Bridging the Knowledge Gap:
School – University Knowledge Exchange Schemes

Authors: Sigurðardottir, A.K., Morris, A., Skoglund, P. and Tudjman, T.

The purpose of this paper is to throw light on sustained research-practice collaborations (called 'schemes' here) aimed at improving educational outcomes. The empirical work combines a survey of thirteen school-university knowledge-exchange schemes in six European countries with four case studies drawn from these. Three theoretical models of knowledge-use are employed to aid analysis of these cases. It is suggested that a judicious mix of the three perspectives helps in understanding what makes such collaborations successful. Stages in the cyclical process of improving practice through use of research are described, beginning with frank analysis of pre-existing ways of thinking and culminating in the challenge of altering established practice.

Keywords: evidence based; knowledge sharing; school improvement

Introduction

Few people will doubt the need to use science to improve the results of educational practice wherever possible. There seems to be a widespread consensus about two elements. One is that educational practice, in order to be efficient and effective, can and should be informed by results from research. The other is that educational theory and research, in order to be valorised, can and should be informed by everyday educational practice. Despite this consensus, it is not common practice yet that educational practice and science inform each other in such a way that they gain from each other, despite considerable effort and the notable progress made in recent years, (i.e.Hannan, Enright & Ballard, 1998; Nutley, Walter & Davies, 2003; Rohrbach, Ringwalt, Ennett & Vincus, 2005; Dagenais, Lysenko, Abrami, Bernard, Ramde & Janosz, 2012). Despite an increasing mobilisation of researchers and research-funding agencies, the literature on research use continues to yield little evidence on the processes involved, and even less on the effects of efforts to promote their use (Davies, Nutley & Walter, 2005; Estabrooks, 2007; Mitton, Adair, McKenzie, Patten & Perry, 2007; Nutley, Walter & Davies, 2007). We argue that there is a need to look at new ways of circulating knowledge through learning networks and cooperative knowledge production processes. School-University partnerships are an important arena for this.

School-University Knowledge Exchange Schemes (SUKES) is a project that was set up by an international group of educational researchers and consultants in 2012 to investigate whether and how the recent policy emphasis on evidence-based practice was reflected in active knowledge exchange partnerships between researchers and practitioners. Our interest in this study is in forms of collaboration between researchers working in universities and practitioners in schools. The focus is on structured arrangements planned on a longer term basis than short life projects. We call these "schemes" to distinguish them from *ad hoc* relationships that sometimes grow up between schools and universities around, for example, teacher training.

The term "exchange" is used to indicate that the association between the parties is two-way. Our focus is on arrangements in which both parties have things to offer each other and both are treated on equal terms. Thus a lecture series delivered to teachers by university staff, for example, is not included. The term "knowledge" is used to indicate that it is not anecdotal experience or points of views that are exchanged but observations, findings, concepts and theories which may derive from research, scholarship or reflections on experience.

The aims of this paper are firstly to shed a light on different knowledge exchange schemes, their forms, theoretical background and characteristics, and then to come up with an integrated model of knowledge exchange partnership; secondly to suggest a conceptual model of the context and process of change in which knowledge exchange is a part. The analysis is based on a review of four different schemes that are active in four countries. The results are discussed in the light of a theoretical perspective with a focus on theory of change - meaning the kind of thinking and strategies actors build up in order to improve their systems' performance and outcomes.

This information will be used to identify implications for the policy and practice of evidence use, and to indicate areas that still need to be addressed in the study of evidence use per se.

Theories of change

Late in the 20th century Tyack and Cuban (1995) were two of many that pointed out that most educational reform efforts so far had resulted in little change over the longer term. Once the extra efforts to implement the reform have been removed the improvements stopped or even went back to the position beforehand. Accordingly, changes that lead to sustainable, long

lasting improvements are highlighted below, drawn from the current literature. Capacity building, inquiry orientated practice and data-driven decisions are considered as central themes of educational improvement (Fullan, 2007; Hargreaves and Shirley, 2013; Stoll & Louis, 2007). This is, for example, reflected in theories about the school as a learning community (Senge, 2000: Sigurdardottir, 2010; Stoll & Louis, 2007) emphasising collaborative inquiry into daily practice with the help of data about student performance. The fundamental goal is to improve the school at the same time as the teachers´ professional knowledge and skills are enhanced. The focus in studies in school and system improvements has moved from understanding the culture of each school towards building capacity for learning and systemic improvement (Hopkins, Stringfield, Harris, Stoll and Mackay, 2014). In systemic improvements the complexity of the educational system is emphasised as well as interdependency of different components. Improvement efforts need therefore to focus on different levels of the system; classroom, school, municipality and/or national level. Changes in one level inevitable affect the next level. In successful improvement processes, the focus must be on the whole system rather than small parts of it.

After studying the top school systems in the world, Hargreaves and Shirley (2013) suggested data should be used to inform teachers' inquiry and decision-making rather than for control. Teachers should engage collaboratively in developing the curriculum rather than delivering it. It is about collective responsibility rather than vertical accountability.

The process of using evidence to improve practice

It is widely acknowledged that effective educational practice should be informed by evidence and, similarly, theories should be informed by practice (i.e. Cooper, Levin & Campbell, 2009). Systematic use of data or evidence can lead to sustainable improvements in student learning and achievement (Schildkamp, Ehrena & Kuin Lai, 2012) There are however, different perspectives on how this happens. The process of using data or evidences for educational improvement is far from being straightforward, assuming that practitioners follow the guidance offered by data or evidence in taking decisions, as Spillane (2012) points out. Using data does not necessarily lead to better practice; it depends on how it is used and whether it is appropriate for the context. The data must be interpreted by the users for their own context (Cordingley, 2008). In line with that, Steiner-Khamsi (2013) criticises the "what-went-right" approach, when universal claims are made based on standardised international comparison without considering local and cultural conditions. These will run the risk of making false

claims about "best practice", especially if it transfers between contexts without regard for differences. A particular practice might be the best one in one context but not in another. Though there may be a wish by practitioners on the ground and educational authorities for evidence that provides solid answers to clear-cut problems, rarely does this prove possible. Problems may not be so clear-cut in reality and knowledge derived from studies tends to be conditional, hedged around with caveats. There is an inherent uncertainty in much knowledge, even when gained through research (e.g. Kuhn, 1962). Evidence may suggest directions, help us to understand what we are doing and what problems should be addressed, or warn that some present practices are ill advised. But it does not determine in which direction to go, and cannot in that sense be a ground on which the policy is based (Jónasson, 2015).

Conceptual model of bridging the knowing - doing gap

A number of new approaches to practitioner use of research evidence have evolved in recent times, including knowledge mobilisation, research-to-action, knowledge translation, evidence-based or evidence-informed policy and practice and knowledge-based practice (Graham et al, 2006; McKibbon et al, 2010). A condition that appears to be a powerful predictor of use is direct contact between researchers and practitioners (Ball, 2012). However, how this might work in reality is unclear. In this section we look to conceptual models to promote collaboration in evidence use through productive contact between researchers and users.

Regarding approaches for addressing the knowing-doing gap in education, Broekkamp & van Hout-Walters (2007) identify various models including the Evidence-Based Practice Model; the Research Development Diffusion Model, and the Knowledge Communities Model. These three models reflect different perspectives regarding the research-practice gap and working assumptions for how the gap can be addressed.

