate externally led innovations, or develop innovative practice themselves. In America, Frank et al argues how national tests have reduced teachers' capacity to innovate (Frank et al 2004).

While national led initiatives can be important to maintain parity of educational experiences for learners, they need

to be incorporated into cyclical and reflective change management strategies that ensure they are part of an ongoing process of innovation, are aligned with schools' beliefs and values, and underpinned by an understanding that the processes of change will be individual to each school. Situating this local change within a nationwide strategy necessitates the provision of a framework of support that seeks to learn from local level innovations to share learning across the system as a whole.

This document began by suggesting that by fostering the enabling conditions of innovation at a local level and by building on notions of user-led innovation, mechanisms can be developed to share the principles, tools and practices from local innovation across the education system. It is important to remind ourselves of Papert's observation that whilst the sharing of innovations will attempt to change local practice, we must recognise that the act of contextualising the innovation will necessarily change it to suit the new context. With this in mind, the change management strategies implemented at national level should look to share the aims and principles of these new practices; provide the tools to afford localisation of the innovation and then share descriptions of practice as examples of innovation, rather than the unit upon which assessment of success is made.

---

**Summary points**

_ Innovation in schools works best when it is a continuous process that relies on the involvement of staff at all levels of the institution.

_ Flexible project management cycles are well placed to do this, for example the 'Innovation Cycle' (Sutch et al 2008).

_ Effective change management requires building an innovator's capacity through developing relevant skills and freeing up time.

_ Students' own comfort with innovations needs to be accounted for within a change management strategy.

_ Effectively managing change requires a shared understanding of the organisation as a whole and a shared organisational vision.

_ To support coherent development, macro level policy changes need to be incorporated into the change management cycle of schools, link to their existing core beliefs and values, and support diffusion of local level innovations across the varied school contexts.

# 5. Conclusion

Throughout this review are a number of recommendations, questions and discussion points to both support the innovator in their individual practice and create the enabling the conditions across a local and national level. These relate to the specific layers of influence within which they are written and, as such, it is recommended they be within the context of the respective sections.

However, it is worth highlighting some of the key recommendations for policy makers and educational leaders:

1. Recognising that innovations are necessarily adapted to the context they are applied in. As such, there are inherent characteristics of innovations that can support their application in different contexts. These are: longevity, fecundity and copy fidelity. It is recommended that approaches to sharing innovation take account of these qualities in order to maximise their potential for successful implementation.

2. Developing change management strategies for implementation at national level should look to share primarily the aims and principles of innovations and provide the tools to afford localisation.

3. At a local level, support change management strategies that encompass an iterative and reflective process to support ongoing innovation and processes of change.

4. To develop a range of tools to support practitioners across the education system to assess and articulate their perception of the requirements of any innovation. This may build upon the Distance and Dependence model, but should explore alternative models of support.

5. To recognise that innovations shared between similar contexts are more likely to succeed. This should inform the development of models of innovation diffusion between teachers.

6. To investigate the application of PLNs as a developing model for CPD and support, and to understand the national role in supporting them whilst safeguarding their inherently personal nature.

7. Further investigate the role of innovation intermediaries as organisations that can best foster dialogue and collaboration across disciplines and contexts of practice.

8. To consider mechanisms to make explicit the challenges and opportunities for educational change, so to direct distributed mass innovation within a national framework for change.

# Appendixes

## Resources

### Vision Mapper

Vision Mapper provides a wide range of activities and resources to explore educational change. The resources provided are designed to support education leadership, including headteachers, department heads, local authorities and school redesign consortia to approach long-term planning and decision making with an informed view of the future. Vision Mapper, part of the Beyond Current Horizons programme, is designed to help examine the future of education beyond 2025. It supports the UK education system in preparing for and responding to the challenges it faces as society and technology rapidly evolve.

www.visionmapper.org.uk

### Map of Innovations

Map of Innovations is an ongoing development project at Futurelab to develop a free, engaging and easy-to-use online space that gives access to a wide range of useful and relevant innovations across educations' varied communities. By connecting people with innovative uses of digital technology, new resources and new approaches to teaching and learning, this resources aims to help inspire further innovation in education.

www.futurelab.org.uk/projects/map-of-innovations

## Case studies from DCSF

**How Nottinghamshire County Council has implemented Every Child a Reader**

**Background:**
Every Child a Reader began as a three year, £10 million pilot project that aimed to show that, with the right resources, it is possible to tackle the literacy difficulties that blight many children's lives – particularly those of children who live in poverty. The initiative, now being rolled out nationally by government, part-funds highly skilled Reading Recovery teachers in primary schools, to provide intensive individual help to children most in need.

