Editorial

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1 Introduction

In the 21st-century, the demands and complexities of empowering learners with broader learning experiences pose a key challenge to schools. Given the increasing and continued emphasis on students' 21st century competencies, research on educational changes and innovations are looking into re-configuring students' learning experiences beyond narrow curricular and assessment outcomes, especially in contexts which privilege high-stakes examination achievements as an educational objective, intended or otherwise. However, educational practices are generally slow and resistant to change. Research in many areas such as educational neurosciences and learning sciences have advanced our

knowledge and understanding about learning and teaching and how to bring about deeper learning and change in our learners. Despite the availability of such empirical evidence, schools and educational systems are facing persistent issues and challenges in embracing and translating such new knowledge into day-to-day classroom instruction and practice. Given the historical and social contexts of schools and schooling, education systems are struggling with the sheer challenge of having to re-contextualise and re-culture learning and teaching in schools. For largely these reasons, instead of adopting systemic changes for improvement, educational change and innovation in many national systems have been sporadic, piecemeal, restrictive, and ultimately unsustainable.

This special issue aims to explore the multiple contexts, processes and outcomes of educational and school innovations, and to raise awareness of possible issues and challenges faced by educational systems, schools and teachers in this endeavour. Such understanding can provide educators with insights into how to realise sustainable innovations. The special issue attempts to raise several critical issues: When facing new situations, how do schools address shifting demands and innovate? What are some of the key leverages that might help to advance thinking about change among educators, and reconfigure curriculum and practice in the classroom? Does change ensure improvement? Does change need to be large scale? What are some of the issues in school improvement and teacher change? What are some key characteristics of innovators that drive innovation or improvement? What is the role of students in school improvement? Titled "Re-configuring learner experiences: Opportunities and systemic challenges", this issue attempts to provide a timely discussion of not only how schools can improve but how education can change to develop learners, teachers and leaders with the capacity to innovate.

2 Contributions

Educational change and innovations suggest that schools initiate or be engaged in novel practices, tools or technologies, and knowledge and ideas (Cohen and Ball, 2007). Often, change can be so complex that it requires the involvement and leadership of multiple stakeholders: policymakers, school leaders, and teachers. While policymakers could institutionalise particular sets of practices, actual policy implementation may vary depending on the policy communication, school accountabilities, policy acceptance, tolerance, mutation or outright rejection. While policy intentions tend to prioritise student learning as an imperative to improve, actual outcomes may, therefore, fall short due to a myriad range of reasons. The majority of the contributions to the Special Issue attend to innovations that are initiated by researchers or schools, a ground-up approach to changing practice. These help to shed light on how learner experiences can be enhanced, or re-imagined, in ways that enable productive learning and identity formation to occur. For example, in re-configuring innovative educational practices, Ponnusamy et al. (2017) point to the use of metalanguage by school leaders as one of the key leverages to motivate and shape the educational innovation process. The use of metalanguage provides the intellectual space to stimulate the imagination of teaching and learning amongst the stakeholders within the school.

Although innovations can often be highly contextualised and uneven within schools, the implementation of such innovations should be seen as a function of design, adoption, and use (Cohen and Ball, 2007). Furthermore, the best innovation designs would be of little use if they could not be implemented widely and deeply. Besides the leadership of school leaders, the role of teachers making meaning of the curriculum and learning is a significant factor in educational innovations. Cohen and Ball (2007) identify the need for implementation strategies that are self-sustaining and at scale. One such strategy is intensive, sustained support for continuous professional learning aimed at change sense-making. Soong and Comber's case study on an imagined 'haven' for refugee Muslim families in a school shows new ways of thinking and doing, both in and beyond the schools. In particular, teachers in the school were provided professional learning opportunities to develop a 'language of empathy' to understand cultural and religious differences and diversities. The study finds that it takes time and perseverance to contest the deficit discourses that surround refugee students and their families. Additionally, the school community has to work across many sites of practice to realise the school as a hopeful and enabling place for all students.

