School policies, leadership, and learning with technologies: an international comparative study

Kathryn Moyle, ACER

Available at: https://works.bepress.com/kathryn_moyle/33/
School policies, leadership, and learning with technologies: An international comparative study

Kathryn P. Moyle
Australian Council for Educational Research
Kathryn.moyle@acer.edu.au

Abstract
Little research has been conducted into the links or intersections between school leadership, teaching and learning with technologies, and the quality of students' outcomes at school. While it is recognised that principals hold a central position in leading schools pedagogical and administrative practices, little is known about what is the role of the school principal in implementing policies that are aimed at improving the quality of teaching and learning in schools, or to achieve smart student learning outcomes. These issues are examined in this paper by reviewing and analysing national school education policies from Singapore, Finland and Hong Kong: countries that have performed highly on both international assessments of students’ performance, and assessments of countries international competitiveness. The policies used in these countries aimed at fostering ‘smart learning’ are examined to determine what lessons can be learned by those nations currently not performing as highly on these internationally-comparative assessments. This paper aims to open up spaces that are at the intersection between the three educational priorities of policies, school leadership and ‘smart learning’, to consider what are the implications for school leadership practices.

Keywords:
Policy; school leadership; ‘smart pedagogies’, quality education

Introduction
For over 30 years, countries have been wrestling with what counts as ‘quality education’ that includes technologies in teaching and learning. Traditionally, education systems and schools have focused curriculum policies on the development of discipline knowledge. In the 21st century, the Organisation for Economic Cooperation and Development (OECD) (Schleicher 2014) has demonstrated that the types of skills school leavers require are the generic capabilities of problem solving; critical thinking; information literacy; creativity and innovation: collectively-labelled here as ‘smart learning outcomes’. At the same time, school leadership is widely recognised as fundamental to making a difference to the quality of teaching and learning that occurs in schools (Leithwood, Seashore-Louis, Anderson, & Wahstrom, 2004). Principals are often held responsible for implementing national and locally-agreed policies within their schools and held accountable for the local implementation of these national and local policies. Through the monitoring of the performance of students on national and international tests¹, communities make judgements about the quality of schools and their principals.

¹ For example: Programme for International Student Assessment (PISA), Trends in International Mathematics and Science Study (TIMSS) and Progress in International Reading Literacy Study (PIRLS)
The introduction of technologies into teaching and learning in schools in both developed and developing countries has tended to be driven by national policies. At the school level these initiatives represent ‘whole school changes’ (Newhouse, 2010). That is, the introduction of technologies into teaching and learning has required changes across all facets of school life: from the infrastructure of the school to the nature of teaching and learning provided in classrooms, and therefore, to the nature of teacher and principal professional development. Furthermore, it is commonly understood that the success of whole school change is largely dependent on the quality of the school principal (Leithwood et al, 2004). Little research however, has been conducted to examine and interpret the intersections between policy implementation, school leadership and teaching and learning with technologies. Indeed, until recently, few countries school education policies have made the links between the role of the school principal and the quality of learning that involves the use of technologies.

Against this background then, in this paper the policy settings used in relation to ICT in school education are examined in three countries that are considered ‘high performing’ in relation to students’ learning outcomes and international competitiveness. The purpose of this analysis is to see what can be learnt from these countries’ policy settings concerning the use of technologies in school education that may be applied elsewhere. The discussion begins by identifying three countries that have performed well on both international tests of student performance (OECD 2013a), and measurements by the World Economic Forum, of countries’ ‘networked readiness’ (Bilbao-Osorio, Dutta & Lanvin, 2014). The policies in these countries concerning the use of technologies in schools are then examined to consider the role of the school principal in implementing policies aimed at improving the quality of teaching and learning in schools focused on achieving smart student learning outcomes.

This paper does not set out to draw causal relationships. Rather, based on understandings gained from an examination of these nations’ policies that relate to school leadership and teaching and learning with technologies, consideration is given to the policy settings that foster school leadership that supports teaching and learning with technologies suited to achieving ‘smart learning outcomes’. The purpose is to see if there are any lessons that can be learned from these countries’ policy approaches to leadership development and the achievement of ‘smart learning outcomes’ that include teaching and learning with technologies.

