Chapter 1
Evidence use, research-engaged schools and the concept of an ecosystem
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Aims of the chapter

- To sketch out different levels of the school ecosystem
- To outline the ecosystem concept of the research-engaged school
- To propose theoretical frameworks to understand the ecological conditions for a research-engaged school system
- To foreground subsequent chapters in this book

Introduction

This chapter explains how research can be integrated into the lives of teachers and school leaders as part of the structures and cultures of the organisation. Research-engaged schools promote enquiry stances by teachers, and the use of published research and other school evidence; they are outward looking and connect to the research community. This engagement occurs through interconnections from the macro to the micro level of the school ecosystem and ultimately affects the lives of young learners. The dimensions and elements of such a system are described here and subsequent chapters elaborate on chosen aspects of these levels. The chapter also opens up thinking about theoretical lenses that can be used to understand and research (social) ecosystems, applying these to research-engaged schools.

Ecosystems and levels

In this section we outline the basic ecosystem concept for the school system that is later built upon in subsequent chapters. This is informed by work published elsewhere, where it is argued that it is helpful to understand research-engaged schools as operating within an ecosystem (Godfrey, 2016, 2017, Godfrey and Brown, 2018). This work has been influenced by Urie Bronfenbrenner's (1992) ecosystems model used in developmental psychology. Bronfenbrenner suggested that in order to study children in a way that led to high 'ecological validity', i.e. generating authentic findings and theories that could be applied to real life contexts, and not just in 'ideal' or 'laboratory' conditions, then we needed to take account of the various subsystems within which children developed. For instance, if we were studying children's classroom behavior or mental health, we may wish to analyse their peer group interactions (the micro system) and their family's economic and social context (mesosystem). In addition, if the child misses school or otherwise gets into difficulties adapting to school life, policies to do with truancy or exclusion may have an impact on how he or she is subsequently punished or supported by the school (the exosystem). In turn, cultural and societal beliefs about school and family life (the macrosystem) influence the exo, meso and microsystems by shaping the way that schools are valued, funded, organized and evaluated. The developmental rate of the changes at each level – e.g. the child's physical, cognitive and emotional development (the chronosystem) could also be studied in relation to their transition through school years, or alongside curriculum reforms. Bronfenbrenner believed that by studying children in such a way we avoid over simplifying the causal links that lead to various outcomes in their lives; we also consciously connect the values and beliefs of society to the eventual impact they have at the micro-level.

This model has much potential when applied to a school system. Here the 'institution' or 'organisational' level is in sharpest focus (meso-level) and we are challenged to think about the nature of influence of political values on the types of schools we have, the working environments they create for staff and children and the ways that schools work together to meet the aims of the education system. Ultimately, these higher-level elements of the ecosystem will have an effect on the micro systems that most impact on children's lives, shaping the way that teachers and other adults 'educate' them. Box 1.1, below, outlines how such a model can be applied to the school system and later sections in this chapter focus on how such an ecosystem can be enhanced or enriched through research engagement.

Box 1.1 Ecosystem levels as applied to the school system

- The macrosystem: This consists of the overarching beliefs and values in society that affect the school system, such as belief that parents should be able to choose their children's schools and that school's need to be measured, ranked and held accountable for 'outcomes'.
- The exosystem: This is the concrete manifestation of the macrosystem. This might include government policies to increase school autonomy and the use of school inspections and the publication of school league tables. This level is also sometimes used to describe the indirect environment, for instance networks or other organisations that connect to the school (as in Chapter two in this book).
- The mesosystem: This is the interaction between elements of the microsystem with the immediate environment, specifically the 'workings' of a school as an organization or institution. This could include a school policy to set up professional learning communities or in the use of data to inform decisions by school leaders.
- The microsystem: This is the immediate educational environment of the child, especially the child as 'learner' in the classroom, their relationships with teachers, peers, parents and other staff. The above levels may influence the methods by which children are taught and assessed, placed into ability groups and so on.
- The chronosystem: The pace of change or development at each and any sub level of the ecosystem. For instance, a child's cognitive maturation can be studied alongside transitions from the primary phase to the secondary phase of education. Attempts to improve or change teaching practice can be contrasted or set within the context of often rapid policy changes introduced by new governments, eager to force through reforms to the school

Some key issues

This ecosystems framing addresses three key issues that we consider essential to the study of research-engaged schools: First, the need to connect all school change ultimately to its intended educational impact on children, and by corollary to society; second, to ensure that elements of the system - especially at the individual school level - are not viewed reductively or in isolation, and third, to see system change as both interconnected and working in patterns of multi-directional cause and effect.

