The need for systems thinking to build cultural capacity for innovation throughout school education

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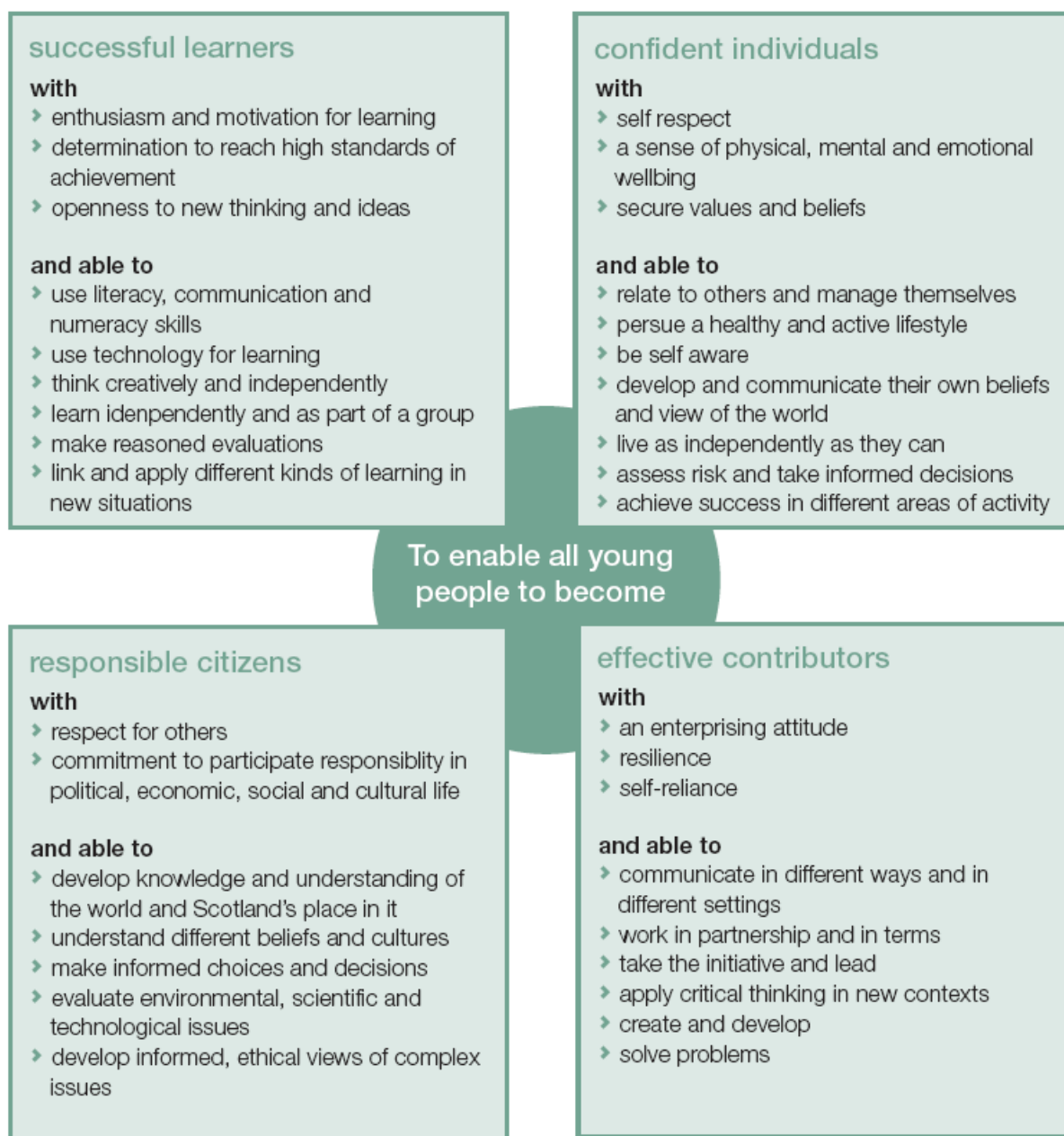
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Abstract

