

Innovating teacher education in a complex era

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Abstract The meteoric increase in technological advancement in the last few decades has dramatically transformed how people live their lives. Innovation is seen to be essential as it ensures sustainable growth in a knowledge-based economy and a competitive global marketplace. Consequently, enabling innovation to occur becomes of prime concern to educators and policymakers. Education for the twenty-first century is about developing multiple intelligences and this demands for a holistic education system committed to enabling a learner to achieve his/her maximum potential. The learning environment in the twenty-first century needs to encompass a multiplicity of places, ideas and people that is technologically driven and often, a virtual rather than a physical space. The responsibility for creating such an environment lies in the teacher. This paper focuses on the role that teachers play in designing a powerful learning environment to drive twenty-first century learning and how teacher education must be re-designed to bring about possibilities of innovation. Possible design features of innovative teacher education programmes are outlined, including the need for a university-based teacher education programme, a strong emphasis on values and the changing role of teachers as mediators and designers of the learning environment. In order to nurture a future generation of strong thinkers, innovative problem-solvers and responsible and active local and global citizens, teachers need to consider teaching as a high calling. Finally, the paper emphasises the need for there to be strong partnerships and systemic coherence between key stakeholders of Education in order for the innovations to bring about transformation.

Keywords Innovation · Teacher education programmes · Learning environment · Twenty-first century education

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1 Introduction

The human factor is seen to be at the heart of all innovation. With the combination of the right skills, experience, knowledge and capabilities, humans are able to study and analyse how to confront up and coming challenges. The increase in technological advancement in the last few decades has dramatically transformed how people live their everyday life. Innovation and new ways of thinking are essential to confront an increasingly diverse and complex environment. Access to and availability of modern technology have enabled people to push boundaries, and it thus comes as no surprise that today's youngsters are able to "solve problems that involve multifaceted solutions, encounter issues that tests their values, and face challenges that are not documented in manuals and textbooks" (Liu and Tan 2015, p. 336). In order to keep the momentum, students need to develop "a deep love for learning, a curious and inquisitive mind to ask questions and find connections, and a deep sense of responsibility to the community and environment" (Tan et al. 2012, p. 72).

In the Global Innovation Index 2014 report (Cornell University, INSEAD, & World Intellectual Property Organization 2014), Chandrajit Banerjee of the Confederation of Indian Industry, in his foreword, posits that worldwide, talented human capital is primarily formed in two ways. First, the government builds infrastructures (e.g. schools and universities and other academic/R&D institutions) that will provide both basic and advanced teaching and R&D facilities to develop the knowledge of its people in both technological and non-technological disciplines of study. Second, the government provides incentives to attract talent from elsewhere. The country that can successfully attract, nurture, and retain the best talent emerges at the forefront of innovation. As innovation stimulates sustainable growth in a knowledge-based economy and competitive market, it is a subject of great importance among educators and policymakers. Equipping students with skills and knowledge aligned with policies and future needs is imperative in sustaining growth in a rapidly changing global economic environment. In order to build an innovation-driven nation, people must be educated well and provided with sufficient resources and incentives to fulfil their goals and aspirations. Hence, nurturing creativity and sustaining that at all sectors of society, is crucial for developing a strong foundational base for innovation.

2 Education in twentyfirst century

Investing in education reforms has increasingly been recognised as a "key investment in the long haul and the quality of education impacts nation-building, people's capacity for adaptation, value-creation, and innovation" (Tan 2012, p. 1). In a recent study published by the National Bureau of Economic Review, the researchers found that "increased per-pupil spending, induced by school finance reforms narrowed adult socioeconomic attainment differences between those raised in low-income and high-income families" (Jackson et al. 2015). Darling-Hammond (2015) also noted in a commentary that "the society benefits a lot when money is properly spent on the right educational resources". More than just preparing people for the future, investing in education is about establishing the mindset change that can create what is to come. While today's world is getting more interconnected, it is becoming more complex, thus, education must adapt by providing a platform with which learners gain multiple and different perspectives in order to develop their own multiplicity of views and to be acquainted with the many different ideologies and paradigms to remain nimble and flexible in their thinking and reasoning skills. As Tan (2003, p. 1) assented "education in the twentyfirst century is about developing intelligences," where knowledge is now more

commonly about being able to synthesise and integrate information and learning offered by different disciplines (multi-disciplinarity). It is about being open to learning and dealing with real-world problems. Noted for this theory of multiple intelligences, Gardner (1983, p. xii) argued for the notion of intelligence as a “multiple reality and identified several distinct ways of learning and knowing such as verbal, logical-mathematical, visual-spatial, bodily kinaesthetic, musical, interpersonal, and intrapersonal intelligences”. This demands an education system that embraces a holistic approach that is committed to enabling the learner to achieve his/her full potential.