The Evidence-Based Practice Model primarily values empirical evidence obtained through randomised control trials or matched study designs. Mediators play a central role in translating findings from research into effective practice, reviewing published educational practices and interventions to determine what is effective or "what works" in education. Practitioners may then make informed decisions about educational provision and choose interventions and methods that have been proven to be effective.

The Research Development Diffusion Model reflects a hierarchy of knowledge production that can lead to improved practice. Practice-oriented researchers draw on theories and decontextualized research, valuing diverse research outcomes such as conceptual frameworks, descriptive reports and learning tasks. Mediators are the key integral link between research and practice. The function of mediators is to translate research into reports, policies, teaching materials and professional development programmes for practitioners.

In *The Knowledge Communities Model*, traditional roles are maintained as a diverse group of actors are mutually engaged in a partnership of knowledge exchange, as they work collaboratively to address an educational issue. This model therefore emphasises collaboration and partnership.

Method

The study reported here took place in two stages. The first stage of the project was an online survey of various schemes across EU countries. For the survey, a request for information about knowledge exchange schemes involving schools and universities was sent to the approximately 40 international partners of the EIPPEE project in 2012. The sample was entirely opportunistic, simply reflecting the willingness of partners to respond. It does not represent the prevalence of such schemes in particular countries. Contact was made by email with those suggested and, of these, thirteen completed the online questionnaire. The survey, developed by the SUKES team, included questions about which parties were involved, how it was funded, what kinds of knowledge were exchanged, as well as perceptions of success factors, difficulties encountered and impact made. Details of the schemes were obtained and analysed, and the findings documented.

The second stage involved reviewing four cases out of the thirteen cases that were found by the survey. They were also chosen opportunistically, though they are entirely different from one another in design, funding, mode of operation, theoretical approach and fortuitously, demonstrate something of the great diversity of approaches. They are also based on schemes in which the four authors of this paper are involved. The four cases were analysed and conceptualised with regard to Broekkamp & van Hout-Wolters (2007) models.

Results

The results are presented in two sections; first the results of the online survey and then descriptions of the four cases.

Examples of schemes – survey results

Thirteen schemes in six European countries, Belgium, Germany Iceland, Netherlands, Sweden and the UK, were identified in the first phase of the project, as shown in Table 1.

Just as there is great variety in the type of scheme so there is variety in the circumstance of each one. The case studies show that the same practice applied in different contexts can produce different results. They indicate that the impact of school-university collaboration depends on the precise conditions locally and the quality of relationships between the collaborating parties. A key factor is whether the practice problem has been clearly identified and the particular need for knowledge to help address it has been clarified.

Table 1 A list of schemes, country, institution and the focus

Country	Institution	Name of Scheme	Focus of Scheme
Iceland	School of Education, University of Iceland	Menntamidja

Education Plaza | A framework for forums for research and development projects across different sectors and educational issues |
| UK | Institute for Effective Education, University of York | The Yorkshire Informed Practice Initiative (YIPI) | A school engagement process for selecting and implementing evidence-based programmes |
| UK | Coventry City Council and CfBT Education | The CfBT/Coventry Anti Bullying Project | Tackling bullying in Coventry schools |
| Netherlands | RISBO Research, Training & Consultancy Agency, Erasmus University,

Rotterdam | Rotterdam Talent Knowledge Network | Building a community of local educational expertise that supports policy development and educational practice in Rotterdam |
| Sweden | National Agency for Special Needs Education and Schools (SPSM) in Sweden, & Borås University College, | Essunga Municipal School: Inclusion and goal attainment | Use of research evidence to create a culture of inclusion in the poorest goal attaining municipality |

Sweden	12 municipalities and their schools, supported by National Agency for Special Needs Education and Schools (SPSM), other national Education Agencies and the university College of Malmö	Creating Inclusive Learning Environments	Creating more inclusive learning environments, using research as an impetus for change and for creating new knowledge through the project
Belgium	Vrije University, Brussels	CLiL Multilingual education	Multi-lingual education
UK	Aston University, Birmingham	How Language Works	Promoting learners' facility with subject-specific language to raise attainment in secondary schools
Germany	Ulm University	Scientific knowledge about effective learning	Identifying factors associated with effective learning through empirical research
UK	Teacher Development Trust, London	National Teacher Enquiry Network	A membership network providing support and resources to teachers
Germany	ZNL Transfer Centre of Neuroscience and Learning, Ulm University and the Sachsisches Bildungsinstitut, Radebeul University	Focus Kind	Development of teaching approaches based on lessons learned and their implementation in practice
Germany	Ulm University	EMIL-Learning emotion regulation	Cognitive neuroscientific research on learning
UK	Centre for the Use of Research Evidence in Education (CUREE), Coventry	Route Maps	Interactive Route maps providing evidence about effective teaching strategies

The results of the survey were reported in the 2012 EIPPEE conference held in Frankfurt (Morris et al, 2012). In summary they showed that:

- There is great variety in the mechanism of collaboration across the schemes
- Leadership of activities within knowledge exchange schemes varies: some are research-led, others school-led and others essentially a form of training
- Independent brokers play an important role in helping to link experiential with scientific knowledge
- Success factors relate to various aspects of a scheme, for example: key individuals involved, pre-existing cultures and suitability of systems in place in the schools and universities
- Key challenges in many cases include: coordinating activity and using knowledge in practice

- Benefits are identified by scheme leaders for both pupils, participants and the wider community

A review of four cases

The four case studies provide realistic pictures of actual knowledge exchange schemes as they were working in four European countries in 2013 - 2015. The detail they provide adds to the more general observations based on the survey of thirteen schemes described above. In this section we offer a set of perspectives on important themes that transcend the specifics of any one scheme. Each section covers an overview, main activities and findings, theoretical background of the scheme and issues for future development.

The Essunga in Sweden transformation

Essunga municipality with 5,500 citizens is located 50 miles from Gothenburg, Sweden. The educational level is low, many young people are supported by the local social work service and some young refugees without parents have been sent to Essunga to stay with support families. There are three primary schools and one secondary school serving all learners in the municipality. The 2007 results, when only 76% of the learners were eligible for upper secondary national programmes, were described as 'a cold shower' for the school.

In the academic year 2006–2007, about 20% of learners in grades 6–9 had been placed in special education groups and other segregated support units. There was recognition that special groups were taking a lot of resources yet, despite this, learners were not achieving the expected grades. It was also evident that learners sent to the special groups - even if a placement was only intended to be short term - did not return to regular class but remained 'excluded' with the consequent low expectations and stigmatisation.

In 2007, all learners (in grades 6-9) were sent back to their regular classes. The fundamental change was institutionalized by:

- Closing down the segregated special education groups that existed in the school.
- Professionals who worked with the special education groups followed the learners into the mainstream classrooms
- The realisation that the classroom is the school's most important arena and that each learner's success is the responsibility of the school.

- Individual adaptations became an everyday occurrence for all learners. Inclusion strengthened both learners and teachers, both regarding knowledge and social development.

Early in the change process, the Education Board decided that all work should emanate from current research evidence. Literature was summarised and given to all staff, from the preschool teachers to the staff at adult education and the content was discussed and connected to the teachers' own knowledge and experiences.

Inclusion, a focus on knowledge and responding to individuals, led to better results for the learners. In 2010, the school reached the Education Board's goal that all learners should pass all subjects (see also Persson, 2012; Persson & Persson 2012; Skoglund, 2013).