This paper serves as prompt for discussion for reasons which as a practitioner I have found necessary to enable practice change in school education to altering normative, technological and policy imperatives. My purpose is to enable a conceptual and operational bridge from those not well acquainted with deep constructivist practice and specifically Knowledge Building, to those establishing the *Building Cultural Capacity for Innovation* initiative at this Summer Institute. I write as a practitioner who sought with colleagues to enable Scotland's 2004 curriculum reform of Four Capacities of student/pupil potential and capability over a twelve-year period to 2016. I encountered a mismatch between audit and curriculum which I found to reside in different conceptual assumptions tempered by inequitable power relations. From that difficult experience I articulate a central need for Systems Thinking and Knowledge Building to serve as symmetric partners in the advance of *Building Cultural Capacity for Innovation* throughout school education.

Introduction

Social change and technological change have been recently so rapid that the means of organising school education practice have found difficulty keeping up. This applies across the domains of management, governance, evaluation, assessment, accountability and the operational tools which bind these altogether. Hannon (2009) writes of "disconnects" wherein "the release of collective creativity – which increasingly characterise successful 21st Century workplaces and enterprises – are, for the most part, absent from school environments." Knowledge Building as a concept and set of practices articulated by Scardamalia and Bereiter (1993), and subsequently by them and colleagues associated with the Knowledge Building Summer Institutes, is quite the reverse. As Scardamalia and Bereiter (2014) put it, "The basic premise of the Knowledge Building approach is that, although achievements may differ, the process of Knowledge Building is essentially the same across the trajectory running from early childhood to the most advanced levels of theorizing, invention, and design, and across the spectrum of knowledge creating organizations, within and beyond school. If learners are engaged in processes only suitable for school, then they are not engaged in Knowledge Building."

The Four Capacities of Scotland's school curriculum reform 2004 to present

From 2004 and continuing to present Scotland initiated a major school curricular reform (Scottish Executive 2004). Four purposes were framed as enabling "Four Capacities" of pupil/student personal, social and intellectual development as "successful learners", "confident individuals", "responsible citizens" and "effective contributors". These were considered equal such that attainment, being learning in the conventional sense, was considered equal to the goals of confidence, responsibility and contribution. It was considered that these would operate holistically so that a very different notion of curriculum and thus of education practice would emerge from the initiative to that which hitherto applied. Essential characteristics were set out as a diagram listing the "capacities" together with key attributes and defining capabilities to be fostered for each, as set out in the diagram on the following page.

successful learners

with
- enthusiasm and motivation for learning
- determination to reach high standards of achievement
- openness to new thinking and ideas

and able to
- use literacy, communication and numeracy skills
- use technology for learning
- think creatively and independently
- learn idenpendently and as part of a group
- make reasoned evaluations
- link and apply different kinds of learning in new situations

confident individuals

with
- self respect
- a sense of physical, mental and emotional wellbing
- secure values and beliefs

and able to
- relate to others and manage themselves
- persue a healthy and active lifestyle
- be self aware
- develop and communicate their own beliefs and view of the world
- live as independently as they can
- assess risk and take informed decisions
- achieve success in different areas of activity

To enable all young people to become

responsible citizens

with
- respect for others
- commitment to participate responsiblity in political, economic, social and cultural life

and able to
- develop knowledge and understanding of the world and Scotland's place in it
- understand different beliefs and cultures
- make informed choices and decisions
- evaluate environmental, scientific and technological issues
- develop informed, ethical views of complex issues

effective contributors

with
- an enterprising attitude
- resilience
- self-reliance

and able to
- communicate in different ways and in different settings
- work in partnership and in terms
- take the initiative and lead
- apply critical thinking in new contexts
- create and develop
- solve problems

(Scottish Government 2008)

This is a framework which is manifestly aligned to deep constructivist approaches. Whilst it has not specifically embraced Knowledge Building and does not refer to in its documentation the capability goals are explicitly collaborative and expressed in terms of the construction of real purposes around which the development of these capacities would occur. It is thereby disposed towards Knowledge Building practice.