In Singapore, having achieved recognition in internationally benchmarked tests such as the Trends in International Mathematics and Science Study (TIMSS) and the Progress in International Student Achievement (PISA), we still ask ourselves, does it mean we really have competent people for the twentyfirst century? The learning environment today has changed tremendously. A learning environment, as described by OECD (2013), “is an organic, holistic concept that embraces the learning taking place as well as the outcomes”. In other words, a learning environment in the twentyfirst century need not necessarily represent a physical space, it can also be a virtual space connected by a technology-driven world and encompasses a multiplicity of places, ideas, and people. The responsibility of creating such flexible learning environments that transcend space, time, people and technology lies on the teacher, who ensures that student learning involves structured challenges, which allow the learner to interact, at the same time, develop new knowledge (Dewey 1963; Mason 2000). If done in a careful and thoughtful manner, these challenges will ultimately lead to a worthwhile educational experience for the students. But how does one design a powerful learning environment that enables students to thrive in the twentyfirst century? How are we using the learning environment to encourage motivation, independence and collaboration amongst our learners?

3 A university-based teacher education

Teacher education in Singapore is a university-based model and grounded in the pragmatics of preparing the holistic learner. Across many parts of the world, there are a lot of debates on how best to prepare teachers. There are movements such as, *Teach for America*, *Teach First* in Britain, and *Teach for Australia*, which perceive that the crafts-manship of the teacher is best prepared from a school-based perspective. On the other spectrum of the debate, there are those who advocate that if the goal is to develop a critical thinker and an adaptive teacher, teacher education must be based within a university setting. Yet, the common perception by policy makers over this view is the opinion that the university focuses a lot on research and theories, not much on teaching practice. Some, such as former British Education Secretary Michael Gove, argue that the best way to learn how to teach is through actual teaching practice. In a speech, Gove (2010) said that “far from being a profession that can be learnt through academic study, teaching is a craft, best learnt as an apprentice observing a master craftsman or woman”. However, studies over the past several decades have revealed that despite the inadequacies and limitations of current teacher education programmes, the evaluation results of fully prepared and certified teachers come out better than those who lack preparation (Evertson et al. 1985; Haberman 1984; Olsen 1985). Therefore, it is important that universities argue for and become the voice of what is at the core of teacher professionalism and articulate why it is necessary for teacher education to take place within the academic confines of the university setting.

University-based teacher education has the responsibility to produce academic knowledge that encourages both personal and professional development. In practice, such preparation

must make a difference to student learning, that research must improve in quality and it must inform professional practice and educational policy. Recently, the [British Educational Research Association \(2014\)](#) released a report substantiating that both student teachers and certified teachers “need more, not less, access to research that underpins professional practice”. [Burgess \(2014\)](#) seconded saying it is vital that student teachers gain “research literacy and are provided with the opportunity to incorporate this knowledge with practical experience in the school and classroom”. [Osman \(2010\)](#) takes the view that systematic research, grounded in the concerns and problems of educational research practice, make the difference in quality teacher education. Similarly, [Shedd \(2012\)](#) maintains that scholarly engagement in the classroom subsequently empowers students.

Additionally, what makes the university so important is the fact that there is an active exchange of ideas through symposia and seminars that can generate research and help seed the next innovative idea. Teacher education as it stands now is ripe for generating all sorts of research on a wide range of topics. When we talk about the teacher, we want to characterise the teacher today as one who is always improving practice. One of the things being done in the National Institute of Education (NIE) is the e-portfolio where student teachers write about their experiences and reflections as they go through their journey of pre-service teacher education. In all areas of studies, such as their educational and curriculum studies, student teachers document and reflect on their learning so that they see how they can apply their knowledge to the practice of teaching in the future.

