Teacher education in Singapore: Charting new directions

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Singapore`s limited resources and need for extensive international engagement have privileged human capital development and thus made education a high policy priority to ensure its responsiveness and relevance. In three decades Singapore unified a fragmented teaching force, set high benchmarks for recruitment, preparation, deployment, and career development. Singapore`s present well-deserved reputation for educational quality, as represented in various international assessments of student achievement, can fairly be attributed to the quality of its teachers. Recognising the opportunities and challenges presented by globalisation, Singapore is seeking to transform its education system from an efficient, industrial era model into one more appropriate for the knowledge-economy. Major reforms are seeking to create more responsiveness to a variety of student needs, abilities and aspirations. There is now much more choice and multiple pathways, curriculum has been broadened, and assessment reforms are being considered. Recognising that such changes can only be successively implemented if teachers have both capacity and confidence, the Ministry has increased opportunities for professional upgrading while the National Institute of Education has redesigned the initial teacher preparation curriculum and introduced a new Masters in Teaching. A huge investment has also been made in education research to aid evidence informed policy and pedagogic change. In this paper we examine these changes in detail and assess prospects for successful and sustained change.

Keywords: Singapore education; globalisation; pedagogic change

Introduction

One of the more enduring threads in the education discourse of the last two decades has been the identification of radically transformed education contexts as a result of globalisation and the increased use of technology in all spheres of life, private and public. In large measure, the main focus of discussion has been on the specification of 21st century skills and the need for students in schools to master these skills. Many technology providers like Microsoft, Cisco, Intel; book publishers like Pearson; consulting companies like McKinsey have become involved in the education reform business. The last decade and a half has also seen the emergence of international student ranking lists such as TIMSS, PISA, PIRLS, Olympiads, which has put tremendous pressure on education ministries. A response to this pressure of 'rank and shame' has been a flurry of education reform initiatives. From

Delhi to Sau Paulo, Washington to London, Seoul to Jakarta, change and reform are on top of the education agenda.

While there are broad similarities, there are many context-driven differences. In the US and UK, there is concern with unsatisfactory levels of literacy and numeracy and reform efforts often seem to have a 'back to the basics' orientation. On the other hand, policy makers in East Asia who have built up effective high performing systems are looking to build on firm foundations for the next necessary stage of education evolution. They appear to have taken on the mantra of 21st century skills to a much greater extent.

Notwithstanding similarities and differences in almost all policy contexts, there is renewed emphasis on teacher and teaching quality, issues around recruiting more able candidates into teaching, and issues around reducing attrition, performance appraisal, incentives and related areas in teacher quality (Barber & Mourshed, 2007; Mourshed, Chijioke, & Barber, 2010). Apart from efforts to make teaching more practice-based as in the UK or to attract talented candidates as in Teach for America, relatively little attention seems to have been given to the design or redesign of teacher education programmes, and how they may need to be retooled for a more diverse educational landscape and the more challenging teaching-learning tasks envisaged by the 21st century skills challenge.

Singapore has earned a justifiable reputation for creating in four short decades, a high performing system from a very unpromising colonial heritage (Barber & Mourshed, 2007; Darling-Hammond, 2010; Gopinathan, 1974). The state had to expand schooling opportunity, modernise the curriculum, align schooling outcomes to labour market needs, and consolidate a colonial system of segregated schooling. Teacher education, in particular, was a major challenge – across all domains e.g. selection, curriculum, service conditions - and the new state had to innovate. An Institute of Education was established in 1974 to replace the Teachers Training College (Chen, 2010; Gopinathan & Ho, 2000; Sharpe & Gopinathan, 1993) and to date, it is the sole teacher education institute that serves the professional learning needs of beginning and in-service teachers.