### Measuring performance

Countries that perform well on international tests of students’ mathematics, science and literacy abilities as measured through PISA, TIMSS and PIRLS, also perform well on World Economic Forum measures such as the Networked Readiness Index (NRI). The NRI is used at a global level to benchmark the information and communication technologies (ICT) readiness and usage of ICT in national economies. The NRI uses indicators within four ‘subindexxes’ and 10 ‘pillars’ as the criteria for the development of the international NRI rankings (Bilbao-Osorio, Dutta & Lanvin, 2014). These indicators include rankings of the country’s digital infrastructure for mobile and online delivery, and the quality of the education, business, legal and regulatory environments for technology use. The rankings on each of the indicators for the purposes of the World Economic Forum are aggregated within each of the 10 pillars, as well as to produce an overall ‘networked readiness’ ranking.

Three countries that have performed well on international student tests as well as the NRI are Singapore, Hong Kong and Finland. In 2012 for example, Singapore along with the other 64 member and partner countries and economies of the OECD participated in PISA 2012.
Singapore’s 15 year old students performed in the top three countries, in science, mathematics and reading (OECD, 2013a). As part of the NRI assessment, Singapore was rated second-highest on the criterion judging the quality of the educational system, and sixth on having Internet in schools (Dutta & Bilbao-Osorio, 2012). In the same year, on the overall assessment of its NRI, Singapore was rated as the second-highest country of the 142 national economies that participated in 2012 (Dutta & Bilbao-Osorio, 2012). Singapore has maintained this overall ranking for 2013 and 2014 (Bilbao-Osorio, Dutta & Lanvin, 2014).

Similarly, in 2012 students in Hong Kong performed in the top three countries in mathematics and science as measured through PISA, and were in the top five countries for reading. Finland’s students also have consistently performed in the top five countries in mathematics, science and reading on PISA tests (OECD, 2013a), while on the NRI criteria of ‘internet in schools’, Finland was ranked second and Hong Kong, 14th (Bilbao-Osorio, Dutta & Lanvin, 2014). On overall ‘networked readiness’ in 2014, of 148 countries, Finland was ranked first, and Hong Kong, 8th on the NRI. Hong Kong’s ranking was an improvement from 14th place in 2013 (Bilbao-Osorio, Dutta & Lanvin, 2014). Hong Kong and Finland also combined their performance with the provision of equity opportunities as measured by the OECD through PISA 2012 (Schleicher, 2014).

These rankings suggest that Singapore, Hong Kong and Finland are high performing countries both in relation to the performance of their 15 year old students in mathematics, science and literacy; and in their approaches to integrating technologies into their nation-state structures. Interestingly, Finland and Singapore have about the same size populations of about 5.3 million people, while Hong Kong has a population of just over 7 million people. The geographical conditions and size of schools however, varies across these three countries. To gain some insights into whether these countries promote practices aimed at fostering ‘smart learning’, education policies in these three countries are now examined.

Policies and technologies
Policies that relate to the implementation of technologies in teaching and learning are examined in this paper, to determine whether school principals are considered central to implementing ‘smart pedagogies’. That is, this paper interrogates whether principals are seen as having a critical role to play in supporting the use of technologies in teaching and learning to build students’ capacities to solve problems, think critically, be collaborative and innovative, and develop high levels of information literacy. The national policies are analysed in order to determine what strategies are used to make a difference to the quality of students’ outcomes achieved at school with technologies. It is recognised that of themselves, technologies do not create high scores on tests, but these three countries have established the conditions to build learning environments that use technologies for pedagogical purposes, and the confluence of these circumstances justifies examination.

Singapore
Since 1997, the Ministry of Education in Singapore has been implementing technologies in schools. The priorities of the Ministry have been conveyed through successive ‘Masterplans’. Masterplan One (1997-2002) (Teo, 1997) established the initial infrastructure for supporting teaching and learning with technologies in Singapore schools. Masterplan One had the goal of allowing students to have computer usage for 30 percent of their curriculum time in fully networked schools, with a computer to pupil ratio of 1:2. Masterplan Two (Tharman, 2002) was aimed at motivating teachers to use ICT effectively in teaching and learning. Masterplan Two introduced the notion of increasing school autonomy about implementing ICT with the
Ministry releasing funds to schools to meet their local school requirements identified through local school ICT implementation plans.