Teacher institutes worldwide have used the e-portfolio as a way of monitoring, documenting, and assessing both the pre-service teacher and in-service teacher education programmes ([Snyder et al. 1998](#); [Porter et al. 2001](#); [Gray 2008](#); [Wray 2008](#)). The e-portfolio is beneficial to student teachers because it provides users a venue to “take ownership of their learning and professional development” ([Banks 2004](#), p. 3). Moreover, the e-portfolio offers the user a holistic view of his/her development throughout the learning process as the tool can be presented in various ways to achieve different objectives. Through purposeful collection of electronic artefacts, such as the compilation of selected student work and other evidence of learning progression, student teachers are able to monitor their growth and learning journey. In the same vein, [Stolle et al. \(2005\)](#) emphasise that by using the e-portfolio, student teachers are able “to identify, analyse, and apply principles, content and dispositions that will be needed to truthfully and realistically verify their competency as a teacher”.

4 Emphasis on values

[Darling-Hammond \(2001\)](#) has noted that student teachers are expected not only to have the knowledge and competence to teach well but also needs to have a strong commitment and passion to the profession and to the students they teach in the classroom. Accordingly this entails teachers to nurture essential dispositions or commitments such as empathy, commitment, and positive view of self and others that contribute towards a deeper understanding of the teaching profession. As one of the high-performing education systems in the world, Singapore recognises the vital role that teachers play and the importance of having a robust teacher education programme. In order to sustain Singapore’s commitment and responsiveness to the changing education landscape, the educational system has adopted a “student-centric and values-driven holistic education to build a broad and deep foundation for lifelong learning” ([Heng 2011](#)). To contribute to this initiative, NIE regularly reviews its programmes, likewise their social relevance, to consistently uphold to its mission of excellence and work towards its vision to be an “institute of distinction” that is aligned with the presentation of national culture, identity and values ([National Institute of Education 2009](#)).

As such, the Teacher Education Model for the twentyfirst Century (TE21) was initiated in 2009. The framework focused on three key attributes of the twenty-first century teaching professional namely Values, Skills and Knowledge, conceptualised as V³SK (National Institute of Education 2009). The V³SK has three value paradigms. The first is learner-centredness, where the learner is placed at the centre of all our educational endeavours. The learner is the one who constructs learning and we create an environment to co-construct with the learner. Hence, it is essential for NIE to continue to build strong partnerships with schools in order to better understand the learners and the learning environment in the realities of the school setting. The second value is teacher identity, which connotes high-quality teaching standards combined with the enthusiasm to learn and the willingness to be responsive to the needs of the students. The third value component is service to the community and the profession. How do we actualize professional learning? Within teacher education at NIE, opportunities and programmes are created where student teachers can begin professional collaboration even whilst they undergo pre-service education. An integral part of the programme is service learning where student teachers 'learn to serve' as they 'serve to learn' by engaging in community work with an organisation of their choice.

Equally important is the need to perennially re-examine, reframe, refresh and re-enact the knowledge and skills required in order to stay relevant with the times. NIE tries to ensure that new and exciting pedagogies are being practiced in order to cater to diverse learners and for the purpose of engaging these learners. Assessment practices are also constantly moving away from the assessment of learning to assessment for the purpose of enhancing learning. Lifelong learning across the continuum of teacher professional development is being emphasised and while in-service, abundant opportunities are provided for teachers to build their professional competencies and to forge strong links with the teaching fraternity (Ducharme and Ducharme 1993).

5 Teachers as mediators and designers of the learning environment

The end goal of education ought to be to nurture a critical mass of individuals who possess higher order of thinking skills with the vision to create the future. In the knowledge-based economy today, where knowledge progresses at breakneck speed, there is a need for educators and educational institutions to be cognizant of the rapid changes in knowledge so that the content that is being delivered does not quickly become obsolete or irrelevant. Added to the rapid pace of technological advances in the knowledge-based economy, there are also more complex issues to deal with such as newer mutation of viruses, different modes of terrorist attacks, unprecedented environmental disasters and the growing complexity in political and socio-economic issues that confront us today. What every person entering the workforce needs is the ability to adapt oneself to the ever-changing demands of the workplace and society and to think on one's feet especially when presented with a situation that is unfamiliar. It is paramount that teachers are able to highlight the relevance of classroom learning to what is happening in the external environment. To accomplish this, Tan (2007, p. 106) underscored three progressive challenges: (i) making content knowledge visible to learners; (ii) making teachers' thinking visible to learners; and (iii) making learners' thinking visible to themselves, their peers, and the teacher. Hence, the real challenge for educators is to be able to design learning tasks and environments that help students to learn quickly, think on their feet, and to eventually become great, if not better, problem solvers.