The first issue addresses the need to understand the way the macro system indirectly impacts on the microsystems of school children. As such, tracing the effect of educational policies purely on the performance of schools in inspection reports or league tables is insufficient – this both stops short of the child's microsystem and too narrowly measures outcomes. In order to link the values that drive school policies to their eventual impact on students, each reform must be judged in terms of its stated aim; for instance to develop children's mental and physical well-being, to eliminate inequalities in student educational outcomes, or to build citizens fit to enter democratic society and to have the means to influence it. Without addressing these issues explicitly, we are in danger of reverting to measuring what is easy to measure - for example examination results - and to simplistic suggestions about 'what works' in schools (Biesta, 2007).

In terms of the second issue, we recognize that research-engaged schools are meso and exo-level organisations / institutions with numerous vertical and horizontal connections in the ecosystem. We

know from previous work on school effectiveness that the effect of the teacher on a child's academic attainment is more than the indirect effect of the school's overall effectiveness (Barber and Mourshed, 2007). More generally we might conclude that the quality of the child's parenting and the home environment has considerable effect on educational outcomes for children and is more important than teaching and that teaching has more importance than the quality of school leadership (Robinson, 2011). Thus the extent to which the school contributes to a system that fosters high quality teaching, support and parental engagement to emerge, should be our main concern. In turn, we need to consider that there are factors outside of the school itself, e.g. the support of local educational authority/district or the role of teacher professional bodies, that also impact on the quality of teaching, the ability of parents to engage in their children's education and so on. If the unit of the individual school is too much the focus, this can lead to unfairly comparing one school's performance with another and in creating a blame culture in which individual schools are disproportionately held accountable for outcomes outside of their control.

The above point also links to the third area that the ecosystems approach addresses, the interconnectivity of levels and multiple directions of cause and effect. For many nations we see a macrosystem emphasising school autonomy, parental choice and external accountability (Sahlberg, 2011). Commonplace in many nations' education policies (exo-level) has been the promotion of school-led improvement, coupled with the encouragement of new types of networks of schools (Greany and Higham, 2018). Such policies emphasise horizontal connections in the ecosystem, specifically at the meso- and exo-levels, through school-to-school collaborations or teachers and school leaders working across schools. Evidence suggests that professional learning networks can positively impact on schools' innovation potential (e.g. Berkemeyer *et al.,* 2008); the professional development of teachers (e.g. Berkemeyer et al., 2011); improved teaching practice (Darling-Hammond, 2010) and student outcomes (e.g. van Holt *et al.,*2015).

With such new forms of lateral work evolving, the role of the exo and macro-level (i.e. local and central government) will need to enable this lateral collaboration to flourish.

Lastly, focusing on the chronosystem helps remind us of the need to examine the relative developmental pace of change from the perspective of actors at different levels in the ecosystem. For instance, governments can impose policy changes that have dramatic implications for the school curriculum in the space of a few weeks. However, it can take teachers months or years to implement the new curriculum due to the need to build new skills, introduce new materials and refine strategies to context. The chronosystem can also be projected backwards and forwards – tracing backwards to the historical antecedents of the present system and forwards towards a new, imagined future for schooling in the late 21st Century (and for those interested, one way for examining policy and systemic evolution in the chronosystem can found in Ball's work on critical policy sociology: e.g. Ball, 2008).

Such thinking also necessitates theoretical approaches that acknowledge the complex and open nature of systems within which schools operate and the factors that impact on young people's educational outcomes. No one factor at any level can be taken to have a function in isolation of the wider ecosystem; and the effects of particular features – for instance the promotion of research use by school principals – must be taken alongside other elements, such as the nature of initial teacher training.

Below we offer a more thorough conceptualization of the research-engaged school in relation to this ecosystem model. Later we outline models to think about two further issues: how to create a highly research-engaged school ecosystem and also how to study it.

The research-engaged school

In chapter 9, Handscomb reflects on the value of enquiry and research being an integral part of the continuing professional development for practitioners – and the personal, professional dividends that can accrue. However it has also been suggested that there are implied benefits for the whole school and indeed for the wider system. The concept of the *research-engaged school* (RES) is helpful here in articulating how practitioner enquiry, embedded within professional learning, is in a symbiotic and dynamic relationship with other cultural elements within the school ecosystem (Godfrey, 2016a; Godfrey and Brown, 2018).