Importantly, teacher professional learning and development becomes an integral part of ensuring fidelity and alignment of educational innovations. If "teaching (is to) be a learning profession" (Goh, 1997, p.23), then there is a need to develop avenues for learning, as teachers carry out their work. Creating a culture of professional excellence requires nurturing the individual and collectively motivating the profession to achieve educational excellence and equity (Teo, 2001). For professional development to influence teacher capacity and practice, it is important that the professional development design and implementation embraces core features of quality professional development highlighted by multiple researchers, both within and across school settings (e.g., Borko, 2004; Desimone, 2009; Garet et al., 2001; Sachs, 2007). These features include providing teachers with

- deep domain understandings and how students think and learn in the domain
- opportunities to engage in exploration, reflection, and discussion with colleagues
- activities that attend and respond to students' thinking in classrooms
- contexts for collegial sharing, collaboration, and follow-up support for substantial periods of time.

Often, professional development adopts a cognitivist stance with the underlying assumption that knowledge can be packaged and transmitted. This perspective has limitations because

- it de-emphasises tacit knowledge
- it assumes knowledge acquired is applied in practice
- it does not acknowledge that knowledge is distributed across the community (Kelly, 2006; Webster-Wright, 2009).

Quality professional development, therefore, needs to embrace a contextualised view that engages teachers in authentic, complex problems in the school context (Borko, 2004; Bound and Middleton, 2003; Putnam and Borko, 2000). Teacher learning occurs by participating in socially organised activities in, within, and across school settings.

Viewed this way, a professional development not only increases teachers' capacities to make informed judgements and solve complex issues collaboratively, it becomes crucial for personal and school growth. Subsequently, teacher learning involves an iterative, dialectical process of engaging in practical and teacher knowledge, and addressing complex problems using research and evidence. Greany and Maxwell (2017) present evidence that collaborative research and development (R&D) can enhance the ownership of change among participating teachers, and can ensure that innovations are based on evidence. For them, an effective continuous professional development and learning (CPDL) can be achieved through integrating it with R&D within and across schools to develop teachers' professional knowledge. It is through the interplay between CPDL and R&D that teaching can become an evidence-informed professional endeavour.

Berliner (1992) points out that teacher expertise is contingent on the teachers' capacity to reframe classroom practices. Lieberman and Mace (2008) also highlight that teacher learning is the key to educational reform. The heavy emphasis on teachers as change agents places tremendous pressure, and accountability, on teachers to ensure that improvements occur. This can be narrow, and potentially naïve, the perception of teachers leading change especially when one considers the presence of multiple levels of enablers and inhibitors across any educational system that can shape any teacher's work and practices. In comparing the pathways of two schools in implementing pedagogical innovations for improving student learning outcomes through technology-mediated inquiry-based pedagogies, Seow et al. (2017) show that context and school practices are pivotal in shaping the school's enactment of innovation and attention needs to be paid to the roles of participants involved in the innovation. Such contextual issues in the implementation of pedagogical innovations can shape the breadth and depth of change.

Besides the key leverages at the system and organisational level and how innovation benefits teaching, learning and professional development, this Special Issue also highlights how students have a voice in educational innovations. Meixi's (2017) paper explores how the legitimate participation of students in teachers' professional learning is key in shifting power relationships through student ownership of ideas and dialogues to deconstruct teachers' deficit beliefs about students. On the nature and characteristics of innovators, Shavinina's (2017) points to the significance of micro-social factors such as good schools and great teachers in nurturing innovator potential to the fullest. Her rich descriptions of the histories, developments and journeys of Nobel Prize laureates help us to draw implications for schools to re-think and re-frame curriculum to facilitate students' interests and curiosity in learning, how teachers can recognise diverse students' learning needs, and go beyond the prescribed curriculum to inspire students. Teachers and schools are the significant others in students' lives, especially teachers who are sensitive to noticing early signs of talent and suggest an individualised pace of learning, and schools that create a space for accelerated education for talented students.

3 Synthesis

While the focus across all six papers in this special issue is around educational innovation or the innovators themselves in the case of Shavinina's piece, we can discern a number of common themes which help shed light on the issue of re-configuration of learner experiences (Table 1).