There are some singularities in the Singapore context that need to be taken into account. One of Singapore's strengths is due in part to its small size, but in greater part, to a determination to succeed via excellence in policy formulation, infrastructure and services. Education, training, and employment are seen in systemic terms, as linked, necessitating a 'joined up government'. The economic changes due to recessions in the late 1980s, 1990s and in the last decade had almost always led to reviews of education policy and practice (*Report of The Economic Review Committee* 2003)

There are many accounts of the evolution of teacher education in Singapore (Chong & Gopinathan, 2008; Gopinathan & Deng, 2006; Gopinathan & Ho, 2000; Gopinathan & Sharpe, 2002; Hogan & Gopinathan, 2008; Sim & Ho, 1990) among others; we will not therefore pay much attention to the evolution of the system. Rather we position our analysis in the broader contemporary context within which teacher education has to operate. While NIE graduates 2000 plus teachers annually, there are some 31,000 teachers practicing their craft on a daily basis. Additionally, many state-led policy initiatives in education have been speedily implemented in Singapore. Such policy-led initiatives in teaching-learning environments in the schools had, by the early 1990s, enabled the system to begin the journey to pedagogic transformation. It is our belief that a productive synergy needs to exist between initial teacher training, professional development (PD) and in-situ teacher-led, school-based changes if substantive pedagogic change is to be achieved. Singapore is one of a few national level sites where substantial change is happening in all three domains (see especially Hogan and Gopinathan, 2008). Therefore, in this paper, we seek to address the following:

- How are Singapore's education policies and structures responding to globalisation?
- To what extent has pedagogic change occurred in schools?
- How enhanced are teacher capacities to meet the challenge of pedagogic change?
- Within this context, what is the promise of Teacher Education 21 (TE21) and what implementation challenges does it face?

Early response to globalisation: Assessing educational outcomes and teacher capacities

By the end of the 1980's, Singapore's education system had become successful in providing for the nation's socio-economic needs. However, the rapid pace of globalisation meant that other nations in the region were catching up in terms of development and were able to provide cheaper skills for their industrializing economies. This led to concerted efforts by the government to develop and expand the national economy into higher value-added industrial activities, finance and banking, tourism, as well as research and development. This meant that the education system needed to be re-engineered to provide workers with skills relevant to its new economic ambitions (Sharpe & Gopinathan, 2002).

The re-engineering of the education system was preceded by a re-think of the aims of and processes for education in Singapore. Two reports, "Towards Excellence in Schools" (1987) and "Improving Primary School Education" (1991) led to a re-shaping of the system. The earlier report led to devolution and greater autonomy, whilst the latter led to changes that enabled more students to successfully complete 10 years of education. Almost a decade later, the Thinking Schools, Learning Nation (TSLN) initiative, introduced by then Prime Minister Goh Chok Tong at the 7th International Thinking Conference in 1997, was a vision for a total learning environment, including students, teachers, parents, workers, companies, community organisations and the government (Goh, 1997). It aimed to move Singapore education from a teacher dominated, examination-oriented system to one focused on lifelong learning, thinking skills, problem solving and greater autonomy for schools and teachers to act according to professional norms. Specifically, TSLN resulted in the creation of three curricula, namely Critical and Creative Thinking, National Education, and Information Technology, which were intended to and did substantially affect curriculum, teaching, teachers and assessment (MOE, 1998). The subsequent Teach Less, Learn More (TLLM) initiative (Lee, 2004), was intended to follow up and further extend the pedagogic changes initiated by TSLN. Substantive changes in pedagogy were mooted such as engaging learners in more hands-on exploratory activities, and giving them opportunities for problem-finding and solving. There were also initiatives to move away from the measurement of achievement based on paper and pencil examination results and towards greater use of alternative formats such as project work.

Charting new directions for teacher education

On the teacher education front, the National Institute of Education (NIE) was established as a specialist institute within Nanyang Technological University (NTU) in 1991; one of its aims was to increase the number of graduate teachers joining the education service especially in the primary education scene. In the same period, NIE developed and implemented its very own B.A (Edun.) and B.Sc. (Edun.) programmes and stepped up research initiatives. These were in fact efforts to "universitize" teacher education. Such a

trend ran counter to the experiences of most teacher education departments in the English speaking world. NIE is structured around academic departments that combine both content and pedagogy staff. This has allowed NIE to control content preparation at a level and in a manner appropriate for primary teaching. It has also brought about useful synergies between content and pedagogy preparation for pre-service teachers; the resulting pedagogical content knowledge focus has been a major strength of the NIE model (Sharpe & Gopinathan, 1993). The TSLN and TLLM initiatives led to changes both in the initial teacher training programmes and the PD courses. For instance NIE established a Centre for Teaching Thinking to enhance teacher capacity to teach thinking skills and a Classroom of the Future to make teacher trainees more aware of the education possibilities of ICT.