As a class-committed principal of a small rural primary school for a decade and a half my own practice with colleagues was framed around a goal of adopting this approach. This was through the enlightened and explicit framework entitled 'Building the Curriculum' (Scottish Government 2008) in which aspects of the new approach were laid out with suggested practice shifts to be enabled in a loose sense through answering reflective questions. The approach was not prescriptive and was laid out in conceptual terms.

The 'Four Capacities' were a bold redirection of expressed goals for a national school education system. I welcomed these principles and aspirations, as described. For a while, being a few years, roughly 2004-2009, my

innovations with colleagues met with those of the national system in Scotland, of which certain agencies and partners gave us development grant funding for both practice and method change and sought publications of our practice as we enacted and reported (MacKinnon 2014). But then something changed, imperceptibly, yet definitively. There was another ethic in the air. The incoming changes came to be mandated from the centre, not as macro-level aspiration but as micro-level prescription. They were wedded to pre-existing suppositions, particularly those of the performance management metrics of local authority 'quality improvement' and national inspection. But were those measuring the right things? By 'right' I mean what we value and thus focused on our purpose, what schools are seeking to achieve as deriving from the needs and potentials of our pupils/students? Those were changing explicitly, as well as implicitly, since we had opened up pupil potential through capacities to be probed, fostered and enabled, not just as 'learning'. At a deeper level did those methods, and the means by which they were applied produce valid outputs defined in relation to purpose? Thus were the metrics of the system now producing data of relevance, as well as data which had validity (not the same thing)? And at a deeper level still, has anyone asked this?

A misplaced assumption

Numeric data has become a goal rather than just one of many means to inform a goal. Its bloat is now profoundly harming services' function. Supposedly objective indicator measurement masks the intentions that frame its collection and the criteria that determine its categories. It subsumes method, as if raising the numbers on the charts of indicator scorings is the goal of public services, rather than receipt of effective services by clients in terms which make sense to them. They are not the same thing, yet the difference is little discerned. This is particularly true of schools. Change cannot solely derive from data that is structured and codified by rationales beyond the local service operational level perspective – Williamson's (*et. al.* 2014) 'code acts'. Instead the sensitive interpretation and adjustment of provider and client at the point of service enaction comprises the knowledge necessary for service enhancement. That is dependent on individual cognition – sense-making, leading on to Knowledge Building (Bereiter and Scardamalia 1993). That must now come to the fore.

The over-riding need for engagement

The principal means to enhance public services at such a time of unprecedented change – technological, social, organisational, policy, values, expectations, infrastructure and resourcing – are new adaptive forms of organisation based on integral operational understanding. These entail a shift in perception from aggregated data units around scorings and rankings, by definition externally imposed, to thinking in systems' terms around meaning and function, which are internally derived. The need is to switch from a blind pursuit of performance, towards capacity, capability, function and knowledge – that is real knowledge of the work in the terms by which it makes sense to those who carry it out and those who receive the service – to inform those who may then appropriately support that service, providing the wherewithal for it to function. Through such means cognition transcends performance. Function may be informed by data but in a far greater range of forms than now, particularly enhancing and emphasising interpretative, qualitative interpretations over statistical, quantitised categorisations, and examining reactive capability to altering or varied need.

   Data is not knowledge. Data, appropriately derived and used, may contribute to its formation, but does not itself comprise knowledge. That is a critical distinction. Nor does the over-riding emphasis on quantitative forms of measurement derive from theory other than that this became easier for those of a statistical bent, for those who prefer soundbites to knowledge and for those seeking the 'quick fix' or easy scapegoat in political discourse. Theory is predicated on explanation. Data does not explain. Yet data-driven management and audit methods have grown, exponentially. Statistics do not make good services. Effectiveness does and that requires knowledge. Knowledge should utilise data, but does not comprise it. It is not formed of it. Performance measures are nothing if not formed through interpretation matched to purpose, rather than merely read off like the readings on a dial, in school education as Corbett's (2008) "edumometer", Reeves' (2013) "assessowork" and Biesta's (2009) "learnification".