When the term "research-engaged school" was first coined it was identified as having four inter-related dimensions: it would have a *research-rich pedagogy* – i.e. manifest in the school's teaching and learning and classroom practice; it would have a *research orientation* – exemplified in the school's values and culture; it would *promote research communities* – within and beyond the school; and research would be at *the heart of school policy and practice* (Handscomb and MacBeath, 2003b). There has been much exemplification and development of these features since. For Wilkins (2011) the term research-engaged entailed the practitioner combining the undertaking one's own action research whilst concurrently accessing and making judicious use of published research, echoing the Research Learning Community practice mentioned in chapter 6. Godfrey (2016b:268) used the focus on research orientation to emphasise that "such schools create a culture in which research provides a richer professional discourse." This is particularly significant in helping to illuminate the reciprocal relationship between practitioner research and professional learning. Engaging in enquiry and research provides teachers with the language and context with which they can explore and evaluate their own practice, and share and critique these insights within their professional communities.

Combining the work of various authors, there are five key aspects of a RES:

1) They promote practitioner research among staff (especially teachers)

2) They encourage staff to read and make sense of published research

3) They welcome participation in research projects led by outside organisations such as universities

4) They use research to inform decision-making at every level of the school - individual, departmental, whole school and in collaborative work

5) They have an outward looking orientation, which may be aided by maintaining research-based links with other schools, universities or professional/academic entities.

 (Handscomb and MacBeath, 2003; Sharp *et al.*, 2005; Wilkins, 2011)

Dimmock (see also chapter 4) develops the notion of the RES as a unifying concept, addressing three systemic concerns:

1. How to bridge the research–policy–practice gap by mobilising knowledge more effectively through knowledge producers and consumers working collaboratively

2. Valuing and integrating both tacit knowledge and academic coded (explicit) knowledge

3. Raising the professionalism and reflectivity of teachers and leaders

(adapted from Dimmock, 2014, p. 1)

Dimmock (2014, p. 3) argues that RESs provide a way to leverage the mobilisation of knowledge across the school system, and they do so by: facilitating research-engaged teachers and leaders; creating schools and networks as research-engaged Professional Learning Communities (PLCs) and using a methodology that enables research to be scaled up, while being tailored to context.

We can map the five features of RESs and Dimmock's 'linchpin' concept onto three overlapping dimensions at the meso-level of the ecosystem of research-informed practice (see Table 1.1 below).

Table 1.1 Key characteristics of research-engaged schools mapped onto the mesosystem of research-informed practice in schools (from Godfrey, 2016b, p. 53)

Features of research-engaged schools (Handscomb and MacBeath, 2003b; Sharp *et al.*, 2005; Wilkins, 2011)	Human and organisational infrastructure for research-engaged schools (Dimmock, 2014)	Mesosystem dimensions of research-informed practice
1) Promotes practitioner research among its staff		
2) Encourages its staff to access, read, use and engage critically with published research	Research-engaged teachers and leaders	Research-informed professional practice
3) Uses research to inform its decision-making at every level	Use of design-research-development	The school as a learning organisation
4) Welcomes being the subject of research by outside organisations		
5) Has "an outward looking orientation"	Schools and networks as PLCs	Connectivity to the wider system

Interplay between enquiry, leadership and professional development

Building on the first dimension above, we prefer to use *research-informed practice* over Dimmock's 'research-engaged teachers and leaders'. By doing so we focus on two concerns:

i) The need to encompass the practices of a wider range of professionals - other than teachers - that work in and with schools and that have a direct effect on learners, such as teaching assistants (TAs) and other support staff. Chapter seven, for instance, looks at the important role of 'knowledge brokers' in enhancing the use of data use in schools. In this book, we have generally excluded the role of 'non-professionals' such as parents and pupils from our analysis, although these groups can

potentially play an important part in the process of enquiry and school transformation (Rubin and Jones, 2007). There is likely to be further scope to investigate the role of wider groups of stakeholders in a research-informed ecosystem beyond this volume.

ii) The need to see leadership alongside professional practice – sometimes as a 'separate' practice and sometimes as integral to the idea of the professional endeavour. Thus, there is an important role of formal leadership in establishing, maintaining and building research engagement in schools (e.g. Brown, 2015 and Sharp *et al.*, 2006b). However, a broader view of leadership also takes into account a distributed model, including how teacher leadership can be enhanced through engagement with research (e.g. Frost, 2000). Thus, it is not always possible to separate out membership of 'leaders' from the work of practitioners.

There is compelling case for enabling research engagement as a core element of all staff development programmes. Indeed some have seen this in terms of a fundamental professional expectation and right:

"All teachers should have an entitlement to research training in order to develop their role as critical users of research … All schools and colleges should have an entitlement, and perhaps a responsibility, to participate in a relevant research partnership for appropriate periods" (Dyson, 2001:4).