Responding to perceived weakness in learning: Implementing TSLN and TLLM

The greater emphasis on engaged and effective learning in the TSLN and TLLM initiatives required some creative responses. The examples discussed below are illustrative of the ways in which policy initiatives were translated into curricular and pedagogic strategies.

In the primary education, two curricular / pedagogic initiatives were introduced: Strategies for Effective Engagement and Development (SEED) and Strategies for English Language Learning and Reading (STELLAR). Whilst SEED advocated more engaging strategies across all subjects for Primary One and Two learners, more specific strategies were recommended and developed by the Curriculum Planning and Development Division to enhance reading and literacy skills through the STELLAR programme for the upper primary levels. Recent research has shown that primary schools have been successful at implementing policies like SEED and STELLAR as is evidence by the resemblance of pedagogical practices across subjects and the fairly uniform infrastructure of adaptation(Silver et al., 2011). At the same time, research has also pointed out that implementers have not been successful with encouraging greater sustainable innovation and that tensions existed because of existing structure (Hogan & Gopinathan, 2008; Silver, et al., 2011), observation that have led the Ministry to approach teacher learning in Singapore in other ways which is discussed later in this article.

Another example of Ministry activism in seeking to enlarge teacher pedagogic repertoire was the dissemination of the "TLLM Ignite!" package to selected schools. This was intended to catalyse School-based Curriculum Innovations (SCI) and the "PETALS: The Teacher's Toolbox" to all schools was intended as a resource for the development of ground-up initiatives to engage students and better cater to their learning needs. PETALS is a research-based package designed to help serving teachers think through the requirements of new instructional strategies. It emphasised five dimensions – Pedagogy, Experience of Learning, Tone of Environment, Assessment, and Learning. The aim was to support ground up initiatives in school-based curriculum customisation, integration, differentiated instruction, inquiry and problem-based instruction.

The Project Work initiative is yet another example of the Ministry's efforts at getting teachers to adopt engaging instructional practices. As a component of school work, Project Work aims to provide opportunities for students to synthesise knowledge from different areas of learning and critically and creatively apply it to real life situations (MOE, 2011). Four learning outcomes are articulated for project work, namely knowledge application, communication, collaboration and independent learning; clearly, these arise from the need to respond to the 21st century skills imperative. Since 2003, project work has become a compulsory subject for university admission for all junior college students. In 2003, the assessment criteria was streamlined to focus on Knowledge Application and Communication

outcomes, and less emphasis was placed on the rather tedious and routine outcomes of project work such as recording and keeping track of collaborative processes (Bryer, 2006).

Other changes that came about as a result of the TSLN included modifications to the assessment system. The Science Practical Assessment (SPA) in 2006 replaced the existing one-time practical examination that had been a component of all Science examinations taken by final-year secondary school students in the GCE O Level examinations. While the earlier examination was premised on assessing the pupil's laboratory and analysis skills at the end of the course of study, the new SPA had a greater emphasis on course work throughout the 2-year study of science. This, it was assumed, would result in better and more engaged student learning and for the teacher a better understanding of the student's learning growth and difficulties over a period of time.