Purposes and principles

Functions of assurance and protection from service failure come from openness and regular contacts with clients and frontline staff, with external moderation and good internal management contact, but not as prescription, inspection and data-driven overload. These can cause the evasive climates of threat, hectoring and fear that dispose towards failure, moreover failure caused by the system itself, as targets, specifications and audit processes impose load but do not enhance perspective or garner organisational response to meet real identified needs. They do not 'absorb variety' (Seddon 2008). The data swamp masks these needs as actually expressed. The collection of 'big data'

becomes the replacement central objective. In times of resource constriction this is not scaled back and then the audit demands come to exceed functional capability. Then audit can even be the prime cause or trigger of service disimprovement, and worse on to service failure, as what a school is seeking to achieve is countered by the demands of audit sanction, which may blindly override service need. Worse, remote managers and auditors may perceive the resultant malaise, if dimly, but then seek to manage their response as commands, imposing new demands and "increased expectations" (HMIE 2011), which only serve to compound the problem for failing to grasp its cause. The overload and functional mismatch cause service capability to implode.

The need to 'get knowledge'

For the service workers caught between performance management layers, deluged with data collection demands, and tied down to the conceptual constraints of imposed specifications, there needs to be an audit rethink. The current situation is unsustainable. The way forward is not to further continue along the audit route of imposing universalistic big data categorisations onto micro-level functioning, and deriving spurious data in response, but to shift perspective and method, requiring a shift in ethos and approach. Staff meeting the needs of clients at the front line need a wholesale shift from performance management to capacity management, from measurement to integral understanding, from 'how good is?' (HMIE 2007) to 'what works?' (Seddon 2008), from quantitised linear grading to integral understanding, from centralised conceptual stricture to localised innovative potential. The system has to cultivate what Seddon (2008) terms 'the capacity to absorb variety' and then on to 'get knowledge' (ibid). The knowledge is of 'what works' in best fulfilling client need and expectation, and how best to organise the work from the point of view of those doing it: "the work which makes the work work" (ibid). All else is waste, another central insight of Seddon's, making a key distinction in public service work function between "value work" and "waste work" (ibid). Seddon conceives the principal lever of service improvement to identify and remove the latter. This he identifies may occur most effectively by understanding the work as a system.

For schools, systems learning at the management and audit level can be matched by Knowledge Building at the pupil learning and development (capacities) level. The Knowledge Building method and philosophy, developed by Scardamalia and Bereiter (1993; 1996; OECD 2008; Scardamalia 2013) is focused on the notion of idea improvement. It pertains to pupil/student learning, where the individualisation of target-based approaches is replaced by collaborative endeavours which move beyond learning to the building of knowledge as authentic modes of school activity of pupils/students. This closely matches Scotland's 'four capacities' approach. It will be apparent in this brief citation, on which I gave a practice-based paper at two Knowledge Building Summer Institutes (MacKinnon 2014b; 2015b), that such conceptual fluidity for pedagogy requires similar fluidity in the system to enable it – school, local authority and governmental structures and conceptualisations. Although the approach to curriculum change in Scotland exhorts improvement and excellence I contend from extensive experience that its methods and organisational suppositions work against these aspirations (MacKinnon 2011a). The overemphasis on 'improvement' is leading to what I term 'overbettering', a negative change process caused where a hectoring desire to 'improve' service function degrades in a welter of threats and invective as the data categories of enforced measurement ill-match service operational function, particularly that which is sensitive to context, variety and variation. For schools, that variety and variation is of individual children, and staff, who understandably resist being batch processed and targetised as production units and operatives. When overly imposed or demanded, to criteria not determined by knowledge of 'how the work works' (Seddon 2008), the implications of change potential are not grasped, and when capacity factors have not been properly factored in, the bloated audit demands cause service function to implode. Invective, castigation and demoralisation then soar – a process examined in further detail by Seddon (2003, 2008, 2014). Far more organic change is needed and a softer discourse.