The theoretical essence of the case is that in order to change toward better and sustainable outcomes it seems crucial that:

- Leadership (politicians and managers) get involved in seeing and understanding "how it really is".
- Principals and supporting functions (e.g. special needs pedagogues) join in a search for understanding the challenges of the school e.g. by relating to an external counselling partner and current knowledge and finding a practical way to involve all professionals in a common reflective process.
- Teachers are supported by researchers, principals and special needs pedagogues to try to better recognize, understand and support each pupil, together with colleagues in those areas where the greatest difficulties are recognized.
- All parties get involved in a search for a joint approach to development of the local school within the local community.

In sum, it seems to be a theoretical challenge to both traditional "top-down" change and "bottom-up" change. Rather, as Argyris (1991) and Schein (1993) have shown is it about "how to help smart people to learn". Smart in this case means those in charge: politicians, managers, principals and teachers.

In order to further develop this learning it seems to be crucial to emphasise that the general motor of development of practice and research is the willingness, the awareness and the ability to question.

Education Plaza in Iceland

Education Plaza (EP) is an open, virtual, collaborative venue in Iceland that is intended to increase collaboration/interaction between actors in the educational community and facilitate cooperation in school development. It started in 2012 and is built on grassroots projects that have emerged in connection with other similar projects. Different plazas or portals around certain areas of education are the basic units of EP and there the core activities take place (see Figure 1).
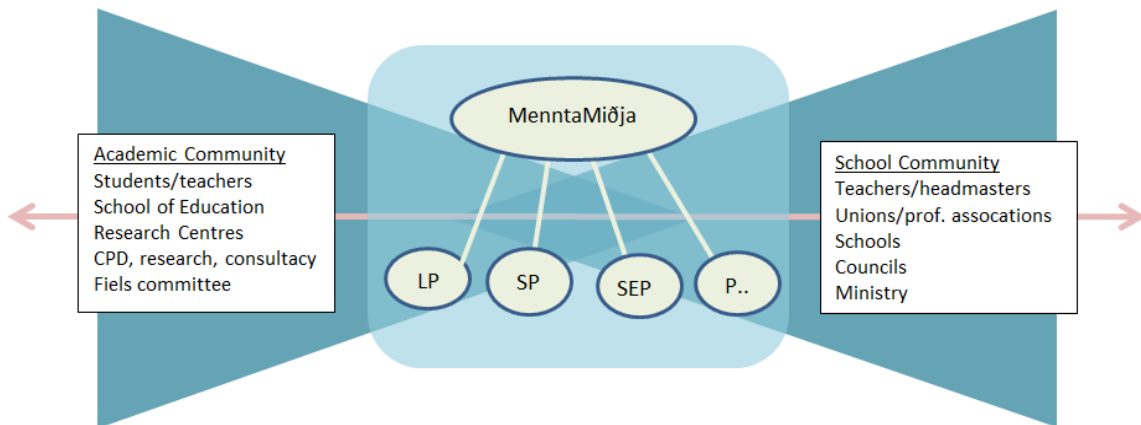

Figure 1: An illustration of the structure of MenntaMiðja (EducationPlaza), a collaborative virtual venue.

The role of the EP is to provide a framework for the various activities within the plazas. EP facilitates and develops channels of communication for sharing information and consulting on research and school development projects. EP also aims to connect the various activities and functions of actors in the school and academic communities through new and existing communities of practice and other collaborative efforts. The EP (the coordination part) has a small budget and is, to some extent, based on voluntary community efforts. It is led by the School of Education in collaboration with the educational authorities at national and local levels, other universities and teachers' union (Jakobsdóttir et al, 2013).

After three years of operation, eight plazas are currently active under the umbrella of EP (Language Plaza, Science Plaza, Special Education Plaza, ICT Plaza, Math Plaza, Philosophy teachers' Plaza; Adults' learners Plaza and Plaza for vocational education). The plazas support teachers' professional development by providing online venues where teachers can share their ideas and interact with colleagues and a broad community of teachers and researchers in their field. All plazas are open for everyone and all of them are temporarily funded by several sources. They use Facebook groups for daily communication outside

meetings, courses, workshops and individual websites (Thayer, 2014). "Educational Camps" are arranged where teachers come together to share knowledge and "Educational chat" via Twitter every other Sunday. The Plaza also participates in international projects e.g. on flipped learning.

The Education Plaza is conceived as a community of practice based on Lave and Wenger's (1991) theory of situated learning which emphasizes the social aspects of learning that occur in groups of individuals with shared interests. These communities are dynamic, physical and virtual forums where members exchange information and experiences to facilitate the acquisition and construction of knowledge and to build various types of capital. Members in a community of practice share a common goal which can be supported with online technology. Wenger, White, and Smith (2009) claim that technology can facilitate community building and vice versa and point out that "technology for community use has become an important area of practice and one that needs to be developed and nurtured to yield its full potential" (p.4). They introduce the concept of digital habitat, referring to the part of a community's habitat which is enabled by a configuration of technologies. For a growing number of communities, a significant part, or even all, of their habitat is online.

As an open venue EP depends on the educational community being active and interested. Several questions rise concerning this kind of a structure, such as:

- How to ensure long term commitment from partners in such an informal relationship?

- How to measure results and outcomes in order to secure continuing funding for the umbrella part of the plaza?

- How is it possible to ensure professional quality in discussions and online publication without challenging partners' open access and ownership?

Three years' experience shows that many teachers welcome this kind of venue, as is obvious from their active engagement in professional discussions online. Involving the academic community has proven to be somewhat problematic. Some academics claim that the pressures of academic work hinder engagement with members of the Education Plaza and its partner plazas, as it is not valued in the University accountability system. Nevertheless, others have found ways to work with the plazas to advance and add important dimensions to their research projects. This suggests that a balance between academic obligations and community involvement is certainly achievable, and when achieved, potentially beneficial to the academic and practitioner communities.

The Knowledge Network on Talent in Rotterdam

Since 2010 a new initiative called the Knowledge Network on Talent (KWP) has operated in Rotterdam. In this network the Erasmus University and the majority of other important Rotterdam knowledge educational institutes work together with the City of Rotterdam to transfer existing knowledge and to find and create new knowledge about education that is relevant for teachers and educational professionals. Evidence-based practice is reflected in this active knowledge exchange partnership between researchers and practitioners.

The idea of the network is to have a professional, fast but loosely coupled group of people and institutes who work together in different mixtures on different subjects. The network is not highly funded or granted. It largely works on professional standards of collegiality and on the experience that everyone gains with the cooperation.

The starting point of the KWP is that the development of knowledge on the one hand and its use on the other hand, should not take place in two separate areas, but in one common area (co-creation). In other words, the knowledge network creates this common area by bringing together parties that deliver evidence for practice as well as practice-based evidence.

An important observation is that much practical knowledge is not made explicit and is therefore also not transferable knowledge. It reverses to Schön's theme of 'reflective practice'. Reflective practice is "the capacity to reflect on action so as to engage in a process of continuous learning", which, is "one of the defining characteristics of professional practice" (Schön, 1983, p.40).

Paterson and Chapman (2013) argue that reflective practice can be an important tool in practice-based professional learning settings where individuals learn from their own professional experiences, rather than from formal teaching or knowledge transfer. The question of how best to learn from experience has wider relevance however, to any organizational learning environment, in particular, people in leadership positions in education. The Knowledge Network on Talent has three types of activities:

1. <u>Networking</u>. Where (inter) national meetings are organized or attended to share and exchange educational knowledge.
2. <u>Educational Practice</u>. Where activities with educational practitionersare put into action.