More recently such an entitlement has been seen as a fundamental feature within the context of the self-improving school system. Thus the BERA-RSA Inquiry into the Role of research in Teacher Education made the case for the development of self-improving education systems in which all teachers become research literate and many have frequent opportunities for engagement in research and enquiry (Furlong 2014).

Sachs (2011) reflects the views of many that sadly much CPD does not enable teachers to be "researchers of their own and their peer's practice" and thus contribute to increased understanding and transformation of practice. To redress this she calls for a range of learning opportunities "supported by school cultures of inquiry and be evidenced-based, where evidence is collected and evaluated" (Sachs, 2011:163). This appeal resonates with a British Education Research Association's call for 'close to practice' research, in which educational research is based on problems in practice, often involves researchers working in partnership with practitioners, may address issues defined by the latter as relevant or useful, and will support the application of critical thinking, and the use of evidence in practice[1].

There is clearly much more ground to make. On the positive side there is significantly greater awareness of the vital part the development of an inquiry outlook can have for professional learning and that a research evidenced-based culture can have for school improvement. However, such awareness has not yet resulted in the kind of momentum where inquiry becomes the bedrock of professional learning in all schools. These issues are explored more fully in this book in terms of: 'Teachers' professional bodies and the role of research' (Chapter five); Research informed Initial teacher education (Chapter eight); Professional learning and Research (Chapter nine) and Professional Enquiry: an ecological approach to developing teacher agency (Chapter ten).

Perhaps the common element in all the explorations of what a research-engaged school might comprise is agreement around the central tenet that "…research and enquiry is at the heart of the

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[1] https://www.bera.ac.uk/project/close-to-practice-research-project

school, its outlook, systems, and activity" (Handscomb and MacBeath, 2003:10). This in turn brings into sharp focus the crucial contribution of leadership to both school-based enquiry and to professional development, and indeed to the relationship between them.

The leadership role is seen as pivotal not just in terms of an authoritative "gatekeeping" function, whereby leaders permit, enable and support teachers' research engagement (Sharp and Handscomb, 2007), but also by the way in which they foster a culture of research engagement through their own outlook, values and behaviour (see also Chapter four, below). Stoll, 2015a characterises this as senior leaders developing "an enquiry habit of mind" which provides role modelling through, for instance, actively looking for a range of perspectives, consciously seeking relevant information from many diverse sources, and constantly exploring new ways to tackle recurrent problems. Indeed the relationship between leadership and research engagement can be seen to be in a mutually beneficial reciprocal relationship with professional development dividends for leaders themselves: "Research engagement provides an opportunity for school leaders to share leadership and for staff to develop their leadership skills" (Sharp, Eames, Sanders, D. and Tomlinson 2006:9).

The interplay between these ecosystem elements of enquiry, leadership and professional development is also implicitly bounded within the overall ethos of the school as a learning enterprise. Thus teachers are characterised as leaders of learning and as continually learning themselves through enquiry: "teachers see themselves increasingly as learning from their students, as well as being leaders of learning, of both their students and one other" (Durrant, 2014:54).

Enquiry, self-evaluation and accountability

For the second meso-level dimension, the school is a learning organisation in as much as it connects research knowledge, alongside other forms of knowledge, to internal school decision-making and practices. This is also complementary, when schools are seen as interconnected and outward-looking institutions, to Dimmock's (2014) point that school innovations sometimes need to be 'scaled up', for instance by using a research-design-development methodology (Bryk and Gomez, 2008). Learning organisations also need to engage in rigorous cycles of self-evaluation. Knowing thyself has never been so important. In the febrile accountability culture in England, of unannounced inspection, maintaining robust self-evaluation processes has become crucial. So there is much perceived value in being able to harness the enquiry and reflection of its staff to feed in to this.

The move from a stark over reliance on external inspection towards an emphasis on schools continuously evaluating themselves is a very welcome development that has taken many decades to gestate in England. Other schools systems have also engaged in self-evaluation to a greater or lesser degree. However, self-evaluation carries with it the risk of schools establishing their own crude overbearing internal inspection regimes: "With the imperative for self-evaluation there is a danger that managers will scurry to precipitate judgements about their schools without taking … a due regard to the evidence. This requires a set of skills that clearly sit within the realm of enquiry and research" (Handscomb and Ramsey, 2008:4). Effective self-evaluation entails taking the opportunity to grow a rich school ethos of enquiry as part of its professional learning culture. Indeed there is clearly a fertile reciprocal correspondence between these two vibrant forces of research engagement and self-evaluation, with increasing evidence that research cultures significantly enhance schools' capacity for self-evaluation and improving themselves:

"Teachers and students thrive in the kind of settings that we describe as research-rich, and research-rich schools and colleges are those that are likely to have the greatest capacity for self-evaluation and self-improvement" (Furlong, 2014:5-6).