Table 1 Synthesis of special issue contributions

Author(s)	*Context imperative*	*Innovation*	*Mechanisms*	*Agents/actors*	*Outcomes*	*Challenges*
Soong and Comber	• Changing demographics of students and need to re-imaging schooling because of new school 'ethnoscapes' • Increase need for inclusivity in schools • Address deficit beliefs	• 'Explicit practices in the school designed to create a 'safe haven' for all their refugee students, including the Muslim families''	• Reculturing mechanisms: • Supportive leadership • Community partnerships • Place-based mechanisms involving communities in and outside of school • Whole school approach • Professional development • Everyday innovations • Language of empathy • Mind-up curriculum	• Ecological: • Whole school effort – leaders, teachers, as well as community organisations, church parish, local residents	• School ethos of belonging • Imagined haven for refugee students and their families • Changed beliefs of teachers	• Reculturing – challenging and unscripted • Time needed – seven years to remove fragments of deficit discourses among staff
Meixi	• Increasing student agency, participation and student voice in the improvement of teaching and learning in school	• Inclusion of students in teacher professional learning settings	• Community based design research that generated an 'open' learning ecology	• Teachers and students	• Changed beliefs of teachers • Changed school culture including changed power relations between teachers and students • Student ownership of learning • Reimagining of who (teachers or students) do the work of teaching and learning	
Ponnusamy et al.	• Need for greater curriculum integration across disciplines	• Curriculum integration that generates arts-anchored learning experiences to promote creating thinking and learning	• Metalanguages – organic communication patterns that connect learners' experiences and professional meaning making. They are the meaningful abstract concepts and synonyms for connected learning across the different disciplines in the integrated curricula • Langauge and vision of curriculum integration shapes and sustains process • Personal meaning making of curriculum design and implementation drives and is driven by metalanguages	• Ecological • Whole school approach • Leaders • Teacher teams	• Increased teacher agency in curriculum design	• Teacher capacities in curriculum design, pedagogical repertoire.

Table 1 Synthesis of special issue contributions (continued)

Author(s)	*Context imperative*	*Innovation*	*Mechanisms*	*Agents/actors*	*Outcomes*	*Challenges*
Greany and Maxwell	• Increasing teacher ownership of change • Increasing Evidence-informed school improvements	• School based innovation efforts based on evidence and driven by CPDL	• Ownership of change process through collaborative R&D • Situated practice • Supportive systems and processes • Effective leadership • Collaborative R&D activities to increase critical reflection • Deeper discourses around T&L • Collaboration across schools • Committed, skilled, enabling leaders at all levels • In-school project facilitators to drive momentum • School cultures, policies and structures to provide time and support to teachers to engage in R&D • Cross-school infrastructures to support R&D • Broad strategic and coherent approach to school improvement priorities	• School leaders • Teachers • HEI partners • Across schools	• Evidence-informed innovation in schools • Teaching as an evidence-informed professional endeavour • Changed attitudes towards role of R&D in teaching • Genuine collaboration across schools	• Time • Resource constraints
Seow et al.	• Improving primary science inquiry T&L through pedagogical innovations	• Technology-mediated inquiry-based pedagogies in science	• University school ministry partnership to drive pedagogical innovation – researchers and schools • Supportive school leadership • School infrastructure to support innovation • Trust between change agents • Practice dissonance • Teacher collaborations • Student voice motivating innovation • Embodied practice to drive sustainable change • Developing teacher capacity for curriculum design and pedagogical innovation	• Tripartite relationship • Leaders • School teachers • Students	• Increased teacher professionalism • Innovation scaling up • Increased student engagement and self-directed learning • Changes in teacher beliefs • Improved teacher design capacities	

Table 1 Synthesis of special issue contributions (continued)

Author(s)	*Context imperative*	*Innovation*	*Mechanisms*	*Agents/actors*	*Outcomes*	*Challenges*
Shavinina	• Fostering next generation of scientific innovators through understanding the history and education of Nobel Prize winners		• Nuclear and extended families – community, network of support • Outstanding teacher – talent development, passionate, open • Good schools – outstanding teachers, accelerated education, CCAs, acting as significant others to compensate for lack in family environment • Early interest in science – sensitive periods • Parents – expectations, environment, interest stimulation, opportunities • Extended family – interest, role model • Interdisciplinary • Curiosity, love of learning, easiness in learning	• Family • Network of support • Teachers • Schools		

