

Measuring Classroom Pedagogical Transformations when “Educating for Change”?
A Lesson from Singapore

Denise E. De Souza, Nanyang Technological University, Singapore

The European Conference on Education 2017
Official Conference Proceedings

Abstract

By standards of international benchmarking tests, Singapore’s education system has been successful in making shifts needed to meet the emerging demands of the 21st century. Despite this recognition, locally, stubborn narratives of Singaporeans’ educational experiences as being primarily didactic and exam-focused persist, with official and public constructions of the “inadequate-Singaporean” being a prototypical fall-out of such a system. This paper adopts a critical realist perspective to disentangle the narrative. Examining educational structures targeted for change under Singapore’s Thinking Schools Learning Nation (TSLN) and Teach Less Learn More (TLLM) initiatives, the paper provides a less simplistic account of Singapore’s shifting educational landscape. The explanatory critique develops an alternative interpretation of findings reported by a large-scale research project in 2013, which observed that ‘a pedagogy that is intractably didactic’ endures in Singapore classrooms, indicating policy ineffectiveness in generating desired changes. This paper re-examines policy documents, and the focus and concepts of change adopted in the large-scale project. It questions an underlying assumption guiding the project, which alludes that the efficacy of educational reform initiatives should be investigated ‘at the point they matter most, the classroom’. By focusing primarily on classroom pedagogical practices, many out-of-classroom programs introduced and adopted under TSLN and TLLM remained unexamined. Findings from the present study suggest two kinds of changes have taken place - the reorientation of pedagogical practices in post-secondary institutions and extensions of what already exists in the primary and secondary sections.

Keywords: educational change, educational policy, ‘inadequate Singaporean’, Singapore, TSLN, TLLM.

iafor

The International Academic Forum
www.iafor.org

Introduction

International benchmarking tests like the Programme for International Student Assessment (OECD, 2016), Trends in International Mathematics and Science Study (Martin, Mullis, Foy & Hooper, 2016; Mullis, Martin, Foy & Hooper, 2016), and Progress in International Reading Literacy Study (Mullis, Martin, Foy & Drucker, 2012), have indicated that the Singapore education system has been successful and consistent in developing students who have shown high levels of competencies in Reading, Mathematics and Science, and who have demonstrated abilities in applying these in day-to-day and professional contexts—abilities which these evaluations propose to measure (e.g. see OECD, 2016, p. 194). Despite these achievements in bringing about educational change, locally, stubborn narratives paint Singaporeans' educational experiences as being primarily didactic and exam-focused. Past reports in locally conducted research, for example, have alluded that the system is one of presumably several, '... educational systems in which the iron laws of high stakes assessment drive classroom pedagogy day in and day out ...' (Hogan, Towndrow & Koh, 2009a, p. 228).

The Local Narrative

This narrative configures the exam-oriented system as the cause of a persistent didactic pedagogical style contributing, somewhat inevitably, to the development of certain inadequacies noted in Singaporean students, graduates and workers. Kramer-Dahl (2004, p. 219) for instance has shared that Singaporean youths have sometimes been portrayed, by ministers, researchers, and local media, as being 'narrowly achievement-oriented, 'exam-smart muggers', who 'lack an enquiring mind' and are 'deficient in expression and critical thinking skills'. More recent depictions, in 2013, have highlighted the 'inadequacies' of Singapore's Professionals, Managers, Executives and Technicians (PMET). Chan (2013) asked in the front-page headlines of the main local newspaper, 'Pampered, Mediocre, Expensive, Timid? Are these fair descriptions of the new Singaporean worker?' and then reasserted the need for Singaporeans to undertake a mindset change, and for schools to start honing critical thinking skills, team and project work, as well as public speaking skills. Lim (2014, p. 79), a year later, similarly noted that references have been made 'to the inadequacy of Singaporeans—by quantity or quality—for many jobs in the country (both labour and talent) ...'. She observes that employers tend to regard local graduates as "cookie-cutter", "risk-averse", "not at all entrepreneurial", "provincial", "materialistic" and simply "boring" (Lim, 2014, p. 90)'. Collectively the repetitive narrative, which provides a rather simplistic account of Singapore's educational system, has had an impact on how Singaporean youths and workers have been, and continue to be, constructed and have persisted despite the introduction of two policies of change in the late 90s and the decade of 2000 aimed at transitioning Singapore's educational landscape to meet the demands of the 21st century knowledge economy.

The Policies of Change

In 1997 and 2004, Singapore rolled out two important initiatives to introduce programmes to bring about changes to Singapore's educational landscape. The initiatives aimed at supporting schools in preparing students to meet the current demands of globalization, a knowledge-based economy and the 21st century. The two

initiatives, Thinking Schools Learning Nation or TSLN (Goh, 1997) and the Teach Less Learn More or TLLM (Lee, 2004), were designed to affect change across the primary, secondary and post-secondary institutions in Singapore.

TSLN (Goh, 1997) tended to invest in infrastructural, and human resource development in terms of teacher training, and focused on 5 areas of development namely; (i) the upgrading of institutional infrastructure to support the introduction of the Information Technology Masterplans (MOE, 1997a) which to date, have gone through 3 phases (1997-2002; 2003-2008; 2009-2014) and which aims to foster the use of ICT in education (Heng, 2013); (ii) a review of the curriculum and assessment systems; (iii) the professionalization of teaching through initial and continual teacher training; (iv) greater investment in supporting pre-school and post-secondary education providers; and (v) the introduction of measures to raise Singapore's profile as an education hub (Teo, 1999).

TLLM, in comparison, tended to focus on three areas in primary and secondary schooling — (i) fostering 21st century competencies; (ii) reducing the overemphasis on exams by giving equal importance to non-academic curriculum and accepting different measures of merit; and (iii) by allowing for diversity within the educational landscape, encouraging a range of talents. In policy terms, TLLM aimed to 'positively encourage a diversity of talents – in intellectual fields, in the arts and sports, and in community endeavor' (Shanmugaratnam, 2004, point 13). In enactment the stance taken continued from that which was adopted during TSLN, which worked to sustain the core of a system which was already performing well internationally, while permitting customization to nurture individual students' aptitudes and abilities wherever possible (Teo in Budget-MOE, 1999).

Findings Reporting on the Policies' Effectiveness

Recent educational research findings from a large-scale educational research project, however, which purported to measure the effectiveness of the two policies to some degree, has reported that little change has taken place in classrooms observed (Hogan et al., 2013). The study, Core 2, located measures of policy effectiveness in terms of observable pedagogical changes enacted in the school classroom. It collected data 'to analyse the pedagogical organization of four theoretically specified 'models' of instructional strategy—traditional instruction, direct instruction, teaching for understanding, and co-regulated learning strategies in secondary 3 Mathematics and English' (Hogan et al., 2013, p. 57). Drawing on findings from observations and surveys of a nationally representative sample of over 4000 students and their teachers the study's results, when focused solely on classroom interactions, proceeded to echo and perpetuate the ongoing narrative about the Singapore education system stating,

... we also think that the national high stakes assessment system has resulted in a pedagogy that is intractably didactic rather than dialogical, compromised the epistemic quality and the transparency or 'visibility' ... of learning processes during lessons, restricted the opportunities of students to engage in knowledge building work in class, and constrained the ability of the system to successfully introduce substantial and sustainable pedagogical improvements despite a strong policy commitment to doing so as reflected in the two key policy documents of the past 15 years—Thinking schools,

learning nation (TSLN, 1997) and Teach less, learn more (TLLM, 2004). (Hogan et al., 2013, p. 60)

As summarized earlier, TSLN and TLLM aimed to introduce education programmes to gear Singapore towards educational outcomes that would enable its students and future workforce to have skills that would meet the demands of globalization and the 21st century (Hogan et al., 2013). While international benchmarking tests have consistently tended to indicate otherwise, core 2 concluded that the TSLN and TLLM initiatives constituted, ‘Tinkering around the edges ... [and] is unlikely to achieve the outcomes the system desires’ (Hogan et al., 2013, p. 60).

Research Question

Against the backdrop of a large-scale study which focused on examining English and Mathematics classroom pedagogical interactions to measure the effectiveness of TSLN and TLLM in bringing about change, this study undertakes a re-examination of the TSLN and TLLM initiatives and asks, ‘What educational structural changes were introduced by Singapore’s Thinking Schools Learning Nation (Goh, 1997) and Teach Less Learn More (Lee, 2004; Shanmugaratnam, 2004) initiatives?’ In asking this overarching research question, the paper responds to two sub-questions: (1) ‘How has educational change been occurring in Singapore under the (a) TSLN and (b) TLLM initiatives (did the introduced changes focus at the classroom level), and (2) ‘Why was educational change not reflected in the findings reported by Core 2?’ The paper aims to provide an account of the complexity inherent in Singapore’s educational landscape, in part, resulting from the changes introduced by TSLN and TLLM.

The findings from this study lend some support to arguments put forth by educational change scholars who have likened educational change efforts which aim to instill improvements within the school, let alone the classroom, as ‘trying to improve performance within what is actually the lesser variable of influence on student achievement’ (Hargreaves et al., 2010, p. xix). The Singapore educational change experience has introduced changes, which supplement existing practices but also move students to learning sites beyond the school classroom.

Methodology

This paper was part of a larger study the design of which has been reported and published elsewhere (De Souza, 2016). The study was informed by a critical realist meta-theoretical framework and this part utilised the document selection method proposed for Realist Evaluations and Reviews (Pawson, Greenhalgh, Harvey & Walshe, 2005). It adopted a purposeful selection of documents from primary and secondary sources to answer the research question posed. The range of documents selected for this study comprised parliamentary debates, speeches and press releases from the Ministry of Education (MOE) Singapore, and other documents/sources which provided details about structural changes made to Singapore’s educational landscape in the primary, secondary and/or post-secondary sections under TSLN and TLLM. The relevant documents have been listed in Table 1.

The analysis of the documents was informed by realist social theory (RST). Singapore’s educational landscape was theoretically decomposed into the conceptual

components proposed by RST, which states that a social context of interest comprises structure, agency and culture (or SAC) and the relations and interactions between them (Archer, 1995). While these components are intimately intertwined, they are treated as analytically distinct to enable the examination of their interactions. Collectively, the components are organised and related in distinct ways, and constitute the social structure of the context.

Table 1

List of documents selected

Parliamentary Debates

Budget, Ministry of Education (MOE) (1997, July 30)

Budget, MOE (1998, March 19)

Budget, MOE (1999, March 17)

Budget, MOE (2001, March 15)

Head K, MOE. (2006, March 7)

Ministry of Education, Singapore (MOE) Speeches and Press Releases

Heng, S. K. (2011, September 22). *MOE Work Plan Seminar*

Heng, S.K. (2013, September 25). *Student-centric, values-driven education: A broad and deep foundation for a lifelong journey.*

Lee, H.L. (1997, Nov. 24). Education in Singapore 21

Lee, H. L. (2004). Our future of opportunity and promise.

MOE (1997a) Launch of the Masterplan for IT in education

MOE (1997b) Launch of National Education

MOE (1998) Work plan seminar on education in schools

MOE (2002). Government accepts recommendations for a broader and more flexible curriculum and a more diverse JC/Upper secondary education landscape

MOE (2003) Nanyang Girls' High School to offer the Integrated Programme in 2004

MOE (2005) 43 secondary schools to participate in the Direct School Admission (DSA) exercise for admission to secondary one in 2006

MOE (2008a) New school of Science and Technology to open in 2010

MOE (2008b) More support for school's 'Teach Less, Learn More' initiatives

MOE (2012) 190 Schools Now Offer Niches of Excellence to Enrich Students' Educational Experience

MOE (2013) Engaging our Learners. Teach less, learn more

MOE (2016a) Advanced elective modules (AEM) portal

MOE (2016b) List of Secondary Schools Participating in 2015 DSA-Sec Exercise for Admission to Secondary One in 2016

MOE (2016c) Integrated Programmes (IP).

Ng, E.H. (2008, September). Our journey in education – Taking stock, forging ahead

Ng, E.H. (2010, September). Bringing out the best in our learners

Shanmugaratnam, T. (2003). The next phase in education: Innovation and enterprise

Shanmugaratnam, T. (2004). To light a fire: Enabling teachers, nurturing students

Shanmugaratnam, T. (2005). Achieving quality: Bottom up initiative, Top down support

Shanmugaratnam, T. (2006). More support for school-based initiatives

Shanmugaratnam, T. (2007). Having every child succeed

Teachers (Completion of syllabus for academic curriculum) (2007, September 17)

Teo, C.H. (1999). Towards ability-driven education: Making every Singaporean matter

Other Documents / Sources

Ng, J.Y. (2015, June 29). Niche scheme in primary schools being phased out. *Today Online*.

O'Grady, G., Yew, H.J.E., Goh, K.P.L. & Schmidt, H.G. (2012). *One-day, one-problem: An Approach to problem-based learning*. Singapore: Springer.

Singapore Polytechnic (n.d.). Advanced elective modules (AEMs) for secondary school students. [Web source].

Temasek Polytechnic (n.d.). Advanced elective modules. [Web Source].

Teng, A. (2016, Oct 7). Seven new applied subjects to pique students' interests. *The Straits Times, Home Section*, B6.

Yeow, C.G. (2002). The PEPP Model: Moving towards problem-based learning in technical education..

Hee, S.Y. (2005). Problem-based learning: An institutional perspective.

Social structure. The social structure investigated was determined by the scope of TSLN and TLLM and how these were crafted as policies. TSLN and TLLM introduced programmes and changes affecting primary, secondary and post-secondary institutions in Singapore. As such, the selected documents relating to the policies moved beyond primary 5 and secondary 3 English Language and Mathematics classrooms, which was the demarcated scope of the core 2 study. The study eventually reported only the findings for the secondary 3 sample as an article (Hogan et al., 2013).

Structural aspect. Investigating the structural component entailed reviewing documents to identify the structures TSLN and TLLM targeted to change. Did the policies, in implementation, aim to change the structure of examinations, classroom pedagogy, how schooling is organised in a day, or school cluster organisation?

The education minister who spearheaded TSLN was Minister Teo Chee Hean. Thereafter, the minister who took over the education portfolio from 2004–2008 and initiated TLLM was Tharman Shanmugaratnam. Most of the documents on TSLN and TLLM, what constitutes their scope and programmes, are taken from speeches and press releases made by the ministers and the Ministry of Education.

Agential and Cultural aspects. Due to space constraints, for this paper, the structural aspects is the main focus with the agential and cultural aspects being mentioned where relevant. For the aspect of agency, only inferences could be made about the kinds of agency schools and teachers could exercise given the structural changes introduced. The cultural dimension, on the other hand, entailed understanding the ideological beliefs and commitments policymakers may have and wish to promote. In RST, these beliefs guide decision-making and influence the direction of change along certain developmental trajectories more than others.

Findings

1a. How educational change occurred under the TSLN initiative

Educational change under TSLN took place under the conditions of an already high performing system. Ideologically, Goh, in announcing the kind of curriculum changes TSLN would undertake emphasized,

Whichever way we cut back and redefine the curriculum, we will ensure our students retain mastery over the core knowledge and concepts that give them the basis for further learning. We must also retain the high standards ... Whatever we do, we must not abandon these fundamentals ... We must not level down. (Goh, 1997, point 20)

The strong structural positioning of the system was accompanied by expressed concerns about 'effective resource deployment' (Teo, 1999, point 14). The eventual strategy adopted to bring about system change therefore, approximated extending and supplementing the strong system already in place.

For mainstream primary and secondary schools, the review of curriculum and assessment under TSLN brought about modest transformations. In 1998, most syllabi were reduced by 10 to 20 per cent, up to 30 per cent with no change to the syllabus structure or to the examinations set indicating continuity of what already existed. By 2001, the plan was to phase in new syllabi that infused thinking skills and the use of information technology, and implement project work in schools, though this implementation would not be examinable or affect the examinations (Teo in Budget, Ministry of Education, 1998, 1776-1777; also see Shanmugaratnam, 2004; 2006).

Change in assessment came not so much in the form of greater assessment literacy or alternative modes of assessment, but in the form of adding additional indicators in addition to academic results, as measures of attainment and criteria for entry into institutions. This led to modifications of the university entry criteria in 2003, which also considered students' participation in co-curricular activities (Budget, Ministry of Education, 2001, 1166-1167). Modifications were also made in the way the quality of schools was appraised – looking not only at results but at sound processes which produced sustainable results over time (Budget, Ministry of Education, 1999; Shanmugaratnam, 2003).

But TSLN did not only bring about modest changes for the primary and secondary schools. In 1997, Prime Minister Lee Hsien Loong announced that the same kind of investment that would go into upgrading and technologizing schools, would go into investing in Singapore's further education institutions—the universities, polytechnic and Institutes of Technical Education or ITE (Lee, 1997, points 36-37). In Singapore, the ITEs and Polytechnics are applied learning institutions, which receive students from all mainstream government schools, whose results qualify them entry into the various courses offered.

TSLN brought about more significant changes in post-secondary institutions than it did to primary and secondary schools. Following from the announcement of the TSLN initiative, the ITEs, Temasek Polytechnic and Republic Polytechnic made

pronounced efforts to introduce and integrate Problem-based Learning (PBL) in their curriculum, replacing the previously existing pedagogical practices, with practices that were better aligned with applied learning (Yeow, 2002; Hee, 2005; O’Grady et al., 2012).

The greater focus on applied learning in these post-secondary institutions, taking place within upgraded infrastructural support and facilities, would play an important role in helping the government roll out the elective and advanced elective modules for secondary students, and the objectives of TLLM announced in 2004.

1b. How educational change occurred under the TLLM initiative

Focusing on primary and secondary schools, TLLM introduced broad-range changes, which aimed to foster the development of 21st century competencies and skills, and diversify Singapore’s educational landscape to steer Singapore’s education system towards changes needed to meet the demands of globalisation.

Fostering 21st century competencies. TLLM fostered 21st century competencies by introducing elective and advanced elective modules (EMs and AEMs) for secondary students in the different streams. Benefiting from the infrastructural and curriculum shifts undertaken in post-secondary institutions under the TSLN initiative, the applied learning modules for secondary school students are designed and conducted by ITE and Polytechnic lecturers, and are 30-hour-courses which students can opt to attend by applying through their schools. Some of these courses may be conducted in school premises but others may be held at the post-secondary institutional premises (MOE, 2016a) to make use of the available and upgraded facilities there. This arrangement suggests some degree of effective resource deployment rather than duplication.

There are a wide-range of EMs and AEMs that students can sign up for. For students in the Normal Technical stream, there are now 31 EMs related to STEM and non-STEM disciplines (Teng, 2016). For Normal (Academic) and Express stream students, the AEMs comprise applied courses such as ‘Application Science in Forensics’, ‘Engineering in Medical Applications’, ‘Gene Therapy and Regenerative Medicine’, ‘Exploring Interior Design and Architecture’ and ‘Cartoons in Motion’—courses relevant to 21st century career interests, just to name a handful of the 150 modules available, though these are not all available at one time (MOE, 2016a; Singapore Polytechnic, n.d.; Temasek Polytechnic, n.d.). Successful completion of EMs and AEMs may be used for future admission into post-secondary institutions and for credit exemptions in related courses (Shanmugaratnam, 2007).

Reducing the overemphasis on exams. Rather than introducing structural changes to the examination system, as done in TSLN, TLLM gave some recognition to the non-academic curriculum, accepting different measures of merit. This was another modest structural change that served to add to what already existed rather than to replace it. The Direct Schools Admission (DSA-secondary) program for example, was first planned in 2004 and put in operation in 43 secondary schools in 2006 (MOE, 2005). This program allows schools to select 10 to 20 per cent of their students based on specific and holistic criteria of merit set by the school, before the release of the primary 6 School Leaving Examination results. Similarly, the Joint Polytechnic Special Admission Exercise, allows post-secondary institutions to admit up to five per

cent of their annual student intake using non-academic related criteria, allowing students with specific talents and aptitudes entry into their programmes of interest (Shanmugaratnam, 2005).

Allowing for diversity and encouraging a range of talents. Diversity, in the form of different types of schools offering different programmes, was extended into the structure of the Singapore's educational landscape through the TLLM initiative. In addition to the existing mainstream, autonomous and independent schools—which focused on academic pursuits—specialized independent schools, which cater to academic pursuits and included an area of specialization, were introduced. The aim was to recognize and nurture exceptional, talented individuals in Sports, Mathematics and Science, the Arts, and Science and Technology (MOE, 2002, point 5; Shanmugaratnam, 2004).

The introduction of the Integrated Program in four schools in 2004 was another method adopted to modify the structure of the education system. This program allowed students to bypass the high stakes examinations in Year 10 but still continue on to prepare for the Year 12 examinations. The purpose of the program was to develop a more flexible learning environment in the secondary school years (MOE, 2003). Currently, 18 schools offer this program (MOE, 2016c).

For mainstream schools, in order to develop some differentiation, while maintaining the existing core of the system, minor structural modifications were introduced in the form of two bottom-up or school-initiated programmes. In 2005, MOE announced that a sum of up to \$100,000 would be provided to mainstream schools to fund the development of niches of excellence to distinguish each school. By 2006, 12 schools were reported to have niche programs with specializations in Sports, Performing Arts, Uniformed Groups and Robotics (Shanmugaratnam, 2006). In 2012, this number increased to 190 with the range of programs being 87 (MOE, 2012). Another large-scale school initiated programme receiving support from MOE, was the School-based Curriculum Innovation projects implemented by 327 primary, secondary and post-secondary institutions. An additional 32 schools undertook SCIs independently without support (MOE, 2013, p. 10). In this programme schools would focus on a specific focus area to introduce curriculum innovation. Shanmugaratnam (2007, point 21) provided an example:

In Marsiling Secondary, teachers felt that the curriculum should do more to expose students to the environmental issues of the day. So this year a group of Science and Geography teachers ... develop [*sic*] a non-examinable Environment Education Module (EEM) – 4 periods a week for a semester - for lower secondary students. Students use a problem-based approach, and work together on projects which help them understand the environmental challenges facing Singapore, the region and the world.

A broad range of focus areas, apart from English and Mathematics, were undertaken by different schools (see MOE, 2013, pp. 100-111). In 2011, it was reported that '96% of the schools involved in TLLM sustained their SCIs ... [and] scaled up their projects to include more classes within the same level and across different levels and subjects' (MOE, 2013, p. 11) suggesting that at present, while all mainstream schools have continued with delivering the content of the core curriculum, some variations are

likely to exist in all schools as a result of the SCI projects.

2. Why educational change was not reflected in the findings reported by Core 2.

As was highlighted earlier, Core 2, a large-scale educational research project, which undertook in part to study the effectiveness of the TSLN and TLLM initiatives, reported that little change has taken place in the classrooms observed in their study comprising 4000 students and their teachers. It also suggested that the changes brought about by TSLN and TLLM especially constituted, ‘Tinkering around the edges ... [and] is unlikely to achieve the outcomes the system desires’ (Hogan et al., 2013, p. 60) – the outcomes being to introduce educational transformations to enable Singapore’s workforce to meet the demands of globalization and the 21st century.

Educational change was not reflected in the findings from observations of Secondary 3 Mathematics and English classrooms because Core 2 interpreted that for TLLM especially, that teachers would make the kind of change that would replace, rather than supplement or extend (see Lee, 2004, points 112 & 121), their preferred pedagogical style with more dialogical interactions. Structurally however, TLLM only enabled schools to make selective change to a focus area of their choice through SCI projects, and these were school-based changes implying that not all classrooms were expected to be affected.

Secondly, the research design located and reduced most of the change efforts, which might affect students’ overall learning experiences, and which the TSLN and TLLM programmes initiated, to the school classroom. In doing so, Core 2 could not take into account the possible impact that other programmes like the EMs, AEMs and the niche programme might have in honing 21st century skills and competencies because these programmes took place outside or beyond the confinements of the school classroom.

Thirdly, where school-initiated innovative programmes of pedagogical change under TLLM were concerned, the research design assumed that all participating schools would focus their curriculum, pedagogical and classroom innovation efforts on primary 5 and secondary 3 Mathematics and English subjects (Hogan et al., 2009c) though only results for secondary 3 were eventually reported as a journal article (Hogan et al., 2013). This imposed uniformity however, was far from the case in schools’ actual programme implementation practices. A range of innovations, in a variety of subject areas and subject combinations, were carried out at different primary, secondary and post-secondary levels by different participating schools, many of which the pre-defined and limited scope of the research project could not take into consideration (see MOE, 2013, p. 100-111).

It is therefore not evident why Core 2 claimed, even if only in part, to measure the effectiveness of the TSLN and TLLM initiatives when its research design could not accommodate the variety and range of programmes implemented through the TSLN and TLLM initiatives—not even the range of innovations introduced by over 300 schools under the SCI projects.

This study has explained how core 2’s focus on primary 5 and secondary 3 English and Mathematics classrooms were hardly representative of the changes undertaken by

TSLN, or the varied TLLM programmes initiated and implemented by Singapore schools in the SCI projects. Despite this, the findings were used to make broad and overgeneralized claims about the Singapore education system as a whole, and the ineffectiveness of TSLN and TLLM in bringing about systemic change to prepare Singaporeans to meet the demands of the 21st century. The underlying assumption guiding Core 2 seemed to be that the efficacy of educational reform initiatives ought to be investigated 'at the point they matter most, the classroom' (Gopinathan & Mardiana, 2013, p. 27). In adopting this narrow focus of interest, Core 2's findings have led the researchers to perpetuate the narrative that Singaporeans' educational experiences continue to be primarily didactic, exam-focused and limiting. This study however, has highlighted how the use of classroom pedagogical change as the measure of effectiveness of policies may be problematic and restrictive when understanding how complex education systems, like the one in Singapore, is carrying out change.

Conclusion

This paper has proposed a different explanation about Singapore's ongoing success in international benchmarking tests and has highlighted the complexity inherent in its educational landscape. The complexity of the system contests the perpetuation of a simplistic narrative that configures the Singaporeans' educational experiences as being examination-oriented leading to predominantly didactic classroom pedagogical practices which are restrictive, and which invariably results in some inadequacies observed in the development of local students, graduates and workers.

If it is indeed so, and this paper seems to support the notion, that student achievement is also affected by what goes on beyond the classroom and school (Hargreaves et al., 2010), then focusing on the kinds of interaction that goes on in the classroom alone as a measure of effective change severely restricts the kinds of transformations that policymakers can undertake and introduce to improve the learning and educational experiences of students. Rather than implementing radical change, the Singapore educational change experience has introduced programmes to supplement existing classroom practices and the examination system rather than replace them. It has also moved students to extended learning sites beyond the school classroom. Contrary to Core 2's interpretation of its findings (Hogan et al., 2013), the changes highlighted in this paper do not indicate a prevailing intractability within Singapore's education system or parts thereof.

References

Archer, M.S. (1995). *Realist social theory: The morphogenetic approach*. New York, NY: Cambridge University Press.

Budget, Ministry of Education. (1997, July 30). *Singapore Parliamentary Reports: Parliament 9, Session 1, Volume 67, Sitting 14*.

Budget, Ministry of Education. (1998, March 19). *Singapore Parliamentary Reports: Parliament 9, Session 1, Volume 68, Sitting 13*.

Budget, Ministry of Education. (1999, March 17). *Singapore Parliamentary Reports: Parliament 9, Session 1, Volume 70, Sitting 9*.

Budget-Ministry of Education. (2001, March 15). *Singapore Parliamentary Reports: Parliament 9, Session 2, Volume 73, Sitting 10*.

Chan, R. (2013, Jul. 13). Are Singaporean workers ... expensive & entitled? *The Straits Times, Saturday Special*, p. D2– D3.

De Souza, D.E. (2016). Critical realism and realist review: Analyzing complexity in educational restructuring and the limits of generalizing program theories across borders. *American Journal of Evaluation*, 37(2), 216-237.

Goh, C.T. (1997, June). *Shaping our future: Thinking schools, learning nation*. Retrieved January 3, 2017 from <https://www.moe.gov.sg/media/speeches/1997/020697.htm>

Gopinathan, S. & Mardiana Abu Bakar. (2013). Globalization, the State and Curriculum Reform. In Z. Deng, S. Gopinathan & C.K-E. Lee (Eds.), *Globalization and the Singapore curriculum: From policy to classroom* (pp. 15–32). London: Springer.

Hargreaves, A., Lieberman, A., Fullan, M & Hopkins, D. (2010). Introduction: Ten years of change. In A. Hargreaves, A. Lieberman, M. Fullan & D. Hopkins (Eds.), *Second International Handbook of Educational Change* (p. xi–xxi). New York: Springer.

Head K - Ministry of Education. (2006, March 7). *Singapore Parliamentary Reports (Hansard): Parliament 10, Session 2, Volume 81, Sitting 8*.

Hee, S.Y. (2005). Problem-based learning: An institutional perspective. In K. Tan (Eds.) *Problem-based Learning: New directions and approaches*. Singapore: Learning Academy, Temasek Polytechnic.

Heng, S. K. (2011, September 22). *MOE Work Plan Seminar*. Retrieved January 12, 2017 from http://www.nas.gov.sg/archivesonline/data/pdfdoc/20110929001/wps_opening_address_%28media%29%28checked%29.pdf

Heng, S.K. (2013, September 25). *Student-centric, values-driven education: A broad and deep foundation for a lifelong journey*. Retrieved January 12, 2017 from <https://www.moe.gov.sg/news/speeches/keynote-address-by-mr-heng-swee-keat--minister-for-education--at-the-ministry-of-education-work-plan-seminar-2013--on-wednesday--25-september-2013-at-915am-at-ngee-ann-polytechnic-convention-centre>

Hogan, D.J., Towndrow, P.A. & Koh, K. (2009a). The logic of confidence and the social economy of assessment reform in Singapore: A new institutionalist perspective. In E.L. Grigorenko (Ed.), *Multicultural psychoeducational assessment* (pp. 213–252). New York: Springer Publishing Company.

Hogan, D.J., Stankov, L., Kaur, B., Yeung, S.S., Towndrow, P.A., Guo, L., Koh, K.H. (2009b). *Core 2 Research Programme: Pedagogy and Assessment*. Unpublished paper. National Institute of Education, Centre for Research in Pedagogy and Practice, Singapore.

Hogan, D.J., Chan, M., Rahim, R., Kwek, D., Khin, M. A., Loo, S. C., Sheng, Y. Z., & Luo, W. S. (2013). Assessment and the logic of instructional practice in secondary 3 English and Mathematics classrooms in Singapore. *Review of Education*, 1(1), 57–106.

Kramer-Dahl, A. (2004). Constructing Adolescents Differently: On the Value of Listening to Singapore Youngsters Talking Popular Culture Texts. *Linguistics and Education*, 15(3), 217–241.

Lee, H.L. (1997, Nov. 24). Education in Singapore 21. Retrieved January 12, 2017 from <https://www.moe.gov.sg/media/speeches/1997/241197.htm>

Lee, H. L. (2004). Our future of opportunity and promise. Retrieved January 12, 2017 from <http://www.nas.gov.sg/archivesonline/speeches/view-html?filename=2004083101.htm>

Lim, L. (2014). What's wrong with Singaporeans? In D. Low D and S. T. Vedaketh (Eds.), *Hard choices: Challenging the Singapore consensus* (pp. 79–96). Singapore: National University of Singapore Press.

Martin, M. O., Mullis, I. V. S., Foy, P., & Hooper, M. (2016). *TIMSS 2015 International Results in Science*. Retrieved January 12, 2017 from <http://timssandpirls.bc.edu/timss2015/international-results/>

Ministry of Education Singapore (1997a). Launch of the Masterplan for IT in education. Retrieved from <http://www.moe.gov.sg/media/speeches/1997/280497.htm>

Ministry of Education, Singapore (1997b). *Launch of National Education*. Retrieved July 27, 2013 from http://www.moe.gov.sg/media/press/1997/pr01797_print.htm

Ministry of Education, Singapore (1998). Work plan seminar on education in schools. Retrieved January 12, 2017 from <https://www.moe.gov.sg/media/press/1998/5sep98.htm>

Ministry of Education, Singapore (2002). Government Accepts Recommendations for a Broader and More Flexible Curriculum and a More Diverse JC/Upper Secondary Education Landscape. Retrieved from <http://www.moe.gov.sg/media/press/2002/pr15102002.htm>

Ministry of Education, Singapore (2003). Nanyang Girls' High School to offer the Integrated Programme in 2004. Retrieved January 12, 2017 from <http://www.moe.gov.sg/media/press/2003/pr20031114.htm>

Ministry of Education, Singapore (2005). 43 secondary schools to participate in the Direct School Admission exercise for admission to secondary one in 2006. Retrieved January 12, 2017 from <https://www.moe.gov.sg/media/press/2005/pr20050524.htm>

Ministry of Education, Singapore (2008a). New school of Science and Technology to open in 2010. Retrieved January 12, 2017 from <http://www.sst.edu.sg/wp-content/uploads/2011/12/20080303-MOE-Press-Release.pdf>

Ministry of Education, Singapore (2008b). More support for school's 'Teach Less, Learn More' Initiatives. Retrieved January 12, 2017 from <http://www.nas.gov.sg/archivesonline/data/pdfdoc/20080108999.pdf>

Ministry of Education, Singapore (2012). 190 Schools Now Offer Niches of Excellence to Enrich Students' Educational Experience. Retrieved January 12, 2017 from http://www.nas.gov.sg/archivesonline/data/pdfdoc/20120426004/press_release_pse_n_s_awards_2012_v1.pdf

Ministry of Education, Singapore (2013). Engaging our Learners. Teach less, learn more. Retrieved January 12, 2017 from <http://eresources.nlb.gov.sg/printheritage/detail/dbe9f1f3-efcb-4bce-917b-1040e95ea179.aspx>

Ministry of Education, Singapore (2016a). Advanced elective modules (AEM) portal. Retrieved January 12, 2017 from <https://aem.moe.gov.sg/about-aem>

Ministry of Education, Singapore (2016b). List of Secondary Schools Participating in 2015 DSA-Sec Exercise — for Admission to Secondary One in 2016. Retrieved January 12, 2017 from <https://www.moe.gov.sg/media/press/files/2015/05/annex-start-of-2015-dsa-exercise.pdf>

Ministry of Education, Singapore (2016c). Integrated Programmes (IP). Retrieved January 12, 2017 from <http://www.moe.gov.sg/education/secondary/other/integrated-programme/>

Mullis, I.V.S., Martin, M.O., Foy, P., & Drucker, K.T. (2012). *PIRLS 2011 International Results in Reading*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

Mullis, I. V. S., Martin, M. O., Foy, P., & Hooper, M. (2016). *TIMSS 2015 International Results in Mathematics*. Retrieved January 12, 2017 from <http://timssandpirls.bc.edu/timss2015/international-results/>

Ng, E.H. (2008, September). *Our journey in education – Taking stock, forging ahead*. Speech by Dr. Ng Eng Hen, minister of Education and Second Minister of Defence, on 25 September at the MOE work Plan Seminar 2008 at the Ngee Ann Polytechnic Convention Centre, Singapore.

Ng, E.H. (2010, September). *Bringing out the best in our learners*. Retrieved January 12, 2017 from http://www.nas.gov.sg/archivesonline/data/pdfdoc/20100930001/speech_by_minister_wps2010.pdf

Ng, J.Y. (2015, June 29). Niche scheme in primary schools being phased out. *Today Online*. Retrieved January 12, 2017 from <https://www.gov.sg/news/content/niche%20scheme%20in%20primary%20schools%20being%20gradually%20phased%20out>

OECD (2016), *PISA 2015 Results (Volume I): Excellence and Equity in Education*, PISA, OECD Publishing, Paris. Retrieved January 12, 2017 from <http://dx.doi.org/10.1787/9789264266490-en>

O’Grady, G., Yew, H.J.E., Goh, K.P.L. & Schmidt, H.G. (2012). *One-day, one-problem: An Approach to problem-based learning*. Singapore: Springer.

Pawson, R., Greenhalgh, T., Harvey, G. & Walshe, K. (2005). Realist review – a new method of systematic review designed for complex policy interventions. *Journal of Health Services Research and Policy* 10(S1), 21– 34.

January 24, 2017 from <https://www.moe.gov.sg/media/speeches/2003/sp20031002.htm>

Shanmugaratnam, T. (2004). *To light a fire: Enabling teachers, nurturing students*. Retrieved January 12, 2017 from <https://www.moe.gov.sg/media/speeches/2004/sp20040929.htm>

Shanmugaratnam, T. (2005). *Achieving quality: Bottom up initiative, Top down support*. Retrieved January 12, 2017 from <https://www.moe.gov.sg/media/speeches/2005/sp20050922.htm>

Shanmugaratnam, T. (2006). *More support for school-based initiatives*. Retrieved January 12, 2017 from <https://www.moe.gov.sg/media/speeches/2006/sp20060928.htm>

Shanmugaratnam, T. (2007). Having every child succeed. Retrieved January 12, 2017 from <https://www.moe.gov.sg/media/speeches/2007/sp20071002-short.htm>

Teachers (Completion of syllabus for academic curriculum) (2007, September 17).

Singapore Parliamentary Reports (Hansard): Parliament 11, Session 1, Volume 83, Sitting 10. Retrieved January 12, 2017 from <https://sprs.parl.gov.sg/search/report.jsp?currentPubID=00004744-WA>

Temasek Polytechnic (n.d.). Advanced elective modules. Retrieved January 12, 2017 from <http://www.tp.edu.sg/schools/advanced-elective-modules>

Teng, A. (2016, Oct 7). Seven new applied subjects to pique students' interests. *The Straits Times, Home Section*, B6.

Teo, C.H. (1999). *Towards ability-driven education: Making every Singaporean matter.* Retrieved January 12, 2017 from <http://www.nas.gov.sg/archivesonline/speeches/view-html?filename=1999090403.htm>

Yeow, C.G. (2002). *The PEPP Model: Moving towards problem-based learning in technical education.* Paper presented at the 4th Asia-Pacific Conference on Problem-based Learning, 11-13 Dec, 2002, University of Songkhla, Hatyai, Thailand.