In chapter 3, Melanie Ehren explores further the relationship between external accountability, self-evaluation and a culture of enquiry.

Only connect!

Thus, the final dimension looks at '**connectivity' to the wider system**. Here, we can analyse meso level interactions with levels above and below this level, as well as laterally. 'Connections' can be seen as an inclusive term to look at 'collaborations' as well as other kinds of interactions, forms of communication, spreading of ideas and knowledge, and so on. Chapter 2, for instance, examines a knowledge network in Canada.

Godfrey (2016a:67) states that in order for teachers to become "research literate, enquiring professionals" they need to be "supported in developing the skills of research through in-house and externally supported expertise." This raises the significant contribution of collaboration within and beyond the school. The forming of research communities was seen as an integral part of the research-engaged school. It has perhaps gained increased profile with the dawn of new forms of school organisation and the proliferation of alliances, trusts, and other school improvement collaboratives:

"In England, increasingly, evidence-based teacher enquiry and joint practice development between schools are perceived by teaching school alliances as impetus for CPD and part of the mainstream school-to-school improvement" (Handscomb, Gu and Varley, 2014).

Often school-university partnerships play an important part in effective research and professional learning collaboration. This can take the form of teacher research coordinators operating across and between schools and universities (McLaughlin & Black-Hawkins, 2006), or the role of "the 'blended professionals' who work across institutional boundaries (HEA, 2012). Such partnerships are not always smooth sailing because of the cultural differences between schools and universities (see the "Mind the gap" critique in Handscomb et al, 2014). However, much of the literature on successful research partnerships points to a common set of conditions which include "the importance of shared leadership, shared goals, development of social and intellectual skills needed for collaborative work, and adequate time" (Arhar et al, 2013:627). Chapter 6 outlines two research projects that have utilised university-school collaborations to inject published research into school practitioners' thinking in order to lead to improvements at the whole school (and to an extent network) level. Such initiatives require skill and time to foster, develop and embed but have provided both sides with highly satisfying experiences of collaborative work that spans research and school practice.

Perhaps one of the biggest challenges is how to foster and ultilise the potential of collaboration between schools. The educational landscape has changed dramatically to that which would have been unrecognisable at the turn of the century: "The pattern of education in England is shifting. Schools that once were islands are becoming connected. Indeed, it is increasingly rare to find outstanding schools that do not have a web of links with other schools. Competition remains, but now co-exists with collaboration and the creation of formal alliances through federations and chains" (Matthews, Higham, Stoll, Brennan and Riley, 2011:5). Such an environment has been uniquely termed 'coopetition' (Muijs and Rumyantseva, 2014). Many other countries will find this a familiar picture. Within this collaborative environment the imperative is to draw upon the expertise that resides within the self-improving school system, "to learn from each other, within and between

schools, to tap into the professional expertise that lies latent in the system, and to learn from what works!" (Handscomb, 2012:3). However, this is no easy task because the sharing of knowledge to bring about genuine "transfer" of practice from one setting to another has always been difficult and highly problematic (Hargreaves, 1998). It is here that professional development grounded in enquiry can make a significant contribution.

For this to happen there needs to be a shift in perspective in both policy and practice which sees enquiry not just as a desirable add on but as a fundamental part of the how we develop educational professionals. When considering schools as ecosystems we need to envisage the forces of collaboration, enquiry and professional learning in dynamic interplay within an intimate relationship: "For teacher development…to occur commitment to certain kinds of collaboration is centrally important. However, collaboration without reflection and enquiry is little more than working collegially. For collaboration to influence personal growth and development it has to be premised upon enquiry and sharing" (Harris, 2002:58). There is much to do to explore what this would look like in practice within collaborative research settings and a range of initiatives have begun to do this (Brown, 2017; Stoll, 2015b). It will entail asking searching questions about not only what effective research engagement across an alliance looks like but also what does being part of an alliance bring to enhance the capacity of a school to be research engaged.

An ecosystem for research-engaged schools: theoretical and conceptual issues

This section addresses some of the potential conceptual issues that relate to the ecosystem of research-engaged schools. These include: the nature of research and evidence and its potential or proposed role in the ecosystem; and the theoretical and conceptual tools that can help to understand the process of maintenance and enhancement of an ecosystem. It is not meant in any sense to be the final word or an exhaustive coverage of the theme and in the last chapter we will seek to further develop ecosystems' thinking around this topic and point to further avenues of action and interest for practitioners, policy makers and researchers working in the field of school research engagement.

