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Lessons that matter: What should we learn from Asia's school systems?

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While the contributions of these individuals and organisations are significant, the author is solely responsible for the content and views included in this report.

*Denotes members of the advisory board for this study.

About the advisory board

To maximise the quality of the research, the study sought the help of senior scholars in each of the jurisdictions as advisors. The study began with interviews with the advisors, who not only provided a broad and comprehensive narrative about education reforms in their jurisdiction but made suggestions, arranged for additional interviewees and gave references to significant documents and scholarly publications. During the development of the report, some advisors were contacted for additional resources and information, and a draft version of the report was sent to the advisors for comments before it was finalised. However the views expressed in this report do not necessarily reflect those of the advisors. The author is solely responsible for all possible errors.

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Professor Yong Zhao is an internationally recognised scholar whose work focuses on the implications of globalisation and technology on education. A Mitchell Professorial Fellow, he has designed schools that cultivate global competence, developed computer games for language learning, and founded research and development institutions to explore innovative education models. Yong has published over 100 articles and 20 books; his latest book, *World Class Learners*, has won several awards including the Society of Professors of Education Book Award (2013), the Association of Education Publishers' Judges' Award, and the Distinguished Achievement Award in Education Leadership (2013). Yong is an elected fellow of the International Academy for Education and currently serves as the Presidential Chair and Director of the Institute for Global and Online Education in the College of Education, University of Oregon, where he is also a Professor in the Department of Educational Measurement, Policy, and Leadership.

About the Mitchell Institute

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■ Executive Summary

Interest in learning from Asia's high-performing education systems has grown rapidly in recent years.

A flurry of research reports, media stories, and personal accounts of how Asia's best education systems achieved their superb rankings on international league tables has been produced in the quest to improve education systems around the world (OECD, 2011) (Tucker, 2011) (Tucker, 2014) (Jensen, 2012) (Barber, Donnelly, & Rizvi, 2012). However, most of the popular observations and suggestions fail to point out the most important lessons to be learned.

The lessons from Asian education systems do not relate to what helped them achieve their high scores on international comparative tests, but to the efforts they have engaged in over the past few decades to transform their educational practices. These efforts are often mistaken for policies and practices designed to produce the high academic performances indicated by international tests. In reality, they are intended to create a different kind of education, an education deemed necessary for cultivating citizens in the twenty-first century.

In other words, what Asia's high-performing systems have to offer the world is not their past, but the future they intend to create. It is their vision of a new education and the courage to make changes to long-held traditions and cultural practices.

This report is based on studies of reform efforts undertaken over the past three decades in Asia's high-performing education systems, specifically Hong Kong, Korea, Singapore and Shanghai. This report is not about 'catching up' to Asian school systems in international rankings, for even if we could learn everything and take 10 years to do so (which is next to impossible), in that time the world will have changed so much that a new order of education will be required.

Over the past few decades, these four Asian education systems have engaged in massive reform efforts. Although these efforts have had varying degrees of success, and some have resulted in consequences opposite to their intentions, they represent a strong desire to create education systems that are more fitting for the future. The reform efforts are characterised by the following:

Expanding definition of education outcomes

All four East Asian systems have been implementing reforms that expand the definition of education outcomes beyond academic performance in a narrow set of subjects. They are targeting skills commonly known as "twenty-first century skills" such as creativity, communication, collaboration, and higher order thinking skills. They are also interested in student social-emotional and physical health.

Improving equity of educational opportunities

All these systems have been working on major reforms to improve equity of opportunity, not just in terms of curriculum and pedagogy, but also and perhaps more importantly, in resources and access.

They are removing regulations and laws that had intentionally created inequity, challenging the tradition of meritocracy and creating new opportunities.

Loosening central control

These systems (except for Hong Kong) are traditionally centralised, but in recent years they have been gradually loosening central control. Local governments and schools have been granted more autonomy in curriculum, pedagogy and assessment.

De-emphasising testing

All four systems have recognised the dangers of over-testing students and have enacted policies and efforts to reduce the importance of standardised and centrally administered testing.

Transforming pedagogy from knowledge transmission to inquiry-based and constructivist

The Asian systems have engaged in massive efforts to transform pedagogy, to move away from their traditional approach of direct instruction that emphasises knowledge transmission and rote-memorisation toward a constructivist approach that is more student-centred and inquiry-based.

Capitalising on technology

The East Asian education systems have a strong future orientation. They are employing emerging information and communication technologies for improving education and developing digital literacies.

Broadening the curriculum

The systems have enacted curriculum reforms to broaden students' education experiences beyond the traditional academic subjects, while strengthening the core subjects. Stressing moral education, the arts, physical education, and social skills is a common theme of reforms in these systems.

Reducing the academic burden

Policies and actions have been implemented to reduce student academic burden, to reduce the amount of time devoted to school subjects outside school, and to reduce the pressure of schoolwork.

■ Introduction

By some measures, East Asia has some of the world's highest-performing education systems.

In the most recent round of Programme for International Student Achievement (PISA), seven of the top 10 scorers in mathematics were East Asian countries, as were six of the top 10 in science. Half of the top 10 scorers in the 2011 Trends in International Mathematics and Science Study (TIMSS) Mathematics (fourth and eighth grades) were East Asian education systems. No education system in East Asia that participates in international tests ranks below the international average.

Such outstanding performance has led to the perception that East Asian education systems, particularly Shanghai, Hong Kong, Korea, and Singapore, exemplify practices and policies worthy of emulation worldwide (Jensen, 2012) (OECD, 2011, 2014; Tucker, 2014, 2011) (Miao & Reynolds, 2014). As a result, governments and international organisations have been working on deciphering and disseminating policies and practices believed to have led to such astonishing accomplishment. A flurry of research reports, academic books, policy briefs, media coverage and personal accounts produced over the last decade offer lessons from Asia.

While the Asian systems are deservedly proud of their performance, they are not content with their achievements.

While the Asian systems are deservedly proud of their performance, they are not content with their achievements, as evidenced by the continuous and constant reforms these systems have launched over the past three decades. These reform efforts, while varying across systems, aim to challenge their educational traditions: from curriculum to pedagogy, from assessment to governance, and from teacher preparation to student admissions. These reforms are drastic, significant and persistent.

Importantly, reform efforts have been directed at abandoning education practices and policies that many outside observers have praised. For example, national and focused curricula, high-stakes testing, carefully controlled gateways, meritocracy, direct instruction, long school hours, and hard work have been identified as factors contributing to Asia's education success (Miao & Reynolds, 2014) (Tucker, 2014, 2011), yet they have been the targets of reform.

Outside observers have largely neglected or misunderstood these reform efforts, either failing to address why and how East Asian education systems have engaged in continuous reform over the past three decades or mistakenly treating some of these reform efforts as reasons for outstanding performance on international assessments. As a result, many of the popularly promoted lessons drawn by outside observers relate at best to the recent past of education in East Asia, while these systems have been actively working to create an education of the future.

The study presented in this report does not attempt to explain how East Asian systems achieved their top international rankings. Instead, it focuses on the reforms that East Asian education systems have undertaken. It attempts to understand why these systems have embarked on this transformation journey and what policies and practices have been put in place to bring about the desired transformation.

The study operated primarily from an insider's perspective, by analysing reform efforts in China, Hong Kong, Korea and Singapore over the past three decades, and interviewing experienced education policymakers, researchers, and practitioners in these systems. To do so, the study was guided by an international advisory board consisting of system representatives who are widely recognised as policy leaders and scholars in each of the four systems. The advisors provided guidance on major reform efforts, insights on these efforts, and which key individuals to interview.

Why change the 'perfect'? Discontent in East Asia

Outside observers characterise education systems in China (Shanghai), Hong Kong, Korea and Singapore as exhibiting high performance, high equity, high efficiency and rapid improvement (Jensen, 2012) (OECD, 2011, 2014; Tucker, 2014, 2011). These qualities have been used to justify the exemplary status of these systems and lead the search for lessons to apply to others. However, those inside the systems clearly had some reservations about the glorious status bestowed upon them, hence their continuous efforts to reform their policies and practices.

High quality

East Asian education systems have been accorded high-performance status largely because of their outstanding results in international assessments such as PISA, (TIMSS and the Progress in International Reading Literacy Study (PIRLS). In terms of rankings based on average scores on multiple rounds of these assessments, Shanghai, Hong Kong, Korea and Singapore are truly global high flyers.

As shown in Figures 1 and 2, these education systems outperform those of Australia, the United Kingdom and the United States by significant margins. While the four Asian systems placed among the top five in maths and science, Australia placed nineteenth in maths and thirteenth in science (better than both the United Kingdom and the United States).

Figure 1: PISA 2012 Scores in maths, science and reading

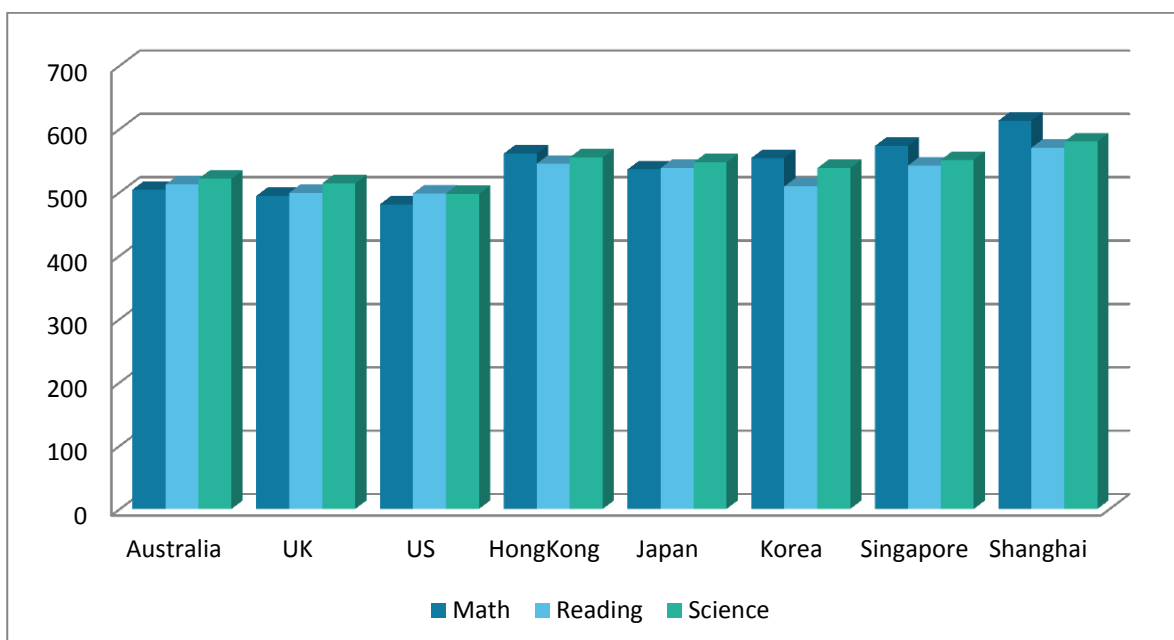
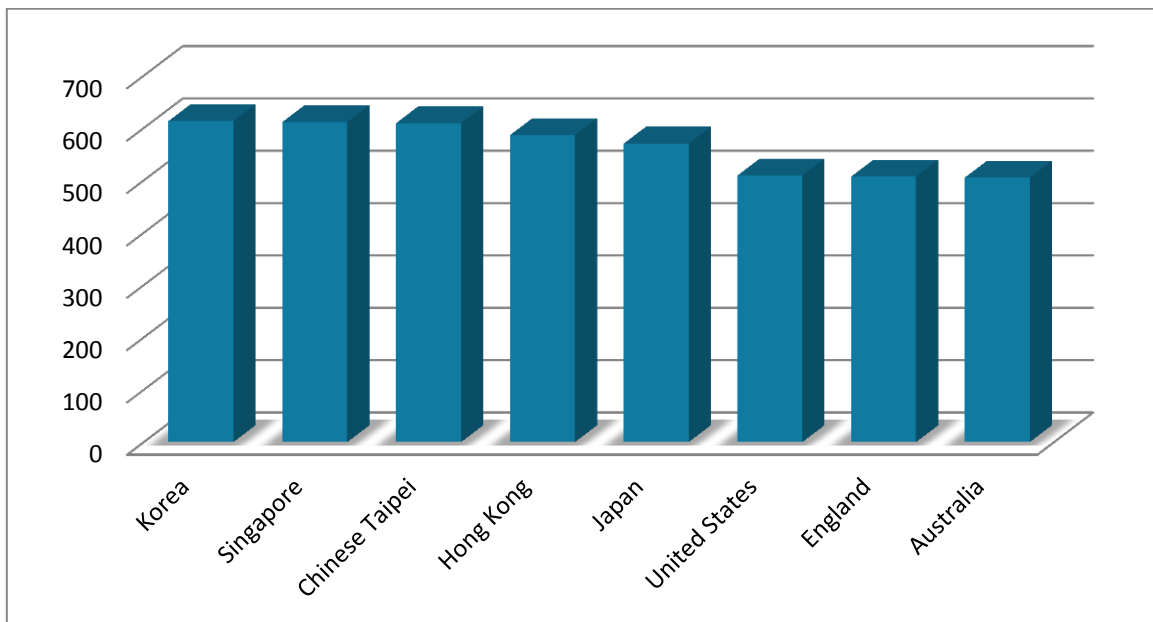


Figure 2: 2011 TIMSS maths scores



However, the Asian systems define education outcomes beyond test scores, and thus are deeply concerned about another set of numbers revealed by these studies. PISA, TIMSS, and PIRLS reveal relatively low levels of confidence and interest in maths, reading and science among Asian students, as shown in Figures 3, 4 and 5.

Figure 3: Confidence in maths, PISA 2012

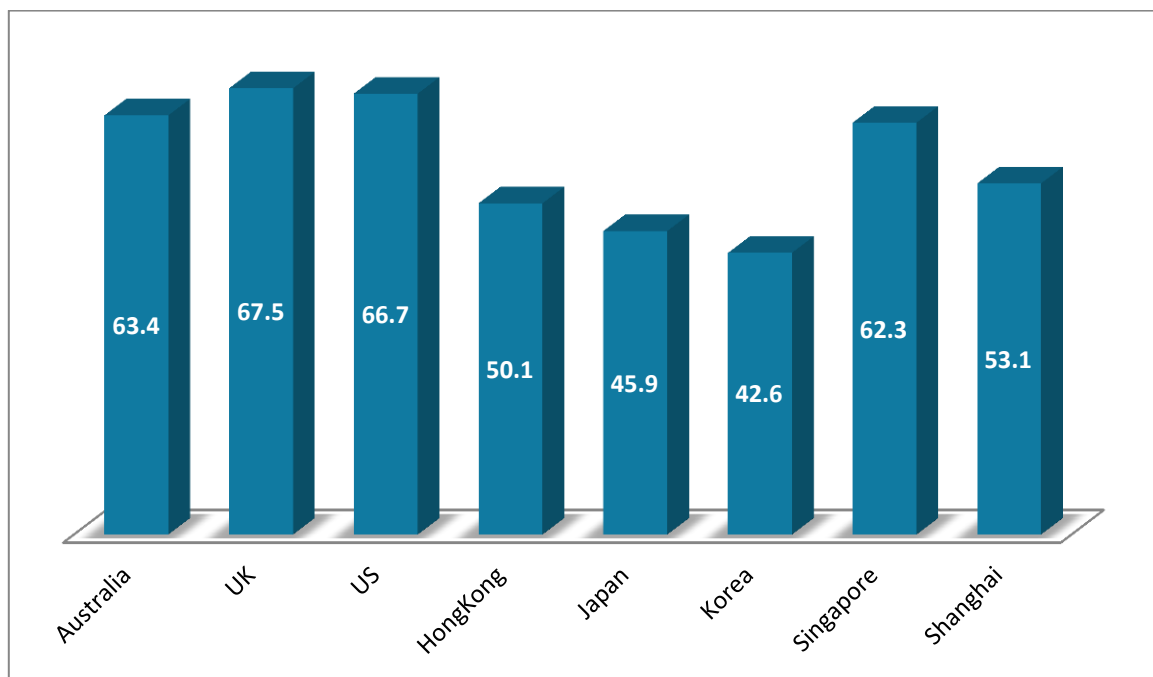


Figure 4: Pursuing a career using maths, PISA 2012

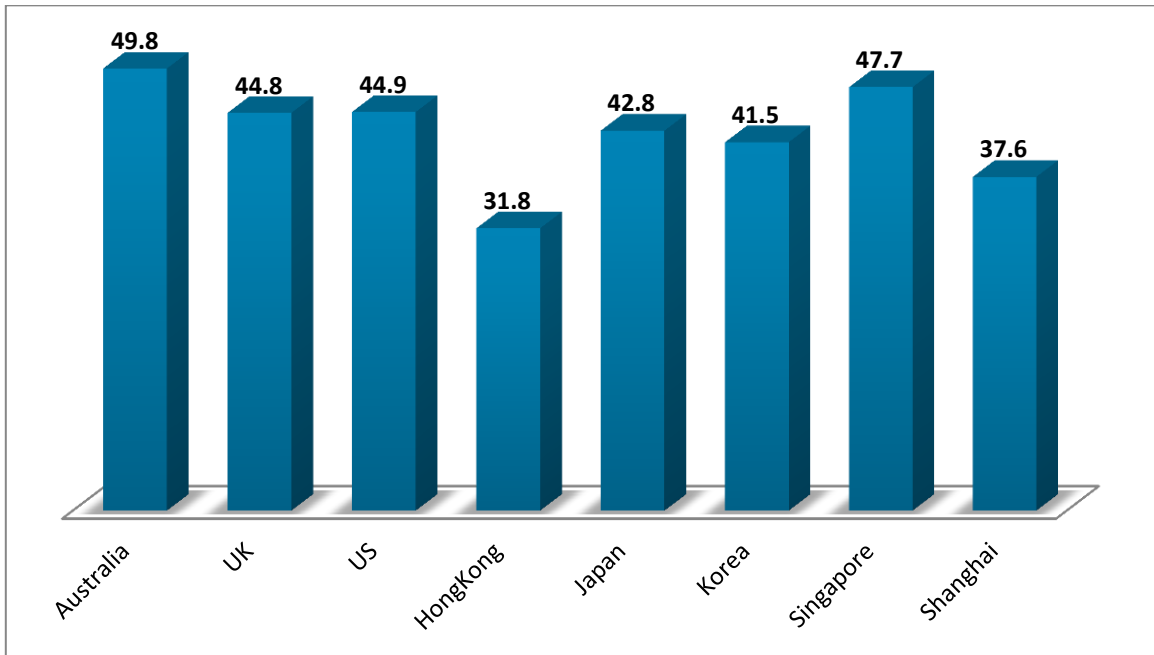
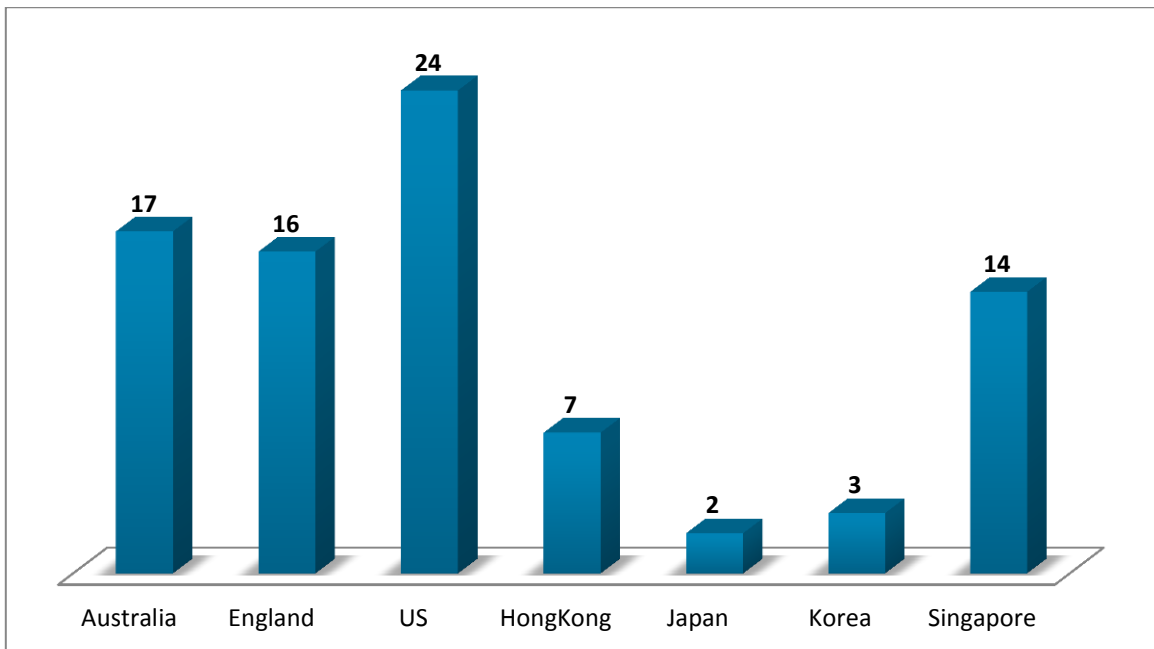


Figure 5: 'Very confident in maths', TIMMS 2011



The low confidence of East Asian students has been documented historically. For example, the percentages of students reporting themselves as 'very confident' in maths and science in 1995 in East Asian systems were much lower than in Australia, the UK, and the US, as shown in Figures 6 and 7.

Figure 6: Percentage confident in maths ('Usually do well in maths'), Eighth Grade, TIMMS 1995

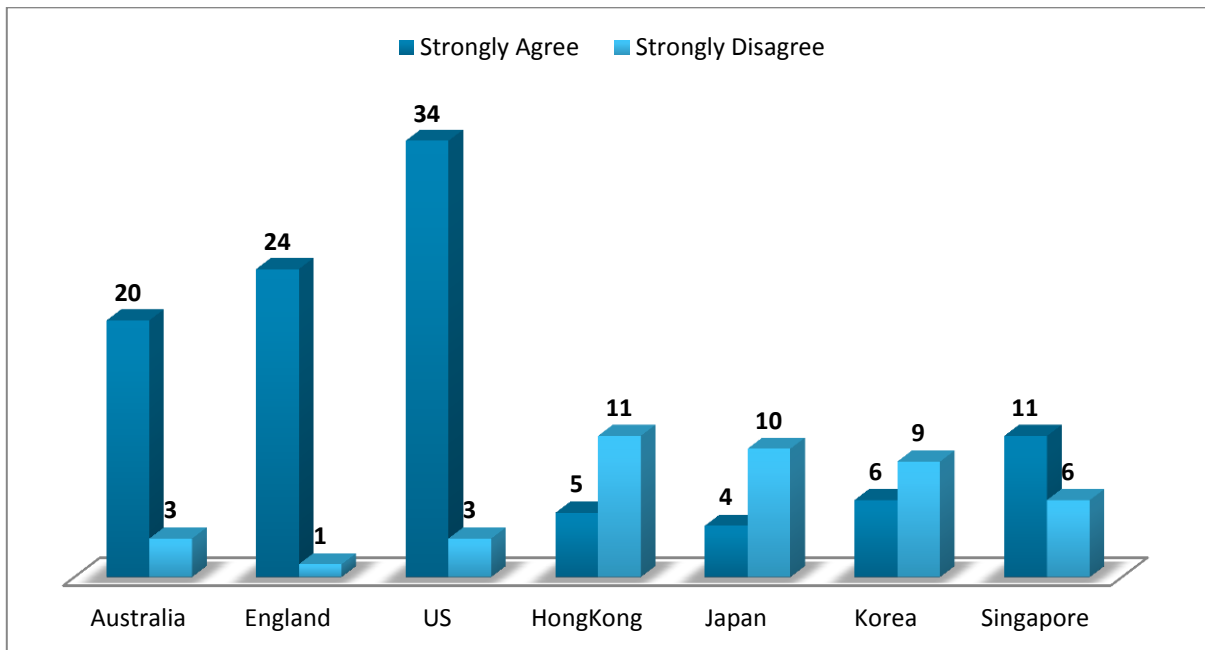
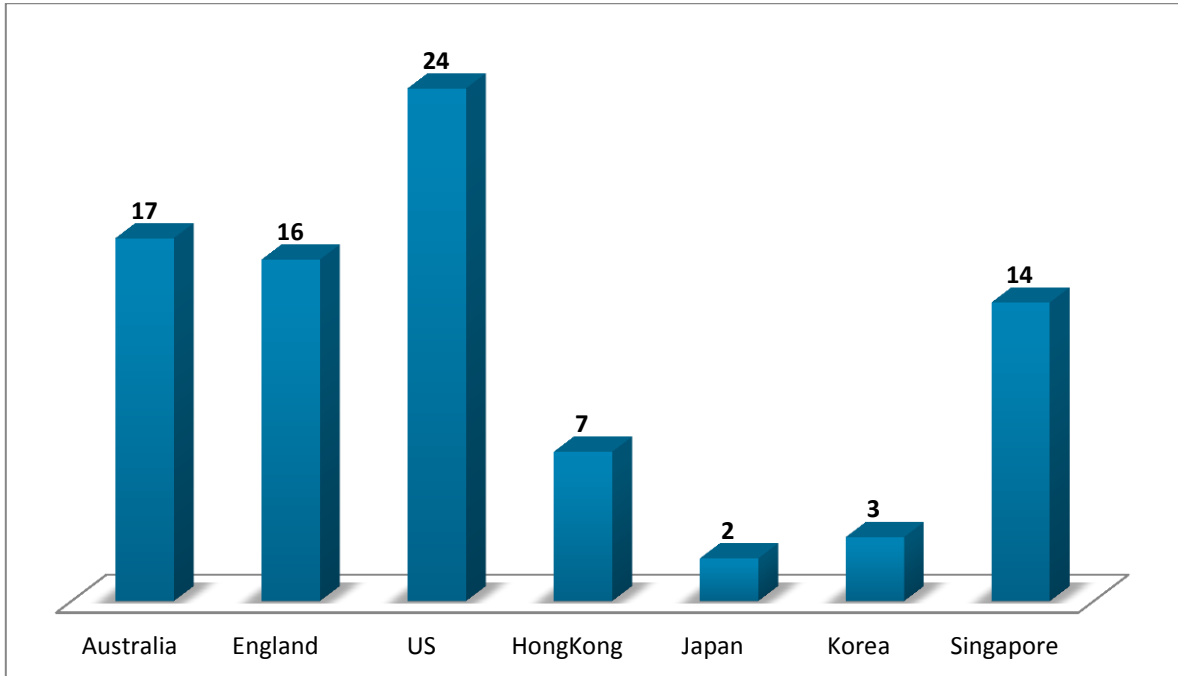


Figure 7: Percentage confident in Science, Eighth Grade, TIMMS 1995



Students' lack of confidence has caused grave concerns in East Asian systems. For instance, after publication of the 2011 TIMSS results, the Singapore Ministry of Education noted: "Despite performing better, our students expressed less confidence in these subject areas than their peers in other education systems – this self-reported lack of confidence is similarly observed in other Asian education systems. Schools, parents and the community can work together to improve this" (S. Ministry of Education, 2012).

Nevertheless, Singaporean students had a much higher level of confidence than those in Korea and Japan. Korea has long been troubled by its students' lack of confidence, recognising that its consistent expression "suggest(s) that it is an important ... goal for educators in Korea to turn their attention to the affective aspects of education" (K. Kim, 2010, p. 274) because "affective variables are not only important in subject learning but are significant in themselves" (K. Kim, 2010, p. 280).

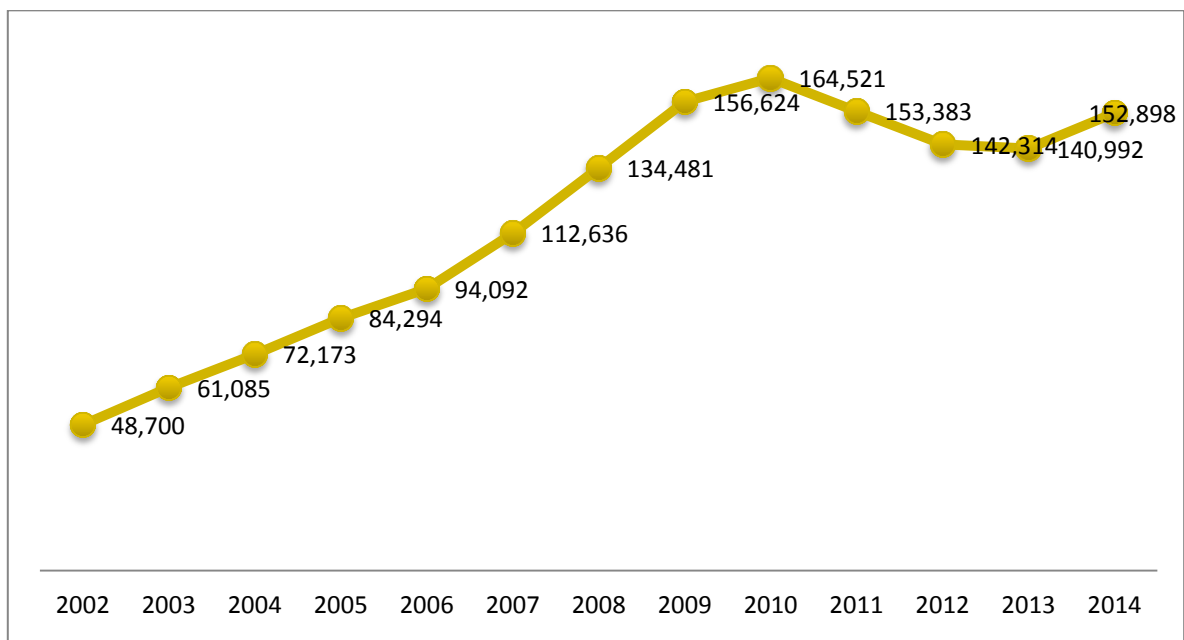
Hong Kong had similar reactions to its students' lack of confidence and interest in subjects in which they earned high scores on international assessments. In the 2011 TIMSS, eighth graders in Hong Kong scored extremely well in maths but only 19 per cent said they liked maths, 26 per cent said they valued the subject, and only seven per cent reported confidence. In response to these findings, Frederick Leung, a professor of Hong Kong University (which coordinates the TIMSS in the region), said that while Hong Kong students are good at "earning high scores," the lack of interest is of concern. "Students are expected to meet the expectations of their parents and society," Leung told *The Standard* (a local newspaper), "However, interest is very important because we are now talking about lifelong learning. Without interest, students will turn away from learning once there are no longer exams" (Li, 2013).

"Scoring high in the PISA test should not be seen as a point of pride for the Chinese educational system, but a reflection on its flaws," said Xiong Binqi, vice president of the 21st Century Education Research Institute and a prominent education leader in China (Waldmeir, 2013). Xiong's concerns are echoed by many others. While "Chinese schools are very good at preparing their students for standardised tests," wrote Jiang Xueqin (deputy principal of Peking University High School) in *The Wall Street Journal* shortly after Shanghai topped the PISA league table, "For that reason, they fail to prepare them for higher education and the knowledge economy" (Jiang, 2010).

The discontent goes beyond a lack of confidence and interest. Unless the outcome of education is test scores on international assessments, these East Asian systems can hardly be called high-quality education systems. Those inside these systems pointed at such indicators as the relative shortage of creative and entrepreneurial talents, high levels of student depression and anxiety, declining physical health, and excessive academic burden.

Even clearer evidence of student dissatisfaction is the strong desire among students and parents in East Asian systems to escape, whenever possible, their own education systems by either migrating to Western nations for education or attending international schools that offer Western-style education. In recent years increasing numbers of students in these systems have gone to the US, Australia (see Figure 8), New Zealand, Canada and the UK for education (Gao, 2015). International schools have also mushroomed in these systems. Who in their right mind would forgo the best education in the world, at tremendous financial and personal costs?

Figure 8: Growth of Chinese Students in Australia



Source: Australian Trade Commission: <http://www.austrade.gov.au/Education/Student-Data/2015#.VVYCzmTBzGc>

High efficiency

East Asian education systems have earned a reputation for high efficiency; that is, they produce the best education value for their education spending. In 2014, for example, Korea and Japan were among the top few of 30 education systems included in *The Efficiency Index* (Dolton, Marcenaro-Gutierrez, & Still, 2014). Other East Asian systems were not included (for lack of data), but previous reports have identified East Asian systems as generally very efficient (Jensen, 2012) (OECD, 2011).

The high efficiency observation is, however, flawed. First, since the outcomes are test scores that are not necessarily reflective of all valuable educational outcomes, the more accurate claim should be that East Asian education systems are highly efficient in producing test scores. That is drastically different from producing valuable educational outcomes. Second, even if test scores were the only educational outcomes worth pursuing, the observation is false because it only counts government spending as input, ignoring the substantial financial resources families invest in their children’s education.

Families contribute a large portion of total education expenditure in East Asian systems to support school activities and private tutoring. For example, average family education expenditure in Shanghai was about \$993¹ in 2007 during the compulsory education stage (primary and middle school), very close to the amount invested by government (Lin, 2009). In Korea, families’ education spending almost matches that of the government with a ratio of 0.8 to 1 (Southgate, 2009). In Hong Kong, over 85 per cent of secondary students receive private tutoring (Bray & Lykins, 2012). In Singapore, families spent about \$857 million² on private tutoring in 2008 (Bray & Lykins, 2012). Even Andreas Schleicher, an avid advocate for East Asian education systems and the Organisation for Economic Co-operation and Development’s (OECD) Director for Education and Skills, admits that “the apparent high degree of efficiency of the East Asian education systems may, at least in part, be due to significant household spending on out-of-school education that is not accounted for by the analysis” (Dolton et al., 2014, p. 7).

¹ 2014 Australian dollars – converted from 2007 Renminbi using the average daily exchange rate and adjustment for inflation.

² 2014 Australian dollars – converted from 2008 Singapore dollars using the average daily exchange rate and adjustment for inflation.

High equity

Widespread and substantial 'shadow education' in East Asia belies the claim that their education systems exhibit high equity, as University of Hong Kong researchers Mark Bray and Chad Lynks wrote:

...shadow education maintains and exacerbates social inequalities. It is self-evident that more prosperous families are able to purchase greater quantities and better qualities of supplementary tutoring than can less prosperous families. Diversification within the industry has made forms of tutoring available at lower cost, eg., through large classes provided by companies and delivered by star tutors. However, some families cannot afford even the less expensive forms of tutoring or cannot access them because they live in remote locations. (Bray & Lynks, 2012, p. 44)

The inequity is also caused by unequal government investment. For example, per pupil government investment varies a great deal across the 18 jurisdictions of Shanghai. In 2005, the jurisdiction with the highest per pupil public expenditure invested \$1798³, while the lowest spent \$159, over 10 times less. In 2007, the gap narrowed a bit so that the highest expenditure was six times the lowest (Xiong, 2008). Moreover, the deeply steeped tradition of meritocracy in these systems makes schools unequal by design. These systems have a longstanding practice of sorting students into different quality schools based on their exam performances. Numerous efforts have been made to address the problem of inequity recently.

Furthermore, the small variation in PISA performances in East Asian systems as evidence of high equity has been questioned, due to PISA's sampling methods. The exclusion of children of migrant workers from the PISA samples in Shanghai is a well-established fact (Loveless, 2014). Furthermore, the extent to which Shanghai's PISA results represent the Chinese education system has been questioned (Altbach, 2011). Korean researchers have also identified widening gaps in student achievement due to differences in socio-economic background (Byun & Kim, 2010). Researchers in Hong Kong found that family background had an impact on education stratification, which then causes a widening income gap (Wu, 2005).

Widespread and substantial 'shadow education' in East Asia belies the claim that their education systems exhibit high equity.

The Asian discontent: A summary

East Asian education systems have long recognised their inadequacies and made their discontent public. In the late 1990s, the concept of building 'a learning society' and a 'life-long learning society' spread rapidly across the region. Traditional systems were viewed as inadequate to achieve these goals. In 2000, the Hong Kong Education Commission released an influential education reform report, which states:

... we must address the inadequacies within the existing education system to enable the majority of Hong Kong people to achieve lifelong learning and all-round education. All in all, despite the huge resources put into education and the heavy workload endured by teachers, learning effectiveness of students remains not very promising; learning is still examination-driven and scant attention is paid to 'learning to learn'. School life is usually monotonous, students are not given comprehensive learning experiences and have little room to think, explore and create. The pathways for lifelong learning are not as smooth as they should be. To make up for these weaknesses, we need to uproot outdated ideology and develop a new education system that is student-focused. (Education Commission, 2000, p. 4)

³ 2014 Australian dollars – converted from 2005 Renminbi using the average daily exchange rate and adjustment for inflation.

At about the same time, in 1997, the Chinese Ministry of Education (then the Chinese National Education Commission) forcefully laid out the damage of China's education system:

'Exam-oriented education' refers to the factual existence in our nation's education of the tendency to simply prepare for tests, aim for high test scores, and blindly pursue admission rates [to colleges or higher-level schools] while ignoring the real needs of the student and societal development. It pays attention to only a minority of the student population and neglects the majority; it emphasizes knowledge transmission but neglects moral, physical, aesthetic, and labour education, as well as the cultivation of applied abilities and psychological and emotional development; it relies on rote memorization and mechanical drills as the primary approach, which makes learning uninteresting, hinders students from learning actively, prevents them from taking initiatives, and heavily burdens them with [an] excessive amount of course work; it uses test scores as the primary or only criterion to evaluate students, hurting their motivation and enthusiasm, squelching their creativity, and impeding their overall development. (Guojia Jiaowei (National Education Commission), 1997)

In 1996, Korea released a plan for education reform produced by the Presidential Commission on Education Reform: *Education Reform for New Education System: to Meet the Challenges of Information and Globalization Era*. While an English version of the Education Reform Proposals (ERP) cannot be located, an OECD review summarises its discontent with and reasons for reforming Korean education:

The ERP critique of the present system [in Korea] is very severe. The system is excessively centralized, enjoins conformity, and offers little scope for diversity or innovation. School curricula, though changing, are rigid, allow little scope for local interpretation, and are supported by textbooks that reinforce the prescriptive nature of what is taught. Teaching and learning relies far too much on the memorisation and recall of fragmented knowledge. The college entrance examination reflects and reinforces these policies and ensures that they will continue. (OECD, 1998, p. 125)

In 1997, Singapore introduced its major education reform *Thinking Schools Learning Nation*. To identify gaps between the existing educational practices and policies and the desired outcomes, Singapore conducted a curriculum review and found several areas of concern.

...there seems to be much less attention given to the nurturing of a positive learning culture in the school. Although there seems to be no significant overload in terms of the formal curriculum content, our students are 'over-drilled' as a result of too much emphasis on completing workbooks accompanying each subject in school as well as at home [in primary education].

... a pressing matter [in secondary education] is that of an over-crowded curriculum which is over-taught by teachers. The focus tends to be strongly concentrated on academic aspects, interpreted rather narrowly to mean quantifiable measures such as examination grades. (Ministry of Education, 1998a)

■ Addressing the discontent

The discontent with East Asian systems expressed in the late 1990s drove massive reforms in subsequent decades.

East Asians were dissatisfied with their education systems, not because their students did poorly academically, but because they recognised that their education system was no longer adequate to prepare citizens for the twenty-first century, when globalisation and technology demand different talents and skills from those they had been good at cultivating. However, the consequent reforms have often been misunderstood as the reasons behind the high performance of East Asian education systems today. One report, for example, states: “Improvement in performance in these four [Korea, Hong Kong, Shanghai, and Singapore] systems has been rapid” (Jensen, 2012, p. 9). Jensen cites evidence such as Korea and Hong Kong’s improvement in PISA reading between 2000 and 2009, as well as Korea and Singapore’s improvement in PIRLS between 2001 and 2006.

East Asians recognised that their education system was no longer adequate to prepare citizens for the twenty-first century.

Slow (or no) improvement

The fact is that these systems have always been strong performers in terms of testing. Prior to the reforms that started in the late 1990s, for example, Hong Kong and Singapore were above-average performers in the 1990-1991 IEA Reading Literacy Study (Elley, 1992). Hong Kong ranked first in the Second International Mathematics Study conducted between 1977 and 1981. Singapore, Korea and Hong Kong have been the top performers in TIMSS since 1995 (see Table 1). Korea and Hong Kong were top performers in the PISA in 2000 and 2003 (Singapore did not participate). Shanghai did not participate in large-scale international studies until the 2009 round of PISA, but small-scale comparison studies conducted in the 1980s and 1990s showed that Chinese students outperformed American students in reading and maths (Stevenson & Stigler, 2006). Instead of rapidly improving over the past two decades, the East Asian systems recorded very slow or even negligible improvement in ranking, since they were at the top anyway.

Table 1. Raw scores and ranking in TIMSS 1995 and 2011 (Eighth Grade Maths)

System	Raw Score		Ranking	
	1995	2011	1995	2011
Singapore	643	611	1	2
Korea	607	613	2	1
Hong Kong	588	586	4	4
Australia	530	505	16	12
England	506	507	25	10
United States	500	509	28	9

The reforms were not undertaken to lift test scores and cannot be credited with bringing the ‘rapid improvement’ some observers noted. One report, for instance, states: “education reforms created rapid changes in reading literacy” because “[Neither] cultural difference nor Confucian values can explain how, in just five years, Hong Kong moved from 17th to 2nd in PIRLS.” But the fact is that Hong Kong’s reading literacy performance was already high in 1990. High performance of East Asian systems predated many of the reforms observed.

Reforms need time to take effect, making it even more unlikely that they are responsible for the high test results of East Asian students. For instance, the cornerstone reform strategy in Hong Kong only began to be implemented in 2000, when Hong Kong was already performing strongly in international studies; it is quite a stretch to believe it resulted in the gains in PIRLS from 2001 to 2006. Another example is Singapore. Major reforms affecting teachers in Singapore began after 1997, when the country had already topped the world rankings in maths in TIMSS in 1995.

A great legacy

The East Asian high performance in international comparative assessments is much less due to recent reforms than cultural legacy (Cheng, 2011; Tucker, 2014) (Zhao, 2014c). All four Asian systems under investigation, namely Shanghai, Korea, Hong Kong, and Singapore, have a strong association with the Confucian culture that values passing exams as a primary means of achieving social mobility or meritocracy. As a result, these systems feature extremely dedicated parents, diligent students, and an education infrastructure built around helping students succeed in exams (Cheng, 2011; Zhao, 2014c) (Coughlan, 2012; Lee, Kim, & Adams, 2010; Schleicher, 2013; Stevenson & Stigler, 2006).

Corroborating this view, a recent study found that students of Chinese origin attending schools in New Zealand and Australia had similar achievement to students in Shanghai in the 2009 PISA, and much higher performance than non-Chinese students in Australia and New Zealand (Feniger & Lefstein, 2014). The finding was unchanged after controlling for parental socioeconomic background factors. This is just one more addition to the abundant literature that shows the high academic success of East Asian students in Western countries. Since these students attend the same schools as their host country peers, the difference is more likely a result of their cultural legacy than schooling.

Inventing the future: Goals of Asian education reforms

The impetus for reforms in the East Asian education systems is not the lack of academic excellence, which is the result of their past practices. Nor is it discontent with their high scores. Rather, they knew that their students' high performance in tests was not sufficient for the new world. Thus the reforms did not aim to sustain or strengthen their existing systems, but to invent a new form of education fit for the future.

The globalised, twenty-first century future East Asian education systems anticipate is one recognised around the world. The 1996 Korean ERPs state that Korea "is faced with a new era where our ideas, institutions, and systems can no longer be protected by national boundaries" (cited in (OECD, 1998, p. 125)). In a 1997 speech by Goh Chok Tong (then Prime Minister of Singapore) that launched the *Thinking Schools Learning Nation* reform, globalisation was identified as one of the primary factors shaping the future. "...it will be an intensely global future, with diminishing barriers to the flow of goods, services and information," noted the Prime Minister; "Competition between cities, countries, sub-regions and regions will be intense. No country or region will have permanent advantages" (Goh, 1997). Similarly, the Hong Kong Education Commission's report that launched the recent reforms said it is "facing tremendous challenges posed by a globalised economy" (Education Commission, 2000, p. 3). The 1997 Chinese Ministry of Education policy, that proposed numerous reforms that have ensued over the past 20 years, stated that the reforms were to "meet the challenges of the 21st Century" (Guojia Jiaowei (National Education Commission), 1997, p. 1).

The globalised economy and rapid changes in technology made the East Asian systems seriously examine their traditional and existing practices and policies. Although worded slightly differently, the common goal of the reforms is to have an education system that prepares students with qualities that are vastly different from those previously sought. In Korea, the reforms were designed to produce citizens who are:

- able to create new knowledge and know-how in aspects of living;
- creative and inventive in their responses to new ideas and challenges;
- secure in their knowledge of their Korean culture;
- well informed about what is happening in the world; and
- humane and peace-loving, and effective in their ability to communicate across cultures. (OECD, 1998, p. 125-126)

Hong Kong's education system aims:

To enable every person to attain all-round development in the domains of ethics, intellect, physique, social skills and aesthetics according to his/her own attributes so that he/she is capable of life-long learning, critical and exploratory thinking, innovating and adapting to change; filled with self-confidence and a team spirit; willing to put forward continuing effort for the prosperity, progress, freedom and democracy of their society, and contribute to the future well-being of the nation and the world at large.

Our priority should be to enable our students to enjoy learning, enhance their effectiveness in communication and develop their creativity and sense of commitment. (Education Commission, 2000, p. 4)

The globalised economy and rapid changes in technology made these systems examine their traditional and existing practices and policies.

In announcing the *Thinking Schools Learning Nation* initiative in Singapore, the Prime Minister said: “we must ensure that our young can think for themselves, so that the next generation can find their own solutions to whatever new problems they may face” (Goh, 1997). Singapore wanted its new education system to:

... produce creative and critical thinkers, who confidently display skills fit for tomorrow's workplace. It must also develop in our people the enthusiasm to learn new skills and ideas and the ability to communicate effectively. These skills must not be confined to the top level of management but permeate every layer of society and every level in the workplace. (Ministry of Education, 1998a)

In China, the 1997 reform document aimed to develop an education system that:

.. serves every student, recognizes individual differences, meets individual needs, and enables each student to grow lively, actively, and proactively; builds a strong foundation for students to develop life-long learning abilities, creativity, and capacity for living and further development. (Guojia Jiaowei (National Education Commission), 1997, p. 1)

To achieve these goals, all four East Asian education systems believed they had to develop a new education system, while acknowledging their traditional strengths and accomplishment. Hong Kong acknowledged the “need to uproot outdated ideology and develop a new education system that is student-focussed” (Education Commission, 2000, p. 4). Singapore’s Prime Minister Goh stated: “We cannot assume that what has worked well in the past will work for the future. The old formulae for success are unlikely to prepare our young for the new circumstances and new problems they will face” (Goh, 1997). Korea needed “a paradigm shift in the theory and practice of education at all levels” (OECD, 1998, p. 125). And China must “take forceful actions to promote quality-oriented education [the new education] and free education from the exam-oriented policies and practices” (Guojia Jiaowei (National Education Commission), 1997, p. 1).

Continuous, constant and comprehensive

Reforms in East Asian education systems are continuous and gradual. Since the 1990s, China, Korea, Hong Kong and Singapore have continued their future-oriented reforms with further initiatives. These initiatives are consistent in their goals: prepare citizens for a globalised world in the twenty-first century. Further initiatives will reinforce and refine the earlier efforts that set the direction for these systems.

In 2006, after the *Thinking Schools Learning Initiative*, Singapore established the *Teach Less Learn More* movement. Along the way, Singapore has had four Master plans for Information and Communications Technology in Education, with the first covering 1997–2002, the second 2003–2008, the third 2009–2014, and the fourth 2014–2019. Hong Kong has had multiple initiatives since the 1990s. In 1997, the Education Commission issued its seventh report entitled *Quality School Education* (Hong Kong Education Commission, 1997). In 2000, the Commission submitted the *Reform Proposal for the Education System in Hong Kong* to the government. Over the last 15 years, Hong Kong has been working on the proposed changes and periodically reported on their progress.

The same is true for China and Korea. In 1998, the Chinese government (the State Council) approved the Ministry of Education’s *Action Plan to Reinvigorate Education for the 21st Century* (Ministry of Education, 1998k). In 1999, the Central Committee of the Chinese Communist Party issued a more comprehensive reform plan to advance systemic educational reform and promote quality-oriented education (Zhonggong Zhongyan (Central Committee of the Chinese Communist Party) & Guowuyuan (State Council), 1999).

The reform continues. In 2014, major changes were made to the Chinese college entrance exam. The Korean Presidential Committee on Education Reform reforms begun in the mid-1990s (The Presidential Commission on Education Reform, 1996) continued into the 2000s; later administrations have introduced further reforms (Lee et al., 2010).

The reforms in East Asian educational systems were intended to be comprehensive and systemic. These reforms went significantly beyond minor tweaking of classroom practices or assessment tools; they aimed to transform the entire system and culture of education. Thus they touched all levels of education, from early childhood to higher education. They also targeted all aspects of education, from curriculum to assessment, from teacher education to pedagogy, and from school governance and management to admission mechanisms. Of course putting new ideas into practice is difficult, and these reforms have not yet fully achieved the intended transformation. The essential qualities of East Asian education systems are deeply rooted in culture and history, and will not be transformed overnight. However the fact that these systems have identified many of these qualities as weaknesses, and are making efforts to change, signals a significant new direction. It is this change of direction, and where it is headed, that should be of vital interest to education policymakers and leaders in other parts of the world.

■ Lessons that matter

Studying East Asian education system reforms since the mid-1990s reveals three important facts.

First, these reforms were not aimed at or responsible for improving the traditional policies, practices and cultural values that resulted in a superb performance in international assessments. Instead, these reforms were driven by the desire to transform their systems so as to meet the challenges of the future. Second, these reforms demonstrate the vision, courage and commitment that exists in East Asian education systems. While they are proud of their past accomplishments and cultural heritage, they are not afraid of making drastic and difficult changes. Third, while specific strategies vary across the four jurisdictions in response to their local contexts, all reform efforts share common themes. These themes reveal the important lessons other nations need to learn.

Expanding the definition of education outcomes

The most significant theme across the reform efforts in all four East Asian systems is broadening the definition of education outcomes beyond a narrow set of subjects and international test scores. They aim to develop twenty-first century skills such as creativity, communication, collaboration and higher-order thinking abilities. They are also interested in students' social, emotional and physical health. Stressing moral education, the arts, physical education, and social skills is a common theme of reforms in these systems.

Singapore, for example, aimed at building a system that produces “creative thinkers who will be measured by the 21st century yardstick of team playing and multi-disciplinary perspectives” (Ministry of Education, 1998a). The curriculum review designed to implement the *Thinking Schools Learning Nation* plan identified “good learners, good creators, and good communicators with a high sense of civic responsibility” as the outcome of its future education system (Ministry of Education, 1998a).

The 7th National Curriculum of Korea defines an educated person as one who:

- pioneers the development of individuality and career on top of a holistic development;
- shows creativity with new thinking and challenges based on basic capabilities;
- leads a dignified life based on understanding cultural knowledge and pluralistic values; and
- participates in community development possessing the spirit of consideration and sharing, as a citizen communicating with the world. (Ministry of Education and Human Resources Development, 2001, p. 1)

In Hong Kong, the reform efforts were designed to “enable every person to attain all-round development in the domains of ethics, intellect, physique, social skills and aesthetics” so they are capable of:

... life long learning, critical and exploratory thinking, innovating and adapting to change; filled with self-confidence and a team spirit; willing to put forward continuing effort for the prosperity, progress, freedom and democracy of their society, and contribute to the future well-being of the nation and the world at large. (Education Commission, 2000)

Enjoying learning, effective communication, creativity, and sense of commitment are the priority outcomes of education in Hong Kong (Education Commission, 2000).

China's 1999 education reform framework puts "the development of creative spirit and implementation abilities" as the priority (Zhonggong Zhongyan (Central Committee of the Chinese Communist Party) & Guowuyuan (State Council), 1999). The framework broadens the definition of education outcomes by stating that "schools must not only provide excellent academic preparation, but more important, they should put more emphasis on character education and strengthen physical education, aesthetics education, vocational education, and social practices" (Zhonggong Zhongyan (Central Committee of the Chinese Communist Party) & Guowuyuan (State Council), 1999). Following the national framework, Shanghai started its local education reform and issued a curriculum framework and standards in 2004, which aim to instil students with national spirit, global perspective, sense of social responsibility, capacity for life-long learning, creative spirit, execution ability, literacy in science and humanities, healthy personality, and physical fitness (Shanghai Jiaoyu Weiyuanhui (Shanghai Education Commission), 2004).

To achieve the intended broadened educational outcomes, China, Hong Kong, Korea and Singapore have instituted a host of transformative changes. A broadened set of education outcomes requires a broad educational experience in schools. To broaden student experiences requires a broad and flexible curriculum. Following this logic, the four Asian systems have engaged in a series of curriculum reform efforts characterised by increasing the breadth and flexibility of their school curricula.

Reducing traditionally mandated 'core' content and skills

Given that time in school is a constant, to make space for broader educational experiences, the East Asian reforms have all worked to reduce mandated content and skills. In Singapore, for example, the Ministry of Education announced in 1998 that it would reduce content by up to 30 per cent "in order to provide room for teachers to implement the key initiatives announced in 1997, namely the infusing of thinking skills and integrating the use of Information Technology in lessons and the delivery of the National Education messages" (Singapore Ministry of Education, 1998). In the first stage, the Ministry reduced the content by 10 per cent to 30 per cent in 117 of the 162 subject syllabuses in use in Singapore schools at the time. It also suggested the number of subjects at the "O" level be capped at eight for all schools (Ministry of Education, 1998a).

In China, the new curriculum reform that started in 2001 resulted in a reduction of 380 class hours during the compulsory education stage (grades one to nine). The number of hours for maths was reduced by 146 hours, while class hours for physical education increased by 156 hours. In high school, 347 hours were taken away from required courses while 410 hours were added for elective courses (Yuan, 2009). Korea's 7th National Curriculum also reduced the number of subjects to be completed per semester (Ministry of Education and Human Resources Development, 2001). Likewise, Hong Kong's reform plan proposed "to eliminate repetitive and unnecessary elements in the curriculum, providing more room to teachers and students to make for all-round, effective, coherent and enriched learning" (Education Commission, 2000, p. 15).

Increasing new learning experiences

Limiting the time and resources devoted to traditional 'core' content enables schools, teachers and students to engage in other learning experiences that support the development of a broad range of abilities. The Asian systems have restructured their curricula to introduce new learning experiences for students. These aim to expand students' education beyond traditional academic subjects and give them more authentic life experiences that cultivate twenty-first century skills.

Shanghai restructured its curriculum into three elements: basic courses, expansion courses and research courses. The basic courses are similar to traditional core academic subjects that are required of all students. Expansion courses are optional courses for students to explore their interests, actualise their unique potential, and develop self-planning and managing abilities. Research courses are inquiry-based courses that help students develop the ability to identify and solve problems, creative ability and spirit, and collaborative skills. These courses can originate from student interest or from a subject (Shanghai Jiaoyu Weiyuanhui (Shanghai Education Commission), 2004).

New courses in information technology, inquiry, arts, and humanities have been added to the curriculum. Korea included "creative experiential learning activities" in its 7th Curriculum as a required component, which is given more than half the school time devoted to Korean language or maths (Ministry of Education and Human Resources Development, 2001). Shanghai requires primary school students to participate in 1–2 weeks of community engagement and service activities (Shanghai Jiaoyu Weiyuanhui (Shanghai Education Commission), 2004). Singapore's curriculum review emphasises the importance of extra-curricular activities (ECAs): "all students should be encouraged to actively participate in ECAs and advised as to how to balance these activities with classroom work" (Ministry of Education, 1998a).

Making new outcomes matter

To emphasise the value of the broadened learning outcomes, Asian systems have also begun reforming their traditional student assessment schemes. Shanghai has been working on developing 'comprehensive assessment systems' or learning portfolios that include scores, grades and records of learning in academic subjects, personalised learning activities and accomplishments, and records of community services and societal practices. It also has started eliminating academic testing as the basis for admitting students to higher levels of education (Shanghai Jiaoyu Weiyuanhui (Shanghai Education Commission), 2004).

Similarly, in Hong Kong, "written examinations and interviews are forbidden" in the placement of children in schools so as "to eliminate any incentive to make excessive demands on young children" (Education Commission, 2000, p. 11). For internal assessment, the Hong Kong Education Commission recommended minimising the use of quantitative assessment and using "various modes of assessment, including flexible formative assessment" that "produces a more comprehensive picture of the performances and needs of students in different areas" (Education Commission, 2000, p. 10). According to the proposal, "excessive dictation exercises, mechanical drilling, tests and examinations should be eliminated to allow students more time to participate in useful learning activities" (Education Commission, 2000, p. 10). For external accountability assessment, the Commission recommended that the examination system be improved "starting from the modes, contents and assessment methods." It advocates a flexible examination approach that "can give students more room for creative and independent thinking" (Education Commission, 2000, p. 11):

Linking the content of examinations with students' experiences in daily lives will raise their interest in learning and will encourage them to put more time and effort on useful learning activities. As regards assessment methods, including an appropriate element of teachers' assessments will help to better examine those abilities that are not easily assessed through written tests (for example, the ability to organize, communicate and work with others). In this way, students are encouraged to participate in diversified learning activities and develop multi-faceted abilities. (Education Commission, 2000, p. 11)

Singapore introduced similar reforms to its traditional one-off summative assessments set and assessed by the Ministry of Education in order to support the *Thinking Schools Learning Nation* plan. The changes include additional modes of assessment that are more conducive to the learning outcomes of various subjects. It also:

... saw the inclusion of performance assessments for coursework in subjects such as Design and Technology, Art and Computer Applications. Assessment of the coursework components of these subjects is school-based and spread over a period of time, as opposed to a one-off, time-based examination. (Chong, 2009, p. 1)

In 2003, Singapore rewrote its national examination history “with the implementation of the first wholly school-based assessment of the Singapore-Cambridge GCE A-Level Project Work” (Chong, 2009, p. 2).

Towards student-centred education

Another commonly shared theme is the movement toward ‘student-centredness’. The four East Asian systems share a long tradition of being authority-centred, exam-oriented and teacher-driven. Reform efforts in Shanghai, Hong Kong, Korea and Singapore all recognise the importance of individual differences and have taken actions to build a student-centred education.

“The main purpose of the education reform is to give students more room and flexibility to organise and take charge of their own learning,” according to the Hong Kong Education Commission (Education Commission, 2000, p. 36). The Education Reform Proposal of 2000 states:

Students should be the main protagonists in learning. The ultimate objective of education is to enable every student to achieve all round development according to his/her own attributes. It therefore follows that in reforming the education system and the methods of learning and teaching, students’ needs and interests must be the foremost consideration. (Education Commission, 2000, p. 36)

The recommendations of The Presidential Commission on Education Reform in Korea made the student the focus of a new education that would serve Korea well in the future. The recommended changes are:

- All education must be student-oriented.
- Schools and curriculum must be diversified to provide more choices in learning experiences.
- There must be accountability to school management.
- Equal opportunity of education and freedom of choice must be guaranteed.
- New technology must be adopted to facilitate continuing education; and the quality of education has to be improved. (OECD, 1998, p. 69)

A student-centred education can come in different forms. Shanghai began to grant students more autonomy over their learning by introducing more optional courses that allow students to personalise part of their education. Singapore’s emphasis on project work gives students more opportunities to exercise autonomy over what and how they learn and to demonstrate their abilities. In Korea, flexibility is built into the 7th Curriculum as one of its design principles; the Curriculum states: “Avoid rigidity of curriculum organization and implementation, and organize grade clusters to allow flexibility of curriculum organization and implementation for schools through inter-connection and cooperation between grades” (Ministry of Education and Human Resources Development, 2001, p. 2).

De-emphasising academic testing

China (Shanghai), Hong Kong, Korea and Singapore had a long tradition of excessive use of testing in education, but these systems have all recognised the dangers of over-testing students. Since the mid-1990s, they have enacted policies and efforts to reduce the importance of academic testing in high-stakes decision-making for students, teachers and schools.

Korea has instituted multiple rounds of reforms to decrease the importance of national exam scores for college admissions. Over successive administrations, Korea has granted increasing autonomy to universities to make admissions decisions based a broad range of evidence, in addition to or in lieu of, the national college exam. Today, Korea's college entrance system has become much more flexible than before by considering a broad range of evidence that includes a statement of purpose, interview, essay and aptitude test (H. J. Choi & Park, 2013).

China has been engaged in similar efforts to de-emphasise the importance of test scores for admission to colleges (Zhao, 2014c). China and Hong Kong have also ended the practice of using academic testing for school placement. Although Singapore continues to use the Primary School Leaving Examination (PSLE) to decide admissions to secondary school, Prime Minister Lee Hsien Loong announced that it will be significantly modified in the near future. The current PSLE T-score, a score based on how well children do relative to their peers, will be replaced by grades. Children within a certain score band will be given the same grade. This will reduce the competition over one or two points (Yng, 2013).

The Asian systems have also started reforms to minimise the number of tests in schools. For example, in 2013 the Chinese Ministry of Education ordered a reduction in the frequency of standardised testing. According to the order, no standardised testing is allowed for grades one through three. For fourth grade and up, standardised testing is only allowed once per semester for Chinese language, maths and foreign languages. Other types of tests cannot be given more than twice per semester (Zhao, 2013).

In 2013, Korea began to pilot the Free Semester Program, an initiative of President Park Geun-hye. The program allows schools and students in middle school to be exempted from regular mid-term and end of the term examinations. According to Mr Choi of the Korean Educational Development Institute:

The objectives of [the] Free Semester Program (FSP) are to provide opportunities for students to explore their dream and talent, and also to develop 21st century competencies including creativity, character building, social skills and self-directive learning skills by reducing burden of written examination. (S.-D. Choi, 2014, p. 1)

The program will be implemented in all Korean schools in 2016.

The Asian systems have also made efforts to decrease or even eliminate the stakes test scores carry for teachers and schools. For example, China has issued numerous orders to forbid the use of test scores to evaluate teachers or schools (Zhao, 2014c). In Singapore, removing or significantly modifying school rankings based on examination results was recommended in the *Thinking Schools Learning Nation* curriculum review, because it "resulted in schools concentrating on performing well in the examinations often at the expense of other aspects of student development" (Ministry of Education, 1998a).

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Transforming pedagogy from knowledge transmission to inquiry-based and constructivist

The Asian systems have been known for teacher-centred pedagogical practices that emphasise direct instruction, rote memorisation, and knowledge transmission. Having recognised the limitation and dangers of this approach, the Asian systems have engaged in massive efforts to transform pedagogy – to move away from their traditional approach of direct instruction toward a constructivist approach that is more student-centred and inquiry-based.

In Singapore, project work was one of the recommendations for transforming curriculum, teaching, and assessment to realise the vision of *Thinking Schools Learning Nation* (Ministry of Education, 1998a). Project work, a form of project-based learning, is believed to engage students in knowledge construction and collaborative learning. Project work was recommended for all levels of education, even in primary grades, to complement traditional teaching:

Learning episodes which are highly structured and teacher-centred or which involve completing worksheets designed for repetitive practice have their place in the classroom but should not become the sole teaching/learning strategy. Time spent on such learning episodes for each subject can be cut down by 20 per cent and the available time used to engage the students in more creative forms of learning activity such as play, drama, games, experiments, project work, field-trips and hands-on learning experiences. (Ministry of Education, 1998a)

In Hong Kong the reform blueprint proposed by the Education Commission in 2000 recommended major transformations in teaching methods:

- shifting from transmission of knowledge to learning how to learn;
- shifting from over-emphasising academic studies to focusing on whole-person development;
- shifting from compartmentalised subjects to integrated learning;
- shifting the focus from textbooks to diversified learning and teaching materials;
- shifting from traditional timetabling to an integrated and flexible arrangement of learning time; and
- abolishing premature streaming and providing more opportunities for students to explore their aptitudes and potentials. (Education Commission, 2000, p. 60-62)

Similarly, Shanghai's curriculum framework requires significant changes in classroom teaching. Teachers are asked to problematise the content and turn it into situations or problems that interest the students so as to promote individual inquiry or collaborative communications. Teachers are also asked to make use of a project-driven approach to activate students' prior knowledge and experiences and guide them to learn proactively (Shanghai Jiaoyu Weiyuanhui (Shanghai Education Commission), 2004).

Loosening central control and expanding local autonomy

The East Asian systems included in this study have traditionally been centralised, but in recent years they have been gradually loosening central control. Local governments and schools are increasingly granting more autonomy in curriculum, pedagogy and assessment.

In Korea, decentralisation and granting schools and local education offices more autonomy has been a consistent theme of its reform policies (Lee et al., 2010) (OECD, 1998). Likewise, since the mid-1990s Hong Kong has been promoting school-based management; School Operation Councils, consisting of parents, teachers and members of the community, have been established to govern local schools.

Singapore, too, has been promoting autonomy for schools. To realise the vision of *Thinking Schools Learning Nation*, it was recommended that schools and junior colleges be given “greater room for differentiation and autonomy to cater to different needs and nurture diverse talents” (Ministry of Education, 1998a). Today, according to Ng (2010a), through the government’s decentralisation strategy, while schools are aligned with national-level strategies, they are also given a high level of tactical autonomy to design education to suit their student profile.

China ended the central government monopoly of curriculum and textbooks in the 1990s. Traditionally China had one curriculum, one syllabus, and one textbook for each subject for the entire nation. Today, China’s curriculum has three components: national, local, and school-based. The school-based courses are entirely up to the school to determine (Chinese Ministry of Education, 2003).

Reducing academic burden

The hardworking spirit of East Asian students and their dedicated parents have often been