**Creating a shared vision with stakeholders, and providing opportunity to develop mutual understanding of the needs of the innovation:**
Headteachers ensured that ECaR was part of their School Improvement Plan and that their staff and governors were fully informed. Half-termly Headteacher Network meetings allowed the schools to share practice and develop an understanding of ECaR and Reading Recovery with the aim of becoming leading ECaR schools.

Within the local authority there has been a collaborative approach from the start. School Improvement and Inclusion have shared the responsibility for the implementation of ECaR. Support has been in place from the very highest of levels, from elected members to school-based staff.

**Individualised, reflective training, integrating practice and the principles of an innovation:**
The year-long Reading Recovery (RR) Professional Development programme trains teachers to become specialist literacy teachers who are reflective, thoughtful and analytical. The training is characterised by intensive interaction with colleagues over fortnightly, half-day In-Service Sessions. Throughout the training teachers are encouraged to challenge their own assumptions whilst developing and integrating

new skills. Learning the 'what' and the 'how' of RR is important, but understanding the 'why' is crucial.

By introducing the sessions fully, systematically, working through tasks, offering clear rationales, summarising and finally evaluating sessions, the team leader helps teachers to work at their 'cutting-edge' or their zone of proximal development. The team leader is actually modelling good RR teaching practice by scaffolding the teachers' learning. Structure and support is in place where needed but withdrawn once the learner can work independently.

**Developing formal and informal infrastructures to share innovative practice:**
"At the beginning of the year I focused on the mechanics of assessment and teaching by telling, sharing, exploring and demonstrating. The 'what' and the 'how' are initially important. Throughout the year I encouraged social interaction, active involvement and above all conversation."

whatworkswell.standards.dcsf.gov.uk/viewcasestudy/introduction?casestudyid=3051&recordid=2544

**How Brookside Primary School supported innovative approach to increase pupils' motivations for learning**

**Background:**
Pupil motivation for learning across the school was relatively low and teachers were looking for more exciting ways to deliver teaching and learning experiences in a range of the foundation subjects.

**Shifts in practice supported by appropriate support, including time and training:**
The first step was to introduce the teacher as a facilitator for learning rather than a teacher. A new classroom atmosphere was created with the teacher as a positive role model as well. Teachers were given training in a range of strategies to enhance group work and speaking and listening by an external personalised learning consultant.

Teachers were then given non-contact time to observe a peer and to observe the teaching and learning in another classroom. Teachers were then given time to follow up these observations and identify excellent examples of strategies.

The curriculum leader monitors the planning against the must-haves of the curriculum and plans CPD according to this monitoring. Teachers are encouraged to visit other schools with the curriculum leader to share their work and to give guidance to others.

**Evaluation procedures related to the objectives of student engagement and achievements:**
Pupil interviews, pupil self assessments and monitoring are taking place regularly to ensure the ongoing development of the curriculum.

**Wide support reported:**
[There is support from] Senior management level. "The headteacher fully supported me in the development of our curriculum. Subject Leaders carefully monitor plans to ensure that there is sufficient challenge and progress in the medium and long term plans."

**Risk Taking:**
Teachers are enjoying teaching as themed units are varied and teachers challenge themselves to create 'out of the box' themes which actively encourage risk-taking.

Teachers are developing more out of the box final products and are taking more risks in the themes and end products that they embark on.

**Leadership:**
Subject Leaders have an increased responsibility for the development of their subject and have a more developed understanding of the skills and progression in skills for their subject. The school have successfully received a Leading Aspect Award for the curriculum work.

whatworkswell.standards.dcsf.gov.uk/viewcasestudy/introduction?casestudyid=2886&recordid=2470

# Bibliography

Åkerlind, G and Trevitt, C (1999). Enhancing self-directed learning through educational technology: When students resist the change. Innovations in Education and Training International, 36,2, 96-105.

Albaugh, P (1997). The role of skepticism in preparing teachers for the use of technology. Education for community: a town and gown discussion panel, Westerville, OH, January 26, 1997. Available from: www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/16/74/ee.pdf

Becta (2009). Harnessing Technology: Business practices which support risk-taking and innovation in schools and colleges. Becta.

Brant, J (2006). Developing Subject Knowledge and Creativity in Business and Economics Teachers. MST Institute of Education, University of London.

Bronfenbrenner, U (1989). Ecological systems theory. Annals of Child Development, 6: 187-249.

Cordingly, P and Bell, M (2007). Transferring Learning and Taking Innovation to Scale. The Innovation Unit, Crown.