Future schools initiative

In line with the Masterplan 2 for ICT in Education which was launched in 2002, the Ministry announced that a core group of FutureSchools would be established to harness ICT more effectively for engaged learning and keep education relevant in preparing students for the future (MOE, 2009). FutureSchools are test beds for ICT enabled pedagogic innovation intended to lead the way for other schools by providing possible models for the seamless and pervasive integration of ICT into the curriculum. The expectation is that the FutureSchools initiative will increase pedagogical innovations and transfer across teachers and thus increase teacher capacity. The Ministry's establishment of six FutureSchools in 2008, which it intends to develop in phases to 15 schools by 2015, is in alignment with the bigger Infocomm Development Authority's (IDA) vision of enhancing the competitiveness of key economic sectors and building a well-connected society (IDA, 2010). A phased approach have been adopted so that the technologies used are the most up-to-date in each phase, as well as allowing the FutureSchools to leverage on the learning points gleaned from previous phases. An $80 million investment fund, provided by the IDA, National Research Foundation and industry players, has been established for such schools to leverage on next generation technologies.

Building capacity, empowering teachers

The TSLN initiative, being cognizant of the need for teachers to have more space and professional autonomy, hoped to promote a culture of reflective practice in schools. In this light, action research, that allows practitioners to arrive at a critique of their educational work and work settings (Kemmis, 2001), was actively promoted and teachers were encouraged to reflect on and study their teaching in greater detail to promote better instructional practices . This start to a culture of teacher-led research and reflection was given a boost by a major PD innovation, the setting up of the Teachers Network in 1998. The Teachers Network hoped to build a fraternity of reflective teachers and to serve as a catalyst for teacher-initiated development that would ultimately lead to self-mastery, professional exchange and collaborative learning (Tang, 2000). In this respect, the Teachers Network is seen as an active agent that promoted bottom-up approaches to pedagogical change. Through its conceptualization and operationalisation of its own version of Learning Circles, it became the promoter of an early form of action research amongst teachers in Singapore schools (Somekh & Zeichner, 2009). Since its onset, several full scale action research projects have been completed, with the learning shared through books, articles and teacher development programmes and subject to critical evaluations by both

local and international educationists (MOE, 2006; Soh, 2006; Tan, Macdonald, & Rossi, 2009).

Aspiring to an even higher target of excellence in professional development and standards that would bring about deeper and sustained teacher learning and thus sustained pedagogic change, NIE led schools and teachers in the Lesson Study movement. Given the potential to foster reflective practice, the Ministry has also been actively promoting its use in Singapore schools. Lesson Study is based on a social theory of learning focused on learning within a social context; it allows teachers to act as colleagues and peers, fosters critical yet respectful evaluation of teaching and adopts a cycle of planning, teaching, evaluating, followed by the fresh implementation of the updated lesson plan. Lesson Study has been widely credited for the improvement of classroom practices in Japan (Stigler & Hieber, 1999; Wang-Iverson & Yoshida., 2005). Some 60 schools to date have taken up Lesson Study in a bid to encourage reflective practice amongst teachers (Fang & Lee, 2010). A large corpus of lesson study projects in many subject areas has been undertaken, with many being collaborative efforts between NIE's research staff and school teachers, with grants provided by the Office of Education Research at NIE or the Ministry of Education (Towndrow, 2005; Towndrow, Tan, & Soo, 2009; Towndrow, Tan, Venthan, & Dorairaju, 2006; Yanping, Lee, & Haron, 2009; Yeap & Ho, 2009). In a recent review of such research, it was found that such close collaboration between teachers and educational researchers are encouraged by the intricate and delicate interrelationships that exist within and across adopters, innovators and environments(Towndrow, Silver, & Albright, 2010). Hence, there will be a need to address these inter-relationships in the context of specific schools and teachers for the full potential of Lesson study to be realised.

MOE's initiatives in helping schools build communities of practice is yet another effort that is intended to build on teacher capacity, as indicated by the then Minister of Education (Ng, 2010). Wenger advocates the use of communities of practice to enable teachers to engage in a process of collective learning, just as a group of doctors or engineers would do to improve their practice (Wenger, 1998). Such communities of practice bring about better practice by tapping on in-school expertise and collegiality and move professionalism beyond individual teachers to the wider school community and therefore create a culture of teacher learning. Such communities of practice have spawned much needed critical inquiry of practices as in ICT-based project work (as product) and teacher learning processes) (Hung, Chee, Hedberg, & Thiam Seng, 2005; So, Losman, Lim, & Jacobson, 2009).