Schools as institutions or organisations?

Recent orthodoxy has tended to talk in terms of schools as 'organisations'. Stemming etymologically from 'organism', this can connote dynamism, growth and adaptability. Simultaneously, being 'organised' suggests the existence of well-defined structures, processes, systems and roles that enable efficient operation (effectiveness). However, referring to schools as organisations can also feed into an instrumentalist, managerial narrative that sees them as merely vehicles for delivering academic targets that we measure and control through the use of a narrow range of indicators of performance. By referring to schools as institutions we can focus on their historical, social and political antecedents, functions and roles (Glatter, 2015). As institutions, schools are less about specific buildings and the staff and students within their four walls; instead they represent something more ideas-based, including the values that they promote and their role in the formation, reproduction and development of past, present and future versions of society.

In a number of case studies of research-engaged schools (Godfrey, 2016b), schools were viewed as 'activity systems' that are both dynamic as well as containing historically and socially situated practices (Blackler, 2009). Importantly, such activity occurs as a result of, and in the context of, a specific 'object' (Engeström, 1996) through which it is teleologically defined. In other words, school education is not just for a purpose, but only makes sense when it is viewed through the lens of its specific object or aims. So, while referring to the notion of research-engaged schools, we may want to focus on schools either as organizational units or as institutions but in the former case, we need to be cautious in not taken as a given the notion of 'effectiveness', since this can only be studied empirically once the goals of these practices are made explicit. In other words, we need to ask: 'effective for what, for whom and to what end?'.

Understanding the chronosystem

In the case studies mentioned above, the historical reasons and conditions that mediate a school's trajectory towards a culture of research engagement are explained (Godfrey, 2016b), see figure 1.1 below. Through the accounts of staff at eight secondary schools in England, the extent of each school's research engagement was examined in surveys and then explored in detailed interviews. Four developmental stages were identified in the surveys, from schools that were *emerging*, *establishing*, *established and embedded*.

This analysis shows an expansive spiral of development in research engagement at the case study schools. As the school leadership introduced research, this had tightly constrained improvement aims, in some cases aligned with the school's external inspection reports and self-evaluation. Despite this instrumental focus for the research, the professional learning environment improved; building collaboration and trust and in turn enabling more research activity to take place. This new activity started to generate a new language through which school practices were understood. In the

more established research-engaged schools, this new language of research became a part of daily school life. This led to the demand for new structures and processes through which to work in a collaborative and enquiry mode and to learn from research and development activities. This in turn expanded professional learning, sometimes across subject teams and transgressing hierarchy, as teachers led initiatives at whole school level. Schools with embedded cultures of research were often able to call readily on external and internal expertise, generating new and enhanced research activity. These research-engaged schools became learning organisations that encompassed staff, students and other stakeholders in the community. They were able to set their own success criteria and to engage in ongoing cycles of evaluation to test how well they had met them. Furthermore, the enquiry stance taken by staff also led to reflection and learning and the renewal of their educational aims.