3. <u>Research</u>. Where issues are explored and evaluated in line with what Rotterdam needs to know.

The main findings are divided into: outcomes for collaborators in the network and outcomes for educational policy and practice. For the network the main result is a less competitive atmosphere with closer cooperation between educational institutions and commitment of school boards. Access to knowledge on important current issues is an important benefit which is apparent in, for example, active discussions on Linkedin and Twitter. Furthermore the KWP has showed that it can get, create and transfer knowledge in a fast way, because the network always knows somebody who is an expert on a certain domain. The same argument reveals that, within the network, important new research questions are formulated and duplication of studies carried out in the Rotterdam context are avoided. The network has become a preferred supplier of knowledge for the municipality which encourages the partners to stay in the network. With their activities a broad audience is being reached.

The focus on making knowledge available for those who need it in the workplace in order to teach in an effective way and to learn more as a professional is a big challenge. The network has to overcome the gap between theory and practice by involving as as wide range of people as it can. This means also that a balance between the supply and the demand for knowledge is to be found. It also means considering ways of communicating and the language that is used in that respect. Just having a website, a newsletter, a lecture is not always the answer. A challenge for the future is to translate abstract educational concepts for implementation at a very practical level.

The network does ongoing research to gather knowledge that is needed in the context of Rotterdam schools. Also in this part of their work they try to make as many parties as possible profit from the collaboration. That means there has to be something to gain for the research partners in the network, but also for the teacher training academies and the schools. The big challenge will be to walk an innovative path, leaving behind the idea that work is done in separate areas where researchers are doing research and teachers are doing the educational process. The Knowledge Network wants to be a platform where parties deliver "evidence for practice" as well as "practice-based evidence". This last theme is still under construction within our network.

The following questions give form to the KWP's future development:

1. How can the network make sure that what it does has an impact (*effectiveness*)?

2. How does it get *knowledge* into school programs?

3. How can the KWP further *strengthen* the professional education community in Rotterdam?

York Informed Practice Initiative (YIPI)

The Institute for Effective Education (IEE) at the University of York in UK is a research centre that aims at having an impact on children's education by researching what works in teaching and learning and providing evidence on educational practice.

The Yorkshire Informed Practice Initiative (YIPI) is an example of a project led by the centre. It involves two elements. Firstly, compiling a directory of research-proven programmes and practices that can be counted on to raise outcomes; and, secondly, developing a process through which schools can use, identify, and implement such interventions in line with their own data and targets (Sharples & Sheard, 2015).

The research question was "how are evidence-based programmes and strategies best selected, introduced, implemented and sustained in schools and what are the outcomes, in terms of changes in practice and school improvement?" Three primary schools in a local authority in the North of England were invited to participate in the initiative. Case studies of the schools' engagement with research evidence were undertaken as part of progressing the schools' individual school improvement agendas. A five-stage engagement process, shown in Table 2, was used as a scaffold for each case study.

Table 2 The Engagement Process: Stages 1 – 5

Epistemic Actions	Engagement Process Stages	Focus
Questioning	**Stage 1. Setting the Scene**	Questions to consider:
Analysing	**Stage 2. Digging Deeper**	Analysing data-driven decision making. Identifying two possible foci for change
Constructing a model to identify a solution	**Stage 3. A Way Forward**	Identifying programmes and processes.
Running the model	**Stage 4. Managing Change**	Ensuring teacher autonomy and implementation fidelity. Promoting networks for teacher collaboration and teacher learning.

	Stage 5. Capturing Outcomes and Sustaining Change	
Consolidating outcomes into a new stable form of practice	**Stage 5. Capturing Outcomes and Sustaining Change**	Cycle of enquiry and review; emphasis on sustained implementation and gathering evidence of raising pupil attainment/achievement.

The Head teachers reported that engagement in the five stages of the process was very supportive and were positive about the distinct contribution of each. They considered the process to be replicable and would be keen to revisit the stages when addressing other school improvement priorities.

School leaders appreciated researchers' recognition that while teachers might be attracted to the idea of engaging with research evidence to inform policy, provision and practice, reliance on research evidence may be counter-intuitive for some teachers, and proven programmes and practices may appear incompatible with existing practices and educational philosophies.

Understanding the processes involved in schools' engagement with research evidence as a management tool for school improvement is enhanced by a theoretical framework that combines the socio-cultural concept of expansive learning (Engestrom, 1987; 1996; 1999; Engestrom & Sannino, 2010) with the concept of 'research-use' as social practice (Nutley et al 2007). Expansive learning emphasises communities of learners, transformation and creation of culture, a horizontal direction of learning and a non-hierarchical exchange of knowledge between co-learners who are equals in the learning process.

The initiative illustrated an important characteristic of expansive learning: that learning expands up and outward from a subjective perspective to a socially shared perspective, then down and inward from those socially shared perspectives to a subjective perspective where learning is shaped by prior experience, personal sense of efficacy, emotion, identity, and moral commitment.

Alongside expansive learning as an explanatory theory is the concept of 'research-use', based on the emerging evidence of a social, collective process that takes place through intricate interactions with research evidence. 'Research-use' may involve transformation rather than straightforward application (Nutley et al, 2007), where transformation may take place within the individual user or user organisation; it is influenced by individuals' interests and ideology, institutional factors, and the nature of the research information (Weiss, 1995).

The challenge now is for school leaders to maximise the potential of their school's engagement with effectiveness research. School leaders and teachers are able to identify and select proven programmes and practices that promise to make the difference to their pupils' learning outcomes. Equally, the challenge for researchers is to engage effectively with school leaders in this process.

Summarising the four cases

The results show that many different kinds of school-university knowledge exchange scheme have developed and they exist in several countries of the European Union. Some, such as Education Plaza in Reykjavik are developing online spaces for knowledge sharing amongst school and university communities. Others, such as the Talent scheme in Rotterdam, provide an ongoing forum based on a municipality, in which school practitioners, university researchers and municipal officials all participate. Some focus on a specific problem by bringing together research-based experts with people involved in school leadership, regional policy and local practice. An example is the Essunga partnership in Sweden which addresses the issue of mainstreaming pupils with special needs. In contrast, others, such as the Yorkshire YIPI scheme are developing an ongoing relationship between the university and schools, building trust and ways of working in order to tackle a variety of issues.

Discussion

The aims of this paper are firstly to shed light on different knowledge exchange schemes, their forms theoretical background and characteristics and come up with an integrated model of knowledge exchange partnership; secondly to suggest a conceptual model of the context and process of change in which knowledge exchange is a part. The three conceptual models outlined earlier are invoked in analysing the four cases just described.

The four schemes – integrated models of knowledge exchange

The four schemes share the purpose of bridging the gap between research knowledge and practice. That is the only thing they have in common as they differ extensively in other ways such as form and theoretical approach. Comparing them using the models of Broekkamp and Hout Wolters (2007) it is obvious that they also differ in the means they rely on for knowledge sharing. We will though argue that they use, or at least should use, more than one route for this.