Aside from being designers, teachers must also be mediators for learning to take place and as facilitators of the learning environment. The challenge, then, is not in mastering the art of

knowledge dissemination but in motivating the students to engage in independent and lifelong learning. The demand for the ability to synthesise information quickly, to write cogently, and to communicate effectively will always be on the rise in the global workplace and society.

6 Teaching as a calling

Teaching in the twentyfirst century is about nurturing a future generation of strong thinkers, innovative problem-solvers and responsible and active local and global citizens. Such high demands call for those entering teaching to do so as answering a calling, rather than merely being occupied in a job. These teachers must have a unity of purpose in terms of aspiring to impact the next generation with deep passion and commitment and must want to develop the requisite competencies to achieve this mission. This also calls for teachers to develop a strong sense of teacher identity in terms of being proud of upholding their profession. The essence of considering teaching as a calling is that it is this deep calling that motivates them to seek out constant opportunities to level up their knowledge and skills and to better their standards of practice so as to be able to offer the best quality of learning to their students. In sum, teachers who have a deep sense of calling will strive to have a multifaceted impact on their students and aspire to imbibe them with the necessary values, character and competencies required for survival in the twentyfirst century environment.

It comes as no surprise that teachers who has a deep sense of calling and purpose will want to constantly improve on their professionalism. Teachers comprehend the need “to have control over their work space and to have personal decision making authority” (Pearson and Moomaw 2005) if they are going to be lifelong learners and effective in the classroom. Put simply, professionalism is about autonomy and empowerment (Brunetti 2001; Klecker and Loadman 1996). What this boils down to is that teachers ought to have the flexibility and responsible independence to make decisions that help improve their students’ learning. They should also be empowered to decide about “what” and “how best” to teach. To allow teachers to develop as professionals, they must be prepared rigorously, given the right tools which allow them the time, space and trust to carry out their jobs well.

7 Strong tripartite partnership

Albert Einstein said “There’s nothing more insane than doing the same thing over and over again and expecting a different result.” Teacher education has always been subjected to critique that we are always doing the same thing. For years our change has not been dramatic. One key factor in all these changes is the fact that we cannot undermine the importance of a right governance structure because in our experience working across systems, we find that a lot of resources are often wasted as a result of a lack of congruence of goals among the different stakeholders. The tripartite relationship between NIE, the Ministry of Education (MOE) and the schools, has been seen to be a key cornerstone for success. With this partnership, the Singapore education system emphasises clarity of purpose, confluence, congruence, and alignment of purposes across stakeholders and other educational champions. Policy coherence and implementation consistency is reinforced through NIE’s commitment to evidence-based policy development and through the honing of pre-service teachers’ pedagogical skills occurring in schools.

Under the tripartite partnership, also known as the Enhanced Partnership Model, teacher education courses take place within the academic confines of the university setting while the

schools take on a partnership role especially in terms of providing clinical on-site experience in the form of the practicum postings and other school attachments aimed at helping to bridge the theory-practice nexus. Another role that schools can play is to allow for experimental pedagogies to be tested out on-site in realistic classroom settings.

However, the research agenda of university academics is often very different from some of the key concerns of policymakers and schools. The criteria of what constitutes scholarly work and what constitutes a good intellectual piece can be very different from what can help address the immediate and proximal needs of the school. In view of this, we need to rethink how we position ourselves in terms of engaging in university research in such a way that stakeholders, including the schools, feel that our research is potentially impactful to the schools. This alignment is very critical to the success of any teacher education system-wide.

8 Conclusion

Singapore has continuously been mindful of the importance of conducting programme review, evaluation, and research to inform the policy and practice of its teacher education programmes. At NIE, research programmes constantly look at the changes, developments, innovations and best practices that are taking place in teacher education all over the world because these have been recognised to be significant in preparing student teachers to function in changing and new environments. Coupled with a strong teacher education programme that emphasises values, skills, and knowledge, a close theory-practice nexus and a strong partnership with stakeholders, NIE strives to develop thinking teachers who are deeply committed to the quality of their students' learning and who are driven to constantly pursue opportunities that can help them to improve their practice.

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