Such initiatives reflect the deep commitment of the Ministry in changing classroom practices through the introduction of new pedagogies and assessments suited to 21st century leaning. Beyond the concomitant emphasis on building teachers' reflective practices through action research and lesson study, the Ministry of Education facilitated the setting up of capstone institution, the Academy of Singapore Teachers (AST). The AST is tasked with the overall vision of building the Singapore teaching fraternity to be a world-renowned model of professional excellence. This is a bold step intended to boost teacher professionalism and expertise in the journey towards a new, future-ready pedagogic landscape.

The new consensus views teachers as knowledge professionals who are only likely to be committed and productive change agents if they have the capacity and space to perform their tasks. It is recognised that there is now a deep need to ensure that teachers move from seeing themselves as implementers of the curriculum to having "... the deep understanding of content and pedagogy which enables them to transform (organise, adapt, present) content in ways which are powerfully responsive to the particular characteristics of learners, curricula and teaching environments"(ACDE, 1998, p. 12). There is at least implicitly an expectation that teachers and schools will "problem-find" and then turn to their own and

other relevant bodies of expertise and knowledge to support the necessary changes in pedagogic practices (Ball & Cohen, 1999; Guskey & Huberman, 1995; McLaughlin & Talbert, 2006).

The transitions made as a result of all of these initiatives can best be described as a "work in progress." It is now acknowledged that substantial pedagogic change takes time and is the result of the interaction of a number of factors – teacher capacity, examination reforms, policy support, institutional autonomy to name a few. The loosening up of pedagogic space has resulted in some changes. Schools like Raffles Girls Secondary School and Northlight School are responding to their students' different learning needs in innovative and customised ways. Hogan and Gopinathan (2008) summarise the current pedagogic scene in the following manner: "the enacted curriculum in Singapore schools is characterised by limited disciplinarity as indicated by a limited focus on advanced concepts, knowledge application, validation of knowledge claims and generation of knowledge that is new to students. Teacher dominated instructional practices prevail within classrooms. There is little instruction but considerable evidence of a very tight coupling between the high stakes examination system and classroom instruction." (p. 370) Other research in this area has pointed to effective top-down articulation of policy, but tensions exist especially when "existing structures (e.g., high-stakes examinations) sometimes countered newer initiatives (e.g., for student engagement through more group work or greater use of learning centres)"(Silver, et al., 2011, p. 2).

Despite fundamental revisions based on feedback from stakeholders, teacher capacity to implement project work have been weak and problems such as the lack of teachers' facilitative skills, the use of standard questions from a question-bank that allowed for rote-learned responses to questions posed during the Oral Presentation element of the assessment have surfaced (Bryer, 2006). Others argue that the structured nature by which Project Work in the JC years is assessed does not allow for the growth of creativity or group synergy and collaboration (Gill, 2007; Yeong, 2005). Clearly, while change has occurred, and the Ministry has responded well with a number of important initiatives, much more change is required We turn in the next section to another aspect of the ecology- the initial preparation of teachers.

Teacher education responds to TSLN and TLLM: The TE21 initiative

NIE's TE21 proposal seeks to build on its established strengths. It has always sought to design and implement a model that balances campus-based theoretical work with relevant sustained and supported classroom practice – it eschewed both an overly apprenticeship-oriented model and one that focused on the disciplines of education. Strong collaborative synergies with the MOE and the schools has enabled it to stay relevant in a shifting national context. The substantial investment in education research since 2003 has enabled NIE to accumulate a comprehensive body of evidence on pedagogic practices in Singapore schools, all of which is crucial to how it structures its initial teacher education programmes. TE 21 has been crafted some of the understandings from such evidence, as well as from feedback provided by its principal stakeholders, schools and the Ministry. The TE21 Framework has identified that following six drivers to raise the quality of teacher preparation.