Education Plaza (EP) is a collaborative virtual venue aiming at creating knowledge communities for reducing the knowing-doing gap. Some researchers hesitated to join in and share or discuss their results while others found ways to work with the plazas to advance and add important dimensions to their research projects. This suggests that while functioning with some success as a knowledge community model (Figure 2), the initiative would benefit from involving researchers more by incorporating more features of the research development diffusion model, and developing the role of researchers as mediators.
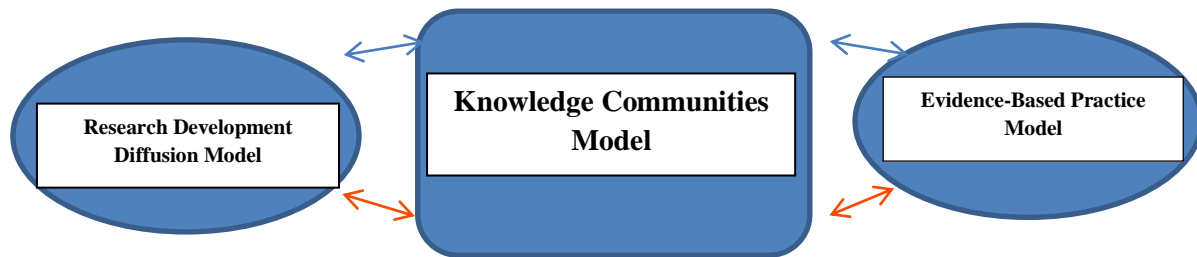

Figure 2. An integrated model to address the knowing-doing gap (Education Plaza and Essunga initiative)

In the Essunga study from Sweden, which focuses on enhancing inclusion and goal achievement through counselling and research cooperation, important work is done by questioning the existing practice and ethics, accepting "uncertainty" as the mean of developing schools. Different actors work together to search for common development of local schools within the local community. As for the EP, this provides an example of *The Knowledge Communities Model* (Figure 2). Early in the change process, literature was suggested by national counsellors, summarised by the principal and other supporting staff, and given to all staff. This, in turn, represents the *Research Development Diffusion Model*, while the role of researchers as mediators is perhaps under-developed and may be given more emphasis in supporting and challenging schools in future work.

Similarly, the Knowledge Network on Talent (KWT) is a professional, fast but loosely coupled group of people and institutes who work together in different ways on different subjects. It provides new ways of circulating knowledge through learning networks and cooperative knowledge production processes to bridge the knowing-doing gap. The knowledge network brings together parties that deliver "evidence for practice" as well as "practice-based evidence". KWT functions well as a knowledge community model for reducing the knowing-doing gap (Figure 3). However, specific collaborations between

researchers and practitioners are less pronounced – a feature of the *Research Development Diffusion Model.*

Figure 3. An integrated model to address the knowing-doing gap (Knowledge Network on Talent)

Furthermore, while the Evidence-Based Practice Model for reducing the knowing-doing gap addresses the questions of effectiveness and translating findings from effective research into practice, it is not yet reflected in the KWT initiative.

The aims of the York Informed Practice Initiative (YIPI) were to develop strategies for implementing evidence based programmes for effective school improvement. A five-stage engagement process was used to structure the collaboration in evidence use through productive contact between researchers and practitioners. The schools welcomed the researchers' provision of research evidence summaries for proven programmes and practices with potential to meet the needs identified by the individual schools and put them to practical use (Figure 4).
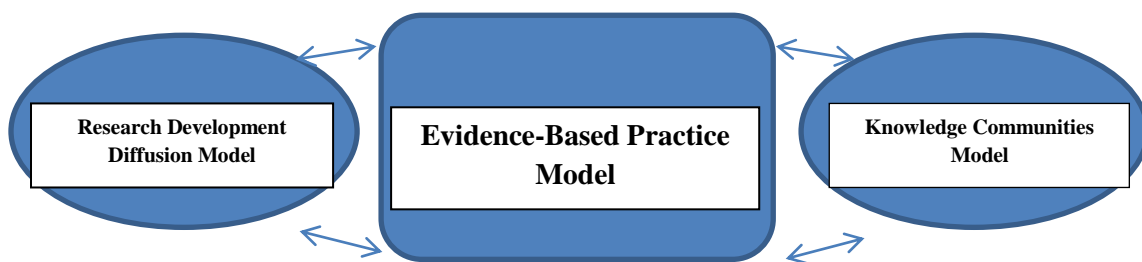

Figure 4 An integrated model to address the knowing-doing gap (YIPI)

The initiative illustrated an important characteristic of the Research Development Diffusion Model: that of expansive learning. The proposed development from this proof-of-concept study is to evaluate the process in a randomised control trial, recognising that only through the

Evidence-Based Model (Figure 4) can questions of effectiveness and translating into practice be addressed.

Applying the three models to the SUKES initiatives helps to identify their similarities and differences. Moreover, it suggests a new conceptual and pragmatic way forward for this knowledge exchange study, aimed at reducing the knowing-doing gap in education. Figures 2, 3 and 4 show how the different models can form an integrated approach to address the questions of effectiveness. Each of the three models is reflected to some extent in each of the four SUKES schemes but in each case one of them can be seen as the principal approach. These models, separately or in combination, should provide a sound theoretical framework for understanding how school-university knowledge exchange initiatives have the potential to address the knowledge gap in education.

Knowledge exchange and the development in schools

All models try to overcome the knowledge- practice gap in their own way. What we discovered was that, based on the four perspectives and the specific schemes, the *connections and relationships* between actors are a vital point for *starting* a process of change or influence. Therefore we offer a conceptualisation of the context and process of change in which knowledge exchange is a part (Figure 5). It is illustrated as a continuous process of learning, where actors continuously inquire into evidence at all levels with the ultimate goal of making change sustain over time.

Exchange, in the meaning of both connection and relation, is not a quick fix. It is not a matter of simple implementation. We argue that it is rather a complex human learning process or, even more importantly, a social process (Cooper et al, 2009) where tools such as research summaries, social media, directories and systematic reviews should be used to support socially mediated relationships and networks. Thereby the relation between school practitioners' experiences and research practitioners' research results must be understood as a complex learning and development process (Argyris, 1991; Comfort, 1994; Skoglund et al, 1996). To clarify this process we have elaborated a cycle of five situations in school development. (see figure 5). Two questions are at stake:

- at which point in school development do the school and research communities connect to each other?
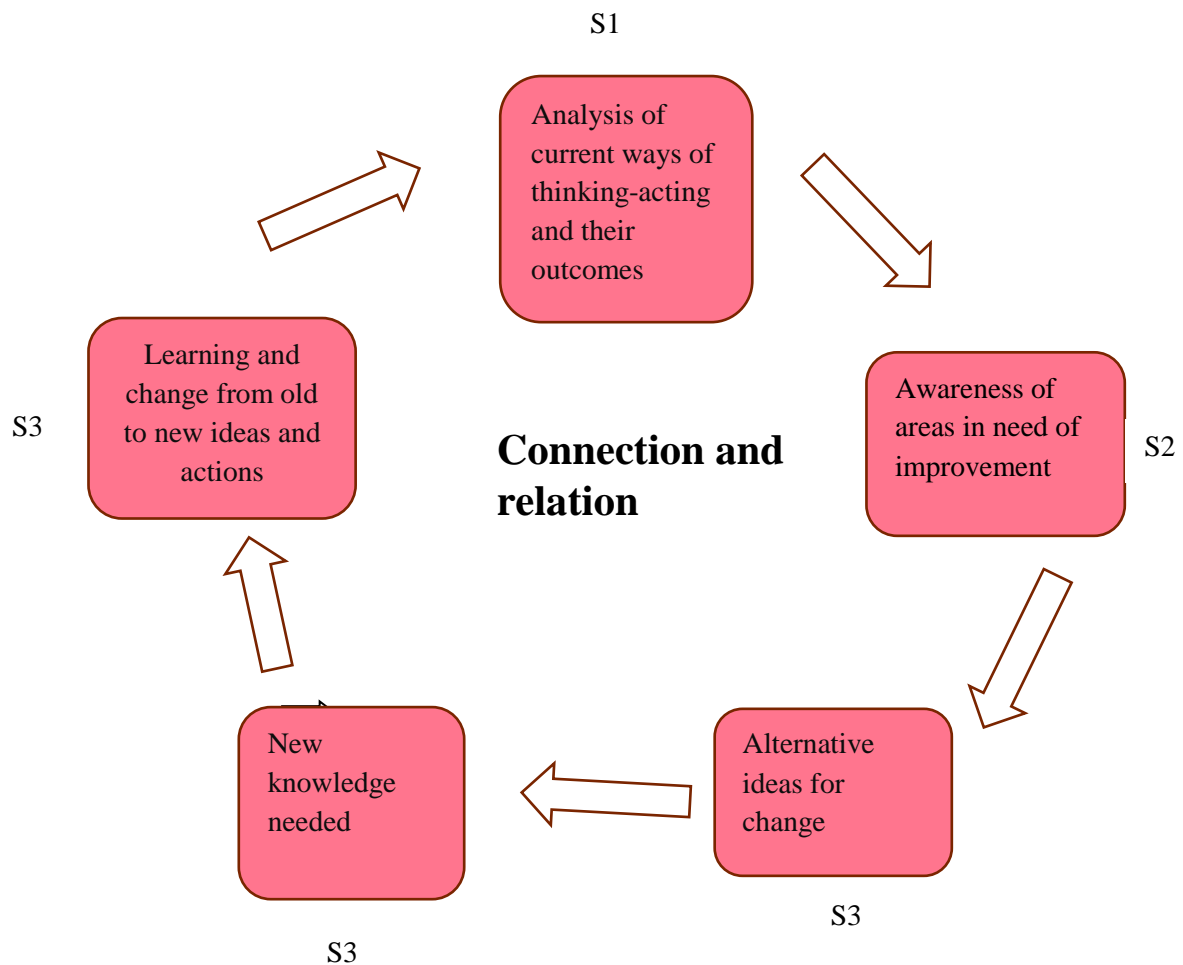
- what kind of relation is built up when they do?

S1

Analysis of current ways of thinking-acting and their outcomes

S3

Learning and change from old to new ideas and actions

Connection and relation

Awareness of areas in need of improvement

S2

New knowledge needed

Alternative ideas for change

S3

S3

Figure 5 Situations in school development: connection and relation between school practice and research

The first *Situation 1* (S1) in the model is about whether a school really does describe and analyse its current way of thinking, organising, doing and achieving (Skoglund & Stäcker, 2015). If it does not, the motivation to develop and change is probably low. Some studies have indicated that it is not enough to describe the problems, one also needs to reach a certain amount of collective awareness of the causes of the problems (Day & Leithwood, 2007; Skoglund, 2013; Höög & Johansson, 2014). In order to move to *Situation 2* (S2 - awareness), research has shown the great importance of the leadership "keeping direction in mind" (Day & Leithwood, 2007; Robinson, 2007). As in the York case, important work is done by questioning the existing practice and ethics (Engestrom & Sannino, 2010). The case of Essunga also uncovered a certain *chain of "tipping-points"* (Skoglund, 2013; 2014; Kim & Mauborgne, 2003). The first step was to accept how bad the situation was, and thereby clarify

a common understanding and certainty about the situation. Every organization facing a situation like this is however based only on its own members "earlier way" of understanding and explaining school problems. This "thought style" (Persson & Persson, 2012:78, based on Fleck, 1935/1997:34) could be labeled the blame theory, which involves blaming others: the pupils, the parents and the problems in the surrounding society with its unenlightened attitudes.

From this, ideas of alternatives may evolve to *Situation 3* (S3) which can push actors to reach out from the concrete school context, to other schools' experiences and to research and then get to *Situation 4* (S4). As in the case of Essunga in Sweden, this push came first to the inner group who asked external counsellors for help with literature and advice, based on a sincere awareness that the school did not have the "right" knowledge at that stage (Persson & Persson, 2012). Based on the certainty that most of the teachers had reached an awareness of their problem and the "urgency" to do something, the inner group related the new knowledge to the wider group. .

But the four cases outlined above also show that it is not enough just to learn from new research knowledge. The toughest challenges are in *Situation 5* (S5)*,* when one has to move from old ideas and routines to develop and internalise new ideas, concepts and routines in everyday action. The process of taking care of new ways of thinking and acting (Douglas, 1986; Persson & Persson, 2012; Persson, 2012) requires a lot of work and changes by the leadership in reorganising resources.

There is a consistency in current literature about educational change as a continous circular process aiming at building individual and institutional capacity for improvement (Hopkins et al, 2014). Examples of this are Sigurdardóttir (2010) model for learning in a professional community, further developed by Wennergren (2015) and Muijs et al (2014) and Murreys (2014) model for effective professional learning. An important message from our case studies is that uncertainty (Kuhn, 1962) needs to be distributed between all the actors: it should not just be the researchers who entertain it, teachers, leaders and officials also need to. We cannot continue with the tradition that teachers deal with fixed, codified procedures whereas academics entertain doubts, nuances and ambiguity. A major strategic problem arises with politicians who necessarily look to public opinion as well as research evidence. For them expressing uncertainty is particularly difficult. It many cases it is equally hard to persuade funders to back a project in which uncertainty is openly discussed.

The usefulness of evidence for practical purposes is not only constrained by the uncertainties inherent in it, it is also limited by its applicability. After all, evidence is simply information; it is not in itself a guarantee of successful change (e.g. Cordingley, 2008; Spillane, 2012). To turn it into the kind of knowledge capable of altering practices and behaviour, human brains are needed. In particular brains that can weigh up costs and benefits, judge when to invest in reform and present ideas persuasively so that resistance to change is overcome. For this to happen the concept of knowledge needs to be broad; the experience and know-how of practitioners needs to interact with evidence from research so that workable plans for improvement action can be drawn up. This is not easy; it inevitably involves professionals from quite different spheres working together, even though the rewards and incentives that motivate their work may differ starkly. Attention needs to be paid to the development of strong professional relationships among practitioners and researchers in a learning community (Hopkins et al, 2014; Sigurdardottir, 2010; Stoll & Louis, 2007). Utilization of research evidence is a dynamic sequence involving facilitation of a constructive ways of using research evidence in context and situations. (Jansson, 2011; Liljeroth et al, 2011; Skoglund & Erkinger, 2007)

Implication and conclusions

There is plentiful experience of many well-intentioned but over-simplified connections between schools and research, ranging from schools trying to copy one example of research based "best practice", to researchers trying to disseminate knowledge that is too general for schools. Most of this did not create successful schools in terms of better professional performance and higher pupil achievement (Allen 2008). Something was missing in this well-intentioned world. We agree with Höög and Johansson (2014) who argue that we need to move from the notion of "best practice" to a general understanding of the underlying evidence and principles that lead to successful education. A fundamental change mechanism seems to be the creation of time and space to confront existing "knowledge in practice" with research "knowledge about practice" and shaping of arenas for developing a common "knowledge for practice"(Håkansson & Sundberg, 2012).

While going through the analysis of these schemes a few common factors seemed to be associated with success. They include the capacity to collaborate effectively between the dissimilar cultures of schools and academia as well as the necessity of building mutual trust to overcome asymmetry of power. We also noticed the importance of beginning a change

process by accepting and reflecting on real issues in schools now by using evidence. Furthermore, the value of different kinds of knowledge needs to be recognised.

As for use of evidence in policy, the complexity of the process as well as the uncertainties of evidence should be acknowledged. In that sense it is important to move from an incidental to a systematic approach, to apply a structure that supports local SUKES schemes. Information and communication infrastructure needs to be created to enable knowledge from different schemes to accumulate, be shared and built upon that offer all parties to collaborate. By being informed about and understanding schemes in their own locality, local policymakers can access and assimilate the evidence being discussed between practitioners and researchers, and can participate in the knowledge exchange discussions.

For research on use of evidence we argue that despite an increasing mobilisation of researchers and research-funding agencies, the literature on research use continues to yield little evidence on the processes involved, and even less on the effects of efforts to promote their use. Therefore models of knowledge exchange schemes need to be developed, drawing on existing theory and further, more comprehensive and analytical empirical study. Approaches and tools to assess the impact of knowledge exchange schemes on outcomes for practitioners and learners need to be developed and trialled.

Much of the value of the schemes, for the actors involved, is to be found in the way in which they operate within their specific context. The mode of operation depends critically on local circumstances, e.g. funding, leadership, political context and individual personalities. It is not expected that any scheme could be transplanted effectively to another context in its entirety as frequently stressed in the literature (Ball, 2012; Cordingley', 2008; Spillane, 2012; Steiner-Khamsi, 2013). This analysis does not attempt to bring out universal, transferable factors of success. Instead we offer perspectives on the underlying themes of importance to any such knowledge exchange scheme. We hope that this paper contributes to the limited body of knowledge about the process of exchanging knowledge for sustainable, long lasting educational development.

Commission. Our colleague, Mary Sheard, contributed extensively to the paper, before she sadly passed away in July 2014.

References:

Allan, J. (2008). *Rethinking inclusive education: The philosophers of difference in practice.* Dordrecht. Springer.

Argyris, C. (1991). Teaching Smart People How to Learn. *Harvard Business Review*. May–June 199, 99–110.

Ball, A.F. (2012). To know is not enough: Knowledge, power, and the zone of gererativity. *Educational Researcher, 41*, 283–293. DOI: 10.3102/0013189X12465334

Robinson, V.M.J. (2007). *School leadership and student outcomes: Identifying what works and why.* Melbourne: Australian Council for Educational Leaders.

Broekkamp, H., & van Hout-Wolters, B. (2007). The gap between educational research and practice: A literature review, symposium, and questionnaire. *Educational Research and Evaluation, 13*(3), 203–220.

Comfort. L. (1994). Risk and resilience: Inter-organizational learning following the northridge earthquake of 17 January 1994. *Journal of Contingencies and Crisis Management, 2*(3), 157-170.

Cooper, A., Levin, B., & Campbell, C. (2009). The growing (but still limited) importance of evidence in education policy and practice. *Journal of Educational Change, 10*, 159-171. doi: 10.1007/s10833-009-9107-0

Cordingley, P. (2008). Research and evidence-informed practice: focusing on practice and practitioners. *Cambridge Journal of Education, 38(1),* 37–52

Dagenais, C., Lysenko, L., Abrami, P., Bernard, R.,Ramde, R. and Janosz, M. (2012). Use of research-based information by school practitioners and determinants of use: a review of empirical research. *Evidence & Policy. A Journal of Research, Debate and Practice, 8*(3), 285–309. http://dx.doi.org/10.1332/174426412X654031

Davies, H.T.O., Nutley, S.M., & Walter, I. (2005). *Approaches to assessing research impact: Report of the ESRC symposium on assessing the non-academic impact of research*, St Andrews: Research Unit for Research Utilisation, School of Management, University of St Andrews.

Day, C., & Leithwood, K.A. (Eds). (2007). *Successful principal leadership in times of change. An international perspective* (Vol 5). Dordrecht, The Netherlands: Springer.

Douglas, M.T. (1986). *How institutions think.* Syracuse: Syracuse University.

Engestrom, Y., & Sannino, A. (2010). Studies of expansive learning: Foundations, findings and future challenges. *Educational Research Review 5,* 1–24.

Engestrom, Y. (1999). Innovative learning in work teams: Analysing cycles of knowledge creation in practice. In Y. Engestrom, R. Miettinen,, & R.L.Punamaki (Eds). *Perspectives on Activity Theory*, pp. 377–406.   Cambridge: Cambridge University Press.

Engestrom , Y.(1996). Development as breaking away and opening up: A challenge to Vygotsky and Piaget. *Swiss Journal of Psychology, 55,* 126–132.

Engestrom, Y. (1987). *Learning by expanding: An activity-theoretical approach to developmental research.* Helsinki: Orienta-Konsultit.

Estabrooks, C.A. (2007). Prologue: a program of research in knowledge translation. *Nursing Research*, 56 (4 suppl 1), 4–6.

Fleck, L. (1935/1997). *Uppkomsten och utvecklingen av ett vetenskapligt faktum: Inledning till läran om tankestil och tankekollektiv. [The development of a scientific fact: Introduction to the idea of thought style and thought collective.]* Stockholm: Brutus Östlings Bokförlag Symposium.

Fullan, M. (2007). *The new meaning of educational change* (4th ed). New York: Teachers College Press.

Graham, I.D., Logan, J., Harrison, M.B., Straus, S.E., Tetroe, J.M., Caswell, W., & Robinson, N. (2006). Lost in knowledge translation: time for a map? *Journal of Continuing Education in the Health Professions*, *26*(1), 13–24.

Hannan, A., Enright, H., & Ballard, P. (1998). *Using research: The results of a pilot study comparing teachers, general practitioners and surgeons*. www.leeds.ac.uk/educol/ documents/000000851

Hargreaves, A., & Shirley, D. (2013). *The global fourth way. The quest for educational excellence.* Thousand Oaks USA: Corwin

Hargreves, A., & Fullan, M. (2012). Professional capital. Transforming teaching in every school. New York: Teachers College press.

Hopkins, D. Stringfield, S., Harris, A., Stoll, L., & Mackay, T. (2014). School and system improvement: a narrative state-of-the-art review. *School Effectiveness and School Improvement, 25*(2), 257–281.

Håkansson, J., & Sundberg, D. (2012). *Utmärkt undervisning. Framgångsfaktorer i svensk och internationell belysning. [Excellent teaching. Success factors in Swedish and international illumination.]* Stockholm: Natur & Kultur.

Höög, J., & Johansson, O. (2011). *Struktur, kultur, ledarskap-förutsättningar för framgångsrika skolor. [Structure, Culture, Leadership –Preconditions for Successful Schools.]* Lund: Studentlitteratur.

Höög, J., & Johansson, O. (eds). (2014). *Framgångsrika skolor-mer om struktur, kultur, ledarskap. [Successful schools-more about structure, culture, leadership.]* Lund: Studentlitteratur.

Jakobsdóttir, S., Sigurdardóttir, A. K., Thayer, T., Pétursdóttir, S., Thorsteinsdóttir, T., & Eiríksdóttir, H. R. (2013). EducationaPlaza – Teachers' professional development. In M. F. Paulson & A. Szucs (Eds.), EDEN 2013 annual conference. *The Joy of learning: Enhancing learning experience improving learning quality*. Conference proceedings (pp. 975–986). Budapest: European Distance and E-Learning Network.

Jansson, U. (2011) "Erfarenhet och evidens- praktik och forskning i möte. [Experiences and evidence- the meeting between practice and research] in Göransson, K., Jansson, U., & Nilholm, C. (2011) *Vetenskaplig artikelsamling om specialpedagogik. [Scientific collection of articles about special pedagogy]*. FoU nr 1/2011. Örebro/www.spsm.se. Specialpedagogiska skolmyndigheten.

Jónasson, J.T. (2015). Basing policy or practice in evidence or research: Some problems in the rethoric. Paper presented at Menntakvika (Annual confernece about educational research in Iceland), October, 2015.

Kim, W.C., & Mauborgne, R. (2003). Tipping point leadership. *Harvard Business Review*. *April*, pp. 61–69.

Kuhn, T.S. (1962). *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.

Liljeroth, I., Engen, T., Larsson, J., Skoglund, P., & Öfverholm, C. (2011). *Verksamma verksamheter. Att bättre förstå, hantera och utveckla verksamheter för kvalitet och effektiv resursanvändning*. Gothenburg*:* Daidalos

McKibbon, K.A., Lokker, C., Wilczynski, N.L., Ciliska, D., Dobbins, M., Davis, D.A., Haynes, R.B., & Straus, S.E. (2010). A cross-sectional study of the number and frequency of terms used to refer to knowledge translation in a body of health literature in 2006: A tower of Babel? *Implementation Science, 5*(1) Feb 12;5:16. doi: 10.1186/1748-5908-5-16.

Mitton, C., Adair, C.E., McKenzie, E., Patten, S.B., & Waye Perry, B. (2007). Knowledge transfer and exchange: review and synthesis of the literature. *Milbank Quarterly*, *85*(4): 729–768.

Morris, A., Sheard, M., Sigurðardóttir, A.K., Skoglund, P. and Tudjman, T. (2012). *School-University knowledge exchange schemes: survey report*. Unpublished; available from first author.

Muijs, D., Kyriakides, van der Werf, G. Creemers, B, Timperlay, H., & Earl. L. (2014). State of the art – teacher effectiveness and professional learning. *School Effectiveness and School Improvement, 25*(2), 257–281.

Murray, J. (2014). *Designing and implementing effective professional learning*. Thousand Oaks, Cal.: Corwin.

Nutley, S., Walter, I., & Davies, H.T.O. (2007). *Using Evidence: how research can inform the public services*. Bristol: Policy Press.

Nutley, S.M., Walter, I. & Davies, H.T.O. (2003). From knowing to doing: a framework for understanding the evidence-into-practice agenda. *Evaluation: The International Journal of Theory, Research and Practice*, *9*(2), 125–148.

Paterson, C., & Chapman, J (2013). Enhancing skills of critical reflection to evidence learning in professional practice. *Physical Therapy in Sport, 14*(3), 133–138.

Persson, B., & Persson, E. (2012). *Inkludering och måluppfyllelse – att nå framgång med alla elever. [Inclusion and Goal Achievement- to reach success with all pupils.]* Stockholm: Liber.

Persson, E. (2012). Raising achievement through inclusion. *International Journal of Inclusive Education. pp 1–16. DOI:10.1080/13603116.2012.745626*

Rohrbach, L.A., Ringwalt, C.L., Ennett, S.T., & Vincus, A.A. (2005). Factors associated with adoption of evidence-based substance use prevention curricula in US school districts. *Health Education Research*, *20*(5) 514–26.

Schein, E. (1993). How can organizations learn faster? The challenge of entering the green room. *Sloan Management Review*. Winter 1993.

Schildkamp, K., Ehrena, M., & Kuin Laib, M. (2012). Editorial article for the special issue on data-based decision making around the world: from policy to practice to results. *School Effectiveness and School Improvement, 23*(2), 123–131.

Schön, D. (1983). *The reflective practitioner: How professionals think in action*. Aldershot: Ashgate Publishing Ltd.

Senge, P., McCabe, N.C., Lucas, B.S., Dutton, J., & Kleiner, A. (Eds). (2000). *Schools that learn. A fifth discipline fieldbook for educators, parents and everyone who cares about education*. New Youk: Doubleday.

Skoglund, P., Leivik-Knowles, B-M., & Pettersson, C. (1996). *Mellan fred och krig [Between peace and war]*. Novemus School of Public Affairs. Högskolan I Örebro.

Skoglund, P., & Erkinger, V. (ed) (2007): *Vägar att förstå och stimulera lärande i praktiken. [A collection of ways to understand and promote learning in practice.*Final report.] http://www.adam-europe.eu/prj/1433/prj/2008%2001%20PRODUCT%20AMS%20-%20Schwedisch.pdf

Skoglund, P. (2013). Inkludering och skolans osäkerheter – att stödja professionella att lära. *[Inclusion and uncertainties in schools – to support professionals to learn.] Paideia, Tidsskrift for professionel paedagogisk praksis, 13* (05), 20–29.

Skoglund, P. (2014). Fundamental challenges and dimensions of inclusion in Sweden and Europe. How does inclusion benefit all? *La nouvelle revue de l'adaptation et de la scolarisation - no 65 • 1er trimestre 2014.*

Skoglund, P. & Stäcker, H. (2015). How to build a resilient system to support all learners. *Implementing Inclusive Education--Issues in Bridging the Policy‐Practice Gap*. London. Emerald Publishers.

Sharples J, & Sheard, M. (2015). Developing an evidence-informed support service for schools – reflections on a UK model. *Evidence & Policy: A Journal of Research, Debate and Practice(online)* (doi: 10.1332/174426415X14222958889404)

Sigurðardóttir, A.K. (2010). Professional learning community in relation to school effectiveness. *Scandinavian Journal of Educational Research, 54*(5), 395–412.

Spillane, J. P. (2012). Data in practice: Conceptualizing the data-based decision-making phenomena. *American Journal of Education, 118*(2), 113–141.

Steiner-Khamsi, G. (2013). What is wrong with the 'What-Went-Right' approach in educational policy? *European Educational Research Journal, 12*(1), 20– http://dx.doi.org/10.2304/eerj.2013.12.1.20

Stoll, L., & Louis, K.S. (Eds). (2007). *Professional learning communities: Divergence, depth and dilemmas.* Maidenhead UK: Open University Press.

Thayer, T. (2014). Constructing optimal futures for education: Technology foresight in educational policy and planning. *Nordic Journal of Digital Literacy*, 9(2), 148–165.

Tyack, D., & Cuban, L. (1995). *Tinkering toward Utopia: A century of public school reform.* Cambridge, MA: Harvard University Press.

Weiss, C.H. (1995). The four "I's" of school reform: How interests, ideology, information, and institution affect teachers and principals. *Harvard Educational Review, 6*(4*)*, 571–593.

Wenger, E., White, N., & Smith, J. D. (2009). *Digital habitats: stewarding technology for communities*. Portland, OR: CPsquare.

Wennergren, A. (2015). Teachers as learners - with a little help from a critical friend. *Educational Action Research,* DOI: 10.1080/09650792.2015.1058170