**Masterplan Three** (2009-2014), (Ng, 2008) has been built upon the achievements of the first two **Masterplans** and has aimed at being more ‘transformative’ than the previous two **Plans**, by equipping teachers and students with competencies such as using technologies, the ability to solve problems and to think critically and creatively. The overarching aim for students is for them to become self-directed learners. These capabilities are all seen as practices required to succeed in a knowledge economy. The next Masterplan, **Masterplan Four** builds on the previous three **Masterplans**, and will be released in mid 2015.

The current plan, **Masterplan Three**, includes four broad strategies for ICT in education. These are as follows:

- To strengthen integration of ICT into curriculum, pedagogy and assessment to enhance learning and develop competencies for the 21st century;
- To provide differentiated professional development that is more practice-based and models how ICT can be effectively used to help students learn better;
- To improve the sharing of best practices and successful innovations; and
- To enhance ICT provisions in schools to support the implementation of mp3 [Masterplan Three] (Ministry of Education, Singapore, 2008, p1).

There is an explicit emphasis in **Masterplan Three** on using ICT to develop “competencies for the 21st century” (Ministry of Education, Singapore, 2008) (ie problem-solving, critical thinking, collaboration, creativity and high levels of information literacy). **Masterplan Three** also states that “school leaders can create the environment for teachers to reflect and learn from each other about effective teaching practices that incorporate ICT use in classrooms to achieve the desired learning outcomes for their students”. Furthermore, the Ministry of Education website designed to support the implementation of **Masterplan Three**, (Ministry of Education, 2010), also includes specific roles for school principals to support the implementation of **Masterplan Three**. In 2015 at the local level, there continues to be an emphasis on school autonomy in Singapore. As a result, Singapore school principals have a substantial role in leading transformation in teaching and learning that includes technologies (Koh, 2007).

The Singapore Government has consistently funded these policy initiatives, and these policies have all been supported with considerable commitments of both human and financial resources. The budget for **Masterplan One** was SGD 2 billion, with each school receiving funding of SGD 1 million. The budget allocation for **Masterplan One** represented a funding commitment of $650 per student. The budget for **Masterplan Two** was SGD 600 million, with each school receiving SGD $450,000, with a per student allocation of SGD 300 per student (Koh, 2007). Available funding for **Masterplan Three** has exceeded **Masterplan Two** and according to Ministry officials, it is expected that the funding for **Masterplan Four** will exceed that of previous Masterplans.

In summary, for almost two decades there has been a consistent, funded policy direction within Singapore to include ICT in school education. The themes within the respective **Masterplans** in Singapore have been on infrastructure, curriculum and professional learning. Over time, there has been a gradual increase in emphasis in policy documents towards integrating ICT with curriculum priorities and the development of generic capabilities (such as problem-solving and information and digital literacy). More recently, the role of school principals has been highlighted as being central to fostering teaching and learning with
technologies at the school level. Pre-service and inservice professional development for teachers and school principals is seen as central to achieving the identified policy priorities.

**Hong Kong**

In May 2014, the Hong Kong government released its *Fourth Strategy on Information Technology in Education (ITE4) - Realizing IT Potential: Unleashing Learning Power*, to facilitate the formulation of the next five year plan for information technology in education (ITE) (Education Bureau, 2014). The release of this *Fourth Strategy* builds on the following previous policies:

- The 1st 5-year strategy on IT education: *Information Technology for Learning in a New Era* (1998);
- The 2nd 5-year strategy on IT education: *Empowering Learning and Teaching with IT* (2003); and

The consultation document for the *Fourth Strategy of ITE4* proposes an holistic approach that focuses on “... realising IT potential and unleashing the learning power” of Hong Kong students to learn and to excel through “self-directed learning, their creativity, collaboration, problem-solving and computational thinking skills, as well as ethical use of IT...” (Education Bureau, 2014, p17). This policy builds on the achievements of previous policies, and places an emphasis on self-directed learning and shares common themes with those found in Singapore education policies.