3.1 Innovation and the context imperative

As Greany and Maxwell rightly point out, innovation suggests "doing things differently in order to do them better". It suggests a "change in emphasis or approach aimed at securing measurable benefits". Drawing from Shavinina's work with Nobel laureates that suggests that innovators are those "who can produce new solutions to environmental, energy, security, and food challenges", innovation and innovators both imply a continuous process of change for some benefit, be it pedagogical, social or societal. It is in this spirit that all authors are deeply engaged, and passionate about educational innovation or in the case of Shavinina, innovation education. The context imperatives may differ across the authors but they focus on a deep sense of the need to improve current or existing beliefs, practices, ways of understanding and changing the nature of teaching and learning. In the case of Soong and Comber, it was the changing demographics of students and the need to re-imaging schooling to accommodate new school 'ethnoscapes' to allow for greater inclusivity and at the same time address entrenched deficit beliefs that can disadvantage particular students. In Meixi's case, it was the need to increase student agency and participation in the improvement of teaching and learning in schools. Curriculum and pedagogical improvements drive the work of Ponnusamy et al. and Seow et al., while increasing evidence-informed school improvements is seen to be an important area of change for Greany and Maxwell. Shavinina takes a different approach to innovation by focusing on innovators themselves, in addressing the need to foster the next generation of innovators in science. Hence, while the actual innovations may differ – from curriculum to pedagogical to professional learning – across these is the perception that the status quo needs to be tackled to improve education as a whole, for all learners.

3.2 Innovation actors and processes

The majority of the contributions point to the need to take a systemic or ecological perspective when it comes to embarking on innovations that will generate deep-seated, entrenched and sustainable change. This applies particularly to the actors or agents involved in innovations. In the case of Soong and Comber, it is a whole school effort as well as involvements of the communities – church parishes, community organisations, local residents. In Ponnusamy et al., it is also a whole school innovation involving multiple actors, from teachers, teacher teams and school leaders. In Greany and Maxwell, innovation requires not just school leaders, but teachers, higher education institute partners, and collaborations across schools. Seow et al. leverage on strong tripartite relationships between the teacher education institute's researchers, the education ministry, and schools, as well as school leaders, teachers, and students. It is Meixi's contribution that is unique in drawing in students as a potential agent of innovation. After all, most if not all innovations focus on the key outcomes of improving student learning and re-configuring learner experiences, and it would be glaringly obvious if students themselves are not part of any community or systemic engagement in innovation.

Due to the highly contextualised nature of innovations, the various processes described in the contributions to the special issue vary significantly. Some commonalities do present themselves. First, given the need to sustain innovations, in the cases of Ponnusamy et al., Seow et al., Greany and Maxwell, Soong and Comber, school leadership plays a critical role in supporting innovation, creating the space for innovation,

or driving innovation directly or indirectly. Second, in a number of contributions, there is a need for a common language to anchor the innovation or to enable productive discussions and sharings of it. Ponnusamy et al. terms this 'metalanguage', although a strong similarity can be made to the notion of 'boundary objects' which are artefacts or languages that bridge different communities or sites, or do the work of crossing between communities or sites (Akkerman and Bakker, 2011). Language as a boundary object enables different actors, communities, to better understand each other and subsequently work together productively, an essential characteristic of any systemically-oriented innovation. Related to this is the third common factor – the need for collaborations and partnerships within and across boundaries (classroom, school, community). Greany and Maxwell's contribution, in particular, cement the importance of collaborations in the context of generating sustainable evidence-informed school improvement, likewise for Seow et al.'s pedagogical innovation into science inquiry which leverages on university-school-government partnerships. Shavinina's work on innovators also points to the role of families, teachers and schools in developing talent and innovation capacities in learners. Finally, innovation and learning are heavily intertwined, be it student learning, teacher learning or school improvement. School-based innovations tend to be driven by professional development and learning, with Greany and Maxwell advocating for a model of CPDL interlinked to R&D efforts to generate sound innovations.

4 Challenges

From these contributions, common challenges to innovations centre around time and resource constraints. In Soong and Comber's case, seven years were needed to remove fragments of deficit discourse among staff. In Seow et al., sustaining and driving innovation also requires improvements to teacher capacities in curriculum design and increasing their pedagogical repertoires. Such challenges to pedagogical innovations can be addressed if the model proposed by Greany and Maxwell is utilised to improve teacher learning. These issues, non-trivial as they are, should not deter, nor discourage, the opportunities to re-configure learner experiences through educational innovations, as our contributors have amply shown.

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