Effective schools require community and family cultures, and forms of involvement with schools, which build trust and respect and cultivate the values in children, families and communities which dispose to schools being able to function effectively. A rights-based approach matched to a performance-based and judgemental audit culture builds barriers not bridges. It sets a negative tone, fosters hostility and demotivates staff whilst dispempowering clients and communities of interest. Shifts of operation require careful managing to ensure that schools and their staff do not become overloaded, and then castigated on indicator scorings to wrong criteria not set up to identify and deal with the emergent functions, those caused by policy change, or the essential variety of the work. The problem is not then the policy change, or the variety, but the mismatch with audit assumptions. Those are applied without 'knowledge' in both senses as deployed by Scardamalia and Bereiter (1993) and Seddon (2008) and in more general common understandings of the term.

A product model of curriculum

The Finnish model in education offers an entirely different approach to change management and quality enhancement, as outlined in Sahlberg's (2011, 2015) book *Finnish Lessons.* The approach he outlines is far more closely suited to Scotland's incoming curriculum than the existing quality assurance methodologies based on elaborated indicators, such as *How Good Is Our School?* (HMIE 2007; Education Scotland 2015), *Journey to Excellenc*e (Education Scotland website) and their equivalent schedules in other audit bodies in Scotland. Many of these are also currently impacting on Scottish schools, such as those pertaining to care and integrated services – all expressed as grade ranked indicators, and thus working against understanding of operational functioning deriving from studying the work in systems-thinking terms relating to purpose. Again there is a parallel right across public services. In *Finnish Lessons* Sahlberg outlines his model of the GERM, or Global Education Reform Movement, being a set of assumptions which has underlain an unofficial education agenda based on market orientated reform ideas and test-based accountability and which was followed by most Western countries. This is in stark contrast to what he calls 'The Finnish Way' based on learning from the past and owning innovations, customising teaching and learning, encouraging risk taking, and shared responsibility and trust. The Finnish Way is one we need now to adopt, or at least adapt to our own conditions and circumstances, if the incoming Scottish curriculum approach is to succeed and proceed as intended, and in accordance with its underlying founding philosophy. The Finnish Way as articulated by Sahlberg is about adapting and personalising so that education practice fits its context and its participants. This is akin to Seddon's (2008) notion to 'absorb variety' in the management and operation of public services generally. For schools the curriculum is no longer a product, to be delivered. This requires conceptualisations of curriculum itself away from a 'product model' (Sahlberg 2005; MacKinnon 2015c).

Regimes of Truth

Ball and Olmedo (2013) write of "regimes of truth" in school education, which they demonstrate to be in opposition. "One produces measureable teaching subjects, whose qualities are represented in categories of judgement. The other is vested in a pedagogy of context and experience, intelligible within a set of collegial relations" (2013:92). Does the latter not read as the vision of Scotland's 'Four Capacities' and 'Building the Curriculum'? So why in Scotland are we allowing an overriding performativity (Ball 2003) ethic and method to judge it, literally, to wrong criteria? Ball and Olmedo continue, "Teachers are no longer encouraged to have a rationale for practice, account of themselves in terms of a relationship to the meaningfulness of *what they do*, but are required to produce measurable and 'improving' outputs and performances… We are in danger of becoming transparent but empty, unrecognisable to ourselves." (Ball and Olmedo 2013:91)

We become hollowed out as non-sense emerges from metrics without meaning. We need to reintegrate meaning and in so doing redefine quality through purpose. We should then study the work[1] through that lens. That should be conducted in participative understanding to discern meaning relating to function and purpose. Therein lies knowledge. The need is profound, "The work overload of drowning in specificatory garbage to irrelevant notions, which ever-change and for which you are damned for the impossibility of keeping up, dealing with damage and somehow trying to find the space for real work which 'they' are not in the slightest bit interested in, is exhausting. How to break out?" (Teacher quoted in: Ball and Olmedo, 2013:91)

The essence of quality

Quality is subtle, its achievement often realised in a moment of satisfaction, an essence achieved, a bridge crossed, a moment of insight realised, or a new opportunity opened up. Change may not look like progress as apparent stability can flash-transform into a new state through the interconnectedness of many factors over a long process of preparation, which may be invisible in a 'snapshot' audit approach. Much of children's learning presents itself in this way. The process has to be worked at, interpreted and reflected upon, with essential mutuality and respect, iteration and interpretation. It is not a simple 'if this then that' input/activity–output/outcome. Snapshot graded measurement can never penetrate these factors. They are not about performance, but about knowledge, the knowledge of an organisation as a system, at all levels, focused on purpose. For schools that purpose derives from knowledge built by pupils, in a Knowledge-Building sense, similarly framed around purpose. The micro, meso and macro layers have to interconnect, over time, acting as a system, and its staff thinking in system terms. That is what generates knowledge, as opposed to data. Data contribute to knowledge but do not comprise it.

The essence of integral service fulfilment is collaborative and cohesive. It is lost if service function is defined as performance management and audit compliance, or worse is reduced to the calibration of pseudo-metrics, reduced to

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[1] A method and phrase forming the Vanguard Method (Seddon 2008) https://vanguard-method.net/

data. Instead purpose must be central. Data must serve purpose, not purpose serve data. Data does not only mean numbers, it also means interpretations, and these are not universal. Numbers relate to measures which relate to purpose. What data, how formed, for what purpose, how interpreted? Those are tasks laden with subjectivity. They depend on rationales and models, which vary. They are situational, and contextual, and informed by theory, which means constructed understandings. Rationales, interpretations and even judgements where necessary, must be probed, not pronounced or imposed without interpretation. They may then inform theory. Data in the absence of purpose or locally-owned interpretation is meaningless. The over-quantitisation of performance management data and functions and the centralisation of audit criteria is an attempt to impose supposedly objective measuring instruments on services, all of which must then be utilised and maintained in ongoing real time to meet the compliance obligations of the performance management audit industry. This is causing an immense load on services, especially schools. Such processes are causing profound harm, and worse, when what comes to be looked for is not then the service function itself, and the perceptions of those realising it – workforce and clients – but those of the data management factory and its audit police. Self-evaluation then transforms into self-inspection, which I contend has happened to schools in the UK – Scotland and England – a shift noted by MacBeath (2008). The audit evaluation and data garnering process can become so unwieldy that the failure to maintain the mandated data stream by service providers can mistakenly be perceived by auditors as a failure of the service itself, whereas it is the unwieldy, cumbersome data requirements which are driving services downwards (Seddon 2008), even to service failure, by working against purpose (ibid). The following is a diagrammatic representation of this problem presented as alternatives which are in opposition:

Self inspection and self-evaluation

Self-Inspection	Self-Evaluation
Top down	Bottom up
A one-off event	Is continuous and embedded in teachers' work
Provides a snapshot at a given time	Is a moving and evolving picture
Is time-consuming	Is time-saving
Is more about accountability than improvement	Is more about improvement than accountability
Applies a rigid framework	Is flexible and spontaneous
Uses a set of predetermined criteria	Uses, adapts and creates relevant criteria
Creates resistance	Engages and involves people
Can detract from learning and teaching	Improves learning and teaching
Encourages playing safe	Takes risks

(MacBeath in de Waal (ed) 2008:40)

This is directly akin to the GERM/non-GERM distinction:

Global Educational Reform Movement (GERM)	Alternative Policies
teaching core subjects	broad & creative learning
standardization	personalization
test-based accountability	professional responsibility
market-based management	educational leadership
data and control	collaboration and trust

(Bower 2011 drawing on Sahlberg 2011:103).