NIE recognises how valuable its close collaboration with the MOE and the schools has been in its evolution as a strong institution and in enhancing its capacity to provide relevant and impactful programmes. The Enhanced Partnership Model (EPM) acknowledges this strength and sees it as a foundation on which to build programme improvements.

The EPM is intended to further strengthen the collaborative framework of shared goals while recognising the need for mutual respect for each partner's roles, beliefs, perspectives, experiences, expertise and knowledge.

1. **The VSK model**
   The emphasis in this model is on what is termed 'three value paradigms'. These are:
   - Learner Centred Values – these include knowledge of learner development and identity, caring for the learner, and believing all students can learn.
   - Teacher identity Values – these are represented by high standards, professionalism.
   - Values of Service to Profession and Community – focuses on teachers' commitment to professional growth through active collaboration.

2. **The TE21 framework**
   The TE21 Framework articulates explicitly a set of expected graduand competencies. What is perhaps unique here is that an explicit connection is sought – with MOE's competencies for beginning teachers which are along three dimensions – professional practices, leadership and management and personal effectiveness. It is hoped that such an alignment will result in greater coherence and the use of a 'common language'. It is also expected to provide a framework for evaluating student outcomes and thus a measure of how well NIE is discharging its obligations to stakeholders.

3. **Strengthening the theory-practice nexus**
   The Practicum has been a particular challenge for teacher educators, especially in the postgraduate diploma programme, principally because a 30-week plus programme allows little time for integration, reflection and reflexive action. In the Singapore context, large enrolments of over a thousand aggravate the difficulties. TE21 seeks to minimise theory-practice gaps with a new emphasis on reflection, experiential learning, and action based on school-based research.

Specifically, the plans are to strengthen mentoring via a structured Mentorship Preparation Programme, provide for links between the practicum mentorship to beginning teacher induction period, and to include Professional Learning Inquiry Sessions, utilising more extensively the experiences of practitioners, among other initiatives.

4. **Modelling best practices**
   TE21 also proposes greater attention to how trainee teachers are taught in NIE and advocates a 'modelling best practices in teaching' approach. It will identify core pedagogical approaches, aligned to what may be expected in transformative pedagogical teaching in schools in pursuit of 21st century competencies.

5. **Assessment Framework for 21st Century Teaching and Learning**
   The report recognises that proposed shifts in pedagogies must be accompanied by newer and more authentic forms of assessment. Through their assessment experiences in NIE, trainee teachers will have substantially improved assessment literacies. Again, a developmental approach, linking initial teacher preparation, beginning teacher, and experienced teacher has been adopted. Apart from specifying assessment competencies, the report proposes the use of e-portfolios as a tool aimed at developing the reflective teacher.

6. **Improving Teaching-Learning Environments**

    NIE has also invested in improving existing teaching-learning environments on campus. It recognises that much has changed in the schools, and that the new pedagogies proposed have to occur in conducive settings. Earlier, 'A Classroom of the Future' display employing existing technologies had been created to expose trainee teachers to newer ways of conceptualising learning environments. Mock-ups of a primary English classroom which is visually attractive, reveals possibilities for immersion in print, shows language in function ie directional signs; tutorial rooms have been upgraded to facilitate more student-centred collaborative learning; these rooms are intended to allow for greater technology-driven learning. A Teachers Language Development Centre has also been established to encourage self-directed and peer-to-peer learning designed to enhance English language skills (NIE, 2010).

A new and promising development in the type of PD provided by NIE is the Master of Teaching programme. It departs from existing programmes such as the Masters in Education by drawing upon new understandings of effective PD and in drawing systematically upon the knowledge and experience of effective practitioners. These practitioners called Professional Learning Mentors will act both as co-learners and guide participants in their in-situ learning. Three theoretical perspectives underpin this MTeach programme: that teacher learning is a continuum; teacher learning is best situated within communities of practice; teacher learning should build on a rigorous knowledge base, all of which have been derived from research about effective PD. What makes the MTeach unique is that it advocates new standards of excellence in professionalism for in-service teachers that goes beyond what is now prescribed in initial teacher education. In this sense, it envisages that MTeach graduates will be better able to transform teaching with effective and transformative pedagogical and assessment practices, conduct rigorous systemic inquiry while developing communities of practice that will be able to achieve the stated objectives of national educational policy reforms.