Since 1998, the Hong Kong government has made financial commitments to the advancement of school-based ICT in learning. Indeed, between 1998 and 2010 the total capital and recurrent spending on ICT in schools was GBP 621 million. Recurrent grants have been made to schools of GBP 24 million per annum to foster local innovation. In Hong Kong, on average, about 13% of the annual school budget is spent on the implementation of ICT in school education. The student to computer ratio in 2010 was 4 to 1 in secondary schools and 4.66 to 1 in primary schools, with all computers networked and connected to the Internet via broadband, along with a wireless network (Chen, 2011). By 2010 nearly all schools had ICT included in their education development plans and incorporated into their school development plans, in which ‘improving students’ learning outcomes’ is the most common goal. Schools in Hong Kong usually have 3 to 4 teachers responsible for coordinating ICT in education development, and 1 to 2 technicians to take care of the IT infrastructure (Chen, 2011).

The priorities of the *Fourth Strategy* indicate that school leaders will be specifically tasked to implement the *Strategy*, with the national ‘recommended actions’ identified in this consultation document as follows:

1. Enhancing schools’ ICT infrastructure;
2. Enhancing the quality of e-learning resources;
3. Renewing curriculum, transforming pedagogical and assessment practices;
4. Building professional leadership, capacity and communities of practice; and
5. Involving parents, stakeholders and the community (Education Bureau, 2014).

This *Fourth Strategy* places ‘professional leadership’ as one of the five actions to be undertaken concurrently with the other four identified actions. Fullan’s concept of ‘widespread leadership’ (2012) is promoted. Furthermore, in this *Strategy*, the role of school
leaders to develop and promote e-learning is explored. Indeed, in the *Fourth Strategy* it is proposed that leaders should influence other leaders to carry out shared agendas. The proposed role of future school leaders is stated explicitly and their tasks specifically addressed, as the following excerpt from the consultation document illustrates:

The role of the school leaders (principal, vice-principal/teachers responsible for curriculum planning) in enabling whole school adoption of e-learning can be summarised as follows:

- Integration of IT into curriculum planning and strategy for curriculum delivery in the school development plan, including the ethical and healthy use of IT;
- Effective school cultural changes among stakeholders (including school management, teachers and parents in particular) through consultation, support and development;
- Formulation of school policy and measures to address the impact of BYOD [bring your own device];
- Engagement of middle managers (e.g. curriculum leaders, panel chairs in different KLAs [key performance indicators]) in curriculum planning, infusion of e-learning, sharing practices;
- Provision of continuous professional development opportunities for teachers, including the development of communities of practice (CoP) within the school and across the school community; and
- Provision of the necessary IT infrastructure with appropriate technical and programme management support for scalable and sustainable development (Education Bureau, 2014, p29).

Further the *Fourth Strategy* promotes professional development within schools that specifically develops students’ generic capabilities such as problem-solving and self-directed learning. As is the case in Singapore, in Hong Kong, principals are seen as having a critical role to play in supporting the use of technologies in teaching and learning to build students’ ‘smart capacities’ such as to solve problems, think critically, be collaborative and innovative, and develop high levels of information literacy.

**Finland**

The right to education is recorded in the Finnish Constitution, and key words used in Finnish education policies are quality, efficiency, equity and internationalisation (Ministry of Education and Culture, Finland, 2014). This commitment to education is reflected in the government education budgets. Finland has consistently spent about 6.5% of its’ GDP on education over the past decade (OECD, 2013b).

Like Singapore and Hong Kong, over the past two decades, Finland has produced policies to address the use of ICT across the school curriculum. These education policies have been coordinated with a national vision for an information society or knowledge economy. These policies include the following:

- *Education Training and Research for the Information Society* (1995);
- *National Strategy* (2000-2005);
- *Information Society Program for Education Training and Research* (2004-2006);
- *Ubiquitous Information Society Strategy – Action Program* (2008-2011);
- *The National Knowledge Society Program* (2007-2015); and
The themes evident in the policies released since 1995 that were reviewed for this paper, have remained consistent:

- the development of ICT in education as part of building a Finnish information society;
- the development of national IT infrastructure to support the vision of a knowledge economy;
- the use of ICT to improve the equity of access to information and to education;
- the use of ICT to foster diversity of use of ICT;
- the provision of pre-service and in-service teacher training to support the use of ICT in teaching and learning;
- the development of online resources to support an ICT-enabled curriculum; and
- an emphasis on innovation at a school level so that the national policies are relevant within the local context.