This spiral of development and expansive learning illustrates the way that new characteristics of the professional learning environment were afforded through the introduction of research-related activities and structures. However, the converse was also true, that the nature and extent of the research depended on the characteristics of the school as a PLC. This reciprocal relationship illustrates the kind of analysis needed to research ecosystems.
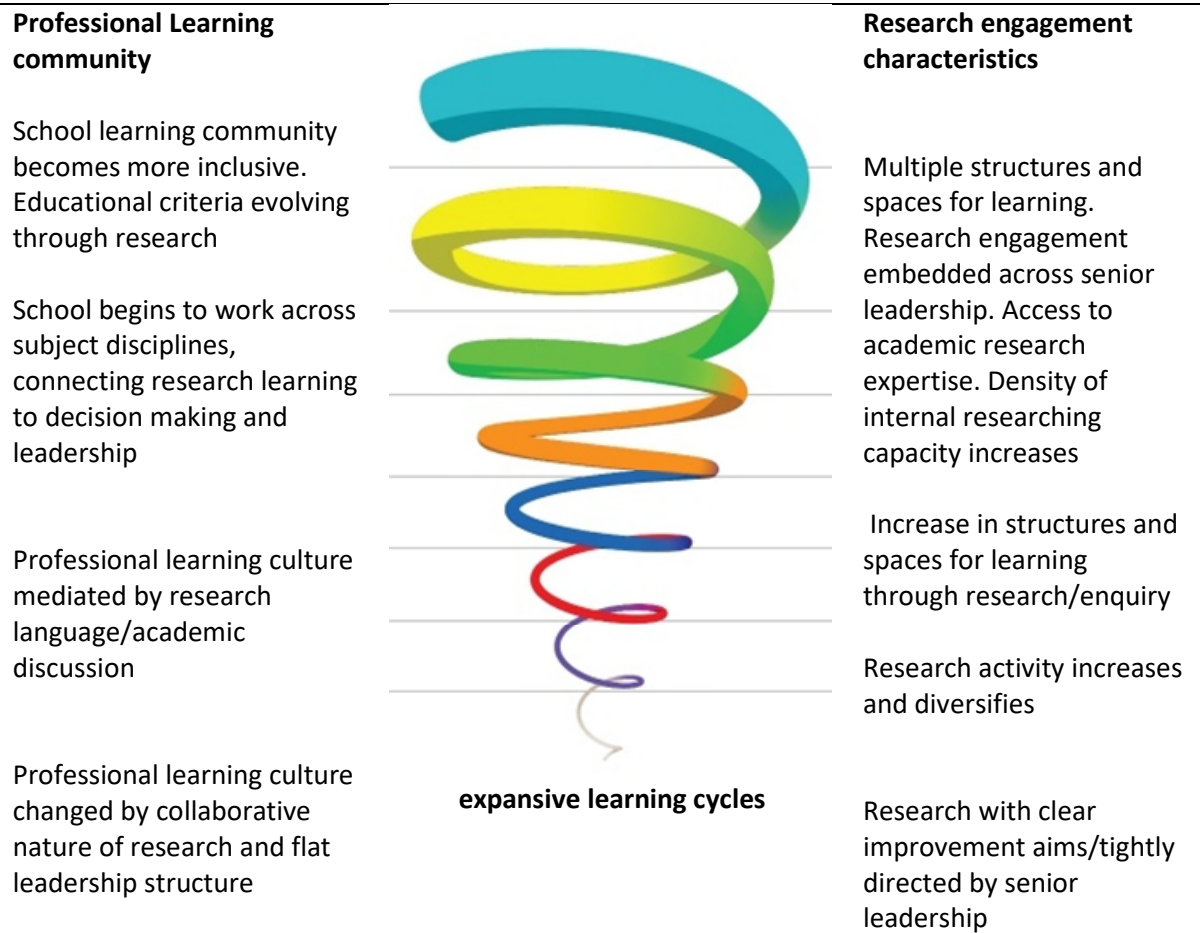
Professional Learning community

School learning community becomes more inclusive. Educational criteria evolving through research

School begins to work across subject disciplines, connecting research learning to decision making and leadership

Professional learning culture mediated by research language/academic discussion

Professional learning culture changed by collaborative nature of research and flat leadership structure

Research engagement characteristics

Multiple structures and spaces for learning. Research engagement embedded across senior leadership. Access to academic research expertise. Density of internal researching capacity increases

Increase in structures and spaces for learning through research/enquiry

Research activity increases and diversifies

expansive learning cycles

Research with clear improvement aims/tightly directed by senior leadership

Figure 1.1 Developmental trajectory of a research-engaged school (Adapted from p. 282, Godfrey, 2016b)

Hostile and nourishing ecological conditions for research-engaged schools

While the above analysis gives a representation of the development of research engaged cultures in case study schools, we should be cautious in presenting this as a predictive model of what would occur in any other school or school system. Indeed, with the quickly changing context of the English school system, such a trajectory cannot be taken for granted as it depends very much on the will, and ability of school leaders to strive towards this aim. Outside of England, the outcome is also likely to vary according to different times, contexts, people or school structures. Nevertheless, the study of the ecological conditions can help us test and build theories about particular types of ecosystems; in particular an ecosystem that affords research engagement and enquiry approaches to learning and improvement.

Such conditions are explored in the professional learning of teachers through enquiry in chapter 10, where the concept of ecological agency is explored; here, agency is viewed as an emergent phenomenon that is achieved rather than as something that people have. In line with ideas about distributed intelligence, the point is made that the resources available in the environment (such as concepts or tools from research) "*are loaded with intelligence which enhances our action*" (Edwards, 2007, p. 4). Edwards also emphasises that such agency occurs when the context allows for it, and this can occur in both formal and informal settings. Priestley and Drew's chapter also gives us a methodology for the study of this agency.