Cox, M, Preston, C, Cox, C (1999). What factors support or prevent teachers from using ICT in the primary classroom. British Educational Research Association Annual Conference, September 2-5, 1999. www.leeds.ac.uk/educol/documents/00001304.htm

Dawes, L (2000). The National Grid for Learning and the professional development of teachers: Outcomes of an opportunity for dialogue. PhD thesis, in Jones (2004)

Earle, R (2002). The integration of instructional technology into public education: Promises and challenges. ET Magazine, 42,1, 5-13. Retrieved 20 June 2009, from www.bookstoread.com/etp/earle.pdf

Ertmer, PEA (1999). Examining teachers' beliefs about the role of technology in the elementary classroom. Journal of Research on Computing in Education, 32,1: 54-72.

Facer, K (2009). Educational, social and technological futures: a report from the Beyond Current Horizons Programme. www.beyondcurrenthorizons.org.uk/wp-content/uploads/final-report-2009-executive-summary.pdf

Frank, A, Zhao, Y, Borman, K (2004). Social capital and the diffusion of innovations within organizations: The case of computer technology in schools. Sociology of Education, 77: 148–171.

Groff, J and Mouza, C (2008). A framework for addressing challenges to classroom technology use. AACE Journal, 16,1: 21-46.

Innovation Unit (2008). Teachers As Innovative Professionals. The Innovation Unit: Crown. www.innovation-unit.co.uk/images/stories/files/pdf/teachers_innovativeprofs.pdf

Hargreaves, DH (2003). Education Epidemic: Transforming Secondary Schools Through Innovation Networks. DEMOS.

Hoban, GF (2002). Teacher Learning for Educational Change: a systems thinking approach. Open University Press.

Horne, M (2008). Honest Brokers: brokering innovation in public service. The Innovation Unit, Crown.

Hoyle, E (1976). The parameters of change in: W Prescott and Hoyle (eds), Innovation: Problems and Possibilities. London: Open University: 27-54.

Jones, A (2004). A Review of the Research Literature on Barriers to the Uptake of ICT by Teachers. Becta.

Kable, (2009). Models for Innovation in Education. Becta.

Kenny, J (2003). A research-based model for managing strategic education change and innovation projects. Research and Development in Higher Education, 26: 333-342

Leadbeater, C (2008). What's Next? 21 Ideas for 21st Century Learning. The Innovation Unit: Crown.

Ling, T (2002). Innovation: Lessons from the private sector. Invest to Save.

Lundblad, JP (2003). A review and critique of Rogers' diffusion of innovation theory as it applies to Organizations. Organization Development Journal, 4.

Mumtaz, S (2000). Factors affecting teachers' use of information and communications technology: a review of the literature. Journal of Information Technology for Teacher Education. 9,3: 319-341.

Papert, S (1997). The Journal of the Learning Sciences, 6,4: 417-427. www.papert.org/articles/school_reform.html

Rakes, G and Casey, H (2002). An analysis of teacher concerns toward instructional technology. International Journal of Educational Technology, 3,1.

Rogers, EM (1995). Diffusion of Innovations. Glencoe, Free Press.

Scrimshaw, P (2004). Enabling Teachers to Make Successful Use of ICT. Becta.

Sutch, D, Rudd, T, and Facer, K (2008). Promoting Transformative Innovation. Futurelab.

Thomson, P (2007). Whole school change: A review of the literature. A report for Creative Partnerships Literature Review. Arts Council England.

Veen, W (1993). The role of beliefs in the use of information technology: implications for teacher education, or teaching the right thing at the right time. Journal of Information Technology for Teacher Education, 2,2: 139-153.

von Hippel, E (1988). Sources of Innovation. Oxford University Press.

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

Zhao, Y and Frank, A (2003). Factors affecting technology uses in schools: an ecological perspective. American Educational Research Journal. 40,4: 807–840.

Zhao, Y, Pugh, K, Sheldon, S, and Byers, J (2002). Conditions for classroom technology innovations. Teachers College Record, 104,3: 482–515.

**About Futurelab**

Futurelab is passionate about transforming the way people learn. Tapping into the huge potential offered by digital and other technologies, we are developing innovative learning resources and practices that support new approaches to education for the 21st century.

Working in partnership with industry, policy and practice, Futurelab:

_ incubates new ideas, taking them from the lab to the classroom

_ offers hard evidence and practical advice to support the design and use of innovative learning tools

_ communicates the latest thinking and practice in educational ICT

_ provides the space for experimentation and the exchange of ideas between the creative, technology and education sectors.

A not-for-profit organisation, Futurelab is committed to sharing the lessons learnt from our research and development in order to inform positive change to educational policy and practice.

Futurelab
1 Canons Road
Harbourside
Bristol BS1 5UH
United Kingdom

tel: +44 (0)117 915 8200
fax: +44 (0)117 915 8201
e-mail: info@futurelab.org.uk
blog: flux.futurelab.org.uk
**www.futurelab.org.uk**

Registered charity 1113051