Issues and opportunities in the implementation of TE21

Clearly, many of the elements of TE21 are consistent with contemporary good practices. These include the stronger partnership between schools, the Ministry and NIE that have led to close mentoring of pre-service teachers through school based mentors and more comprehensive beginning teacher induction programmes, practices that have been advocated in the literature (Feiman-Nemser, 2003; Hammerness et al., 2005). Another good practice has been the consistently important emphasis placed on the teaching practicum element of initial teacher education programme that has been advocated as a necessary part of teacher learning that helps them to bridge the theory practice divide. These practices together with the establishment of graduand competencies in TE 21 are expected to lead towards developing the thinking teacher, arguably the most important part of the teaching and learning enterprise.

However, a significant issue that arises in the implementation of TE21at this point in time is with ensuring that the teacher learning processes being created by the TE 21 programme are consistently situative, social and distributed (Putnam & Borko, 2000), across the continuum as teachers move from the pre-service to in-service programmes . The issues that are faced by pre-service and in-service teachers are also different and thus systemic attention need to be given to deal with teachers learning in each context so that one feeds naturally into the other.

While TE21 draws on many different types of pedagogical tools in reaching pre-service teachers providing a situated environment to apply the learning is difficult to create for pre-service teachers. Firstly, there is inconsistency between the provisions for practicum between different batches of initial teacher education programmes, with the use of a 30-week practicum for the four-year degree programmes and 10-week one in the one-year diploma programmes. The much needed practicum experience is inevitably reduced in shorter programmes, and clearly this is not without its problems. Notwithstanding the school-based practicum and simulations in actual classrooms, much of the teacher learning in TE21 happens predominantly in university classrooms. Teacher educators will therefore need to identify key characteristics of field-based experiences that can foster newer ways of teaching. A greater use may need to make of micro-teaching and ICT-led simulations. In addition, there is also a need to select schools that are seen as good sites for such apprentice-style learning for the practicum modules and this can be problematic. Pre-service teachers will need to have constant access to such real learning environments in schools so that they can think, talk, act and reflect as teachers. In addition to this, initial teacher education needs to create professional learning communities, within its own ranks, and on site, that extend beyond the relationships created with their mentors to foster deeper professional dialogue (Blase, 2009).

The strong focus on the use of ICT in TE21 creates significant opportunities in the growth of teachers' capacity in teacher education. Given the situative and distributive nature of learning, the use of ICT as efficient tools that capture and promote learning by individuals and across groups has been seen as having the potential to transform pedagogy and the performance in future classrooms (Putnam & Borko, 2000). The cooperation between schools and the information and communication community in Singapore through the FutureSchools initiative shows up as a clear opportunity for the extension of teacher learning as much as they offer for prospects for pedagogical innovations. New technologies allow for the extension of learning from having to traditionally access each individual teacher's classroom to the capture of real-time lessons for learning by a wider community as well as the opportunity for feedback.

Beyond these issues and opportunities, there exist the perennial problem of ensuring sufficient contact and linkage between the different stakeholders in TE21. Given that teacher learning is multi-faceted (Borko, 2004) there is a need to ensure that sufficient weight is given to detailed inquiry which is sometimes not possible in reductionalist situation of teacher education systems. This has serious repercussions to ensuring that teacher education is coherent and well organised given the multiple aims and outcomes that come from the situated and distributed nature of the learning.

Finally, the notion of a twenty-first century teacher education creates visions of waves of initiatives that prevent us from realising a greater goal of ensuring teaching is always reflexive (Alexander, 2010). Hence, the development of TE21 should be seen as an opportunity for teacher learning to be a sustainable and perennial quality that outlasts current fashionable notion of meeting 21st century learning needs and therefore creates a teacher learning trajectory for the growth of professionalism as teachers learn.

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