Applying this thinking to the macro context of English schools, we argue that there are a number of ecological conditions that encourage research-informed practice, while others act antagonistically towards this aim (Godfrey and Brown, 2018). This study looked at the capacity of schools to engage in research and development, the extent to which impact is being measured and the alignment between the external accountability environment and the aim to self-evaluate and learn through research and enquiry. On the plus side there was evidence of plentiful discussion, collaboration and will to engage in and with academic research, and increasing understanding of how to engage in research activity to improve school practices. However, it was also concluded that an effective ecosystem at present is hindered by a number of structures, cultures and incentives that bridge the research–practice divide, and by accountability arrangements that lead to defensive responses from schools rather than leading to genuine learning through enquiry and self-evaluation.

Exploring further theoretical and methodological approaches, Brown, in chapter 11, introduces the concepts of Optimal Rationality and Optimal Rational Positions in the context of a research-engaged school in England. His chapter examines why research-informed practice does or does not occur in schools based on a semiotic analysis of how teachers interpret and respond to signals in their environment, such as the current 'push' for research-informed practice.

What kind of research engagement?

Elsewhere, one of us has argued, through an analysis of English policy, that the emphasis on evidence-based policy and practice in schools may hide a narrative that disempowers and de-professionalises teachers and school leaders (Godfrey, 2017). A 'what works' model of evidence supports the idea of a hierarchy of knowledge and is in danger of downplaying the role of teacher professional judgement, and of favouring research that is proven to increase academic attainment on standardised tests. In Chapter 12, Wisby and Whitty argue for a broad and inclusive model of research-to-practice and to remain vigilant against creating an ecosystem that narrows and prohibits the use of certain kinds of research and professionally created knowledge.

After such an ambitious undertaking, we then draw together some of the key learning in Chapter thirteen in order to stimulate further discussion about how policy makers, school practitioners, academics and other stakeholders can work together to create a healthy and sustainable research-engaged school system. We also offer an expanded conceptual framework of such an ecosystem and finally, point to some potential further lines of enquiry.

Conclusions

In this chapter we have outlined our conception of the ecosystem of schools based on Bronfenbrenner's ecological model. We have applied this specifically to describe the elements of a research-engaged school mesosystem and some of the ecological conditions that enable such a system to survive, grow and flourish. Following this, we have raised some potential theoretical approaches and issues in the study of this ecosystem. Finally we have cautioned that the nature of such an ecosystem must be made explicit so that the proposed relationship between research and practice is not disempowering for practitioners in particular.

In the chapters that follow, several distinguished authors working from their different perspectives have added their thinking, their evidence and some of their solutions to create an effective research-informed school ecosystem. We hope that you the reader will gain a sense of how a well-nurtured ecosystem could exceed the sum total of its elements.

Implications for the research informed ecosystem

- We can frame the school ecosystem according to the macrosystem, exosystem, mesosystem, microsystem and the chronosystem.

- A research-engaged school is a multi-faceted concept, promoting research-informed practice, schools as learning organizations and connectivity to the wider system.

- Ecosystems often require 'non-linear' forms of analysis and research to account for the richness and complexity of inter-connected elements.

Chapter outline of this book

While all chapters make reference to the various inter-connections in the whole ecosystem, they move generally from upper to lower levels of the ecosystem, starting at the exosystem and working down towards the meso and microsystems of schooling. Thus, we look at a knowledge network for schools in Canada (Chapter two) and then the accountability systems surrounding the schools (Chapter three). This is followed by examining leadership at every level of research-engaged schools (Chapter four) and then by the role that is and could be played by teacher professional bodies in their growth and sustainability (Chapter five). In Chapter six, we outline two innovative approaches to school collaboration, based on shared principles for bringing research knowledge to bear in school improvement alongside other sources of enquiry and information. Moving more clearly to examining the mesosystem, we then look at how schools can increase their ability to make data-informed improvements to practice with the aid of data brokerage (Chapter seven). Then follow four chapters that are more closely focused on the practice of teachers (the microsystem). We start this by looking at pre-service professional education (Chapter eight), then in-service professional learning and research (Chapter nine), a case of teachers learning through professional enquiry (Chapter ten) and then by looking at the decision-making processes of teachers through the lens of optimal rationality

(Chapter eleven). In the penultimate chapter (Chapter twelve) the values dimension in research-practice ecosystem is examined, in particular the need to maintain openness to a range of research methodologies, an inclusive research focus and towards a principled agenda. Finally Chapter thirteen synthesises the learning of the chapters in the body of the book, integrates them into the ecosystems literature and suggests a new conceptual framework for the ecosystem of research-engaged schools.

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