While infrastructure remains important, these respective policy positions have progressively changed their emphasis from technological infrastructure, to a focus on issues of information and technological literacy, community integration and the everyday use of ICT. Like Hong Kong and Singapore, there is an emphasis on discipline knowledge that is underpinned with the development of generic capabilities supported with the use of technologies.

School education in Finland operates through a decentralised model where school principals have the authority and responsibility to implement policies within their schools. A research report in 2006 however, indicated that school principals had negative attitudes towards the role of ICT in schools. Only 5 percent of principals of lower secondary schools considered ICT very important for changing the performance of school students (OECD, 2008). Like Singapore and Hong Kong, there is increasing recognition in Finland that to bring about the changes they are seeking, requires the leadership of school principals.

**Technology trends**

Schools in each of the three countries studies have an IT infrastructure in place within the school. The policies for ICT in education in Finland, Hong Kong and Singapore suggest that there is a move away from school-provided desktop computers, to mobile devices. In Hong Kong and Finland there is a move towards ‘bring your own devices’ (BYOD). There is an increasing emphasis on the use of data about students’ performances within the classroom and on national and international tests, to inform the work of teachers. To that end, the use of learning analytics and big data sets to inform pedagogical practices is on the very near horizon. All three countries initially placed an emphasis on establishing a workable IT infrastructure. Over the two decades of the respective policies reviewed in the three countries, infrastructure has remained a priority as technologies have changed and the speed of bandwidth has increased. There is a recognition emerging that teaching students how to program and code, is a literacy required in the 21st century. In addition, the role of the school principal in supporting teaching and learning with technologies is now emerging as critical. To support this work the use of handheld and desktop IT administrative solutions for school leaders are being released onto the market.

**Conclusion**

There is a high degree of homogeneity in these three nations’ respective school education policies that relate to the use of technologies for teaching and learning. The policy settings in each of these countries share similar and consistently held trajectories, that have been consistent over the past two decades. Periodically these policy settings have been reviewed.
and priorities sustained over time. There is an increasing integration of policy initiatives where ICT is seen as integral to rather than separate from the core curriculum studies undertaken at school. Furthermore, the most recent policies put an emphasis on the role of the school principal for leading whole school change. All three countries are increasing the autonomy of schools within a national system, which also increases the dependency on school principals to take a leadership role, in supporting teaching and learning with technologies.

The students in Finland, Singapore and Hong Kong, perform highly on international tests such as the PISA, TIMSS and PIRLS and these countries also rate highly on the World Economic Forum’s assessments of a country’s ‘networked readiness’ and of their international competitiveness. In these countries, along with a consistent and sustained emphasis on including technologies in teaching and learning, these policy initiatives have been well-funded and have had support at the highest levels of government. Over time there has been a broadening of the emphasis on learning with technologies from fostering pedagogies to encourage the learning of discipline knowledge, to more recently also fostering ‘smart learning’. The most recent policies from Singapore, Hong Long and Finland have more explicitly focused on the role of school principals to support innovative ways of teaching and learning with technologies, in their schools.

There are many challenges and dilemmas that face school leaders who are trying to foster quality learning with technologies. In the policies of the countries reviewed here, there are emphases placed on self-directed and collaborative, student-centred learning; on attracting and retaining high quality teachers and school principals; and encouraging students to consistently perform highly in relation to their own innate abilities. These countries have dedicated policies for the implementation of technologies in teaching and learning, and principals, to varying degrees, are recognised as critical to the achievement of ‘smart learning’. In these countries, principals are supported to employ multiple leadership styles that include support for teaching and learning with technologies, and these respective styles of leadership are formally valued by the communities in which the principals work. The policy settings used in these three countries is achieving the outcomes they are seeking. The challenge for less successful countries is to determine whether there are messages and lessons that can be learnt from these countries, and applied to their own specific settings. This challenge is before us.
Reference Citation


Chen, K. (2011). ICT in Education: a Hong Kong perspective. Briefing for UK ICT in education connections, Education Bureau, Hong Kong Special Administrative Region, Hong Kong


Education Bureau (2014). Fourth Strategy on Information Technology in Education (ITE4) - Realizing IT Potential: Unleashing Learning Power,