It is congruent with the distinction between 'command and control' thinking (Seddon 2003) and the Vanguard Systems Thinking approach to effecting change in public services:

Command and Control Thinking		Vanguard's Systems Thinking
Top-down	Perspective	Outside-in
Functional specialisation	Design	Demand, value and flow
Separated from work	Decision-making	Integrated with work
Budget, targets, standards, activity and productivity	Measurement	Designed against purpose, demonstrate variation
Extrinsic	Motivation	Intrinsic
Manage budgets and the people	Management Ethic	Act on the system
Contractual	Attitude to customers	What matters…?
Contractual	Attitude to suppliers	Partnering and co-operation
Change by project/initiative	Approach to change	Adaptive, integral

(Clark 2012)

In a national review of audit and scrutiny in Scotland (Scottish Government 2007) I presented a dichotomy which was conceptually congruent with the above schemas:

Poles of scrutiny pressure	
Quantitative	Qualitative
Objective	Interpretative
Externalised	Engaging
'Independent'	Holistic
Imposed	Partnership
Scrutinising	Involving
"You write action plan"	Giving direction
Judgemental	Respectful
Accountability = 'hold to account'	Accountability = 'give account'
Opinionation: imposed statements	Evaluation: dialogue, 'giving value'

(MacKinnon 2007)

Understanding the work

Management is redefined from a systems-thinking perspective. Seth Godin writes about turning the traditional top-down power structure up-side down:

> I always took the position that my boss (when I had a job) worked for me. My job was to do the thing I was hired to do, and my boss had assets that could help me do the job better. His job, then, was to figure out how best give me access to the people, systems and resources that would allow me to do my job the best possible way.
> Of course, that also means that the people I hire are in charge as well. My job isn't to tell them what to do, my job is for them to tell me what to do to allow them to keep their promise of delivering great work." (Godin, 2010, quoted in Bower, 2010)

That is the counterintuitive notion of management that systems thinking opens up. The supreme success of the Finnish model of education derived not from what Finland did, but more pertinently from what Finland has **not** done to its education system (Bower 2011c), and that was not submerging itself in performance management overload matched to centralised audit compliance.

The lessons are of global reach and go far beyond education. We need to "think purpose"[2] not "think performance". Scotland's incoming reforms since 2004 have been shaped in Sahlberg's (2011) GERM, when what is needed is to grasp the GERM-free alternative (MacKinnon 2011b). We are not getting the right answers because we are not asking the right questions: "You say you want this, so then why are you doing that?" (Bower 2011a). This problematic has profound implications for the concept of leadership which can then be operationally optimised, yet be inverted, as a "subversive activity" (MacBeath 2012), needing to be reframed as an "essential conversation" (MacBeath *et. al.* 2009) in which education is reformed through dialogue. This is akin to Reeves' analysis for Scotland's curriculum reform from 2004, "The conditions for learning require an organisational culture that, in Deming's (1982) terms 'drives out fear,' and encourages people to be open to, and about, change and prepared to take the risks of both justifying and enacting new behaviours" (Reeves 2008:12).

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[2] The title of a website which explores these issues: http://thinkpurpose.com/

Conclusion

To enable Knowledge Building and be able to take part meaningfully in *Building Cultural Capacity for Innovation* national education systems would have to overcome these blockages. The task in *Building Cultural Capacity for Innovation* is to reach out to all levels within and between education systems and the communities they serve. The means operate at both conceptual and operational levels. They are mediated by human sensibility. The aspiration is to enable the synergy which derives from adaptability and locally owned professionalism within more overarching wholes. Achieve that and the promise of a truly international endeavour can be realised. The means lie in building knowledge at multi-levels which necessitates the enablement of thinking at the systemic level relating to purpose, connection, function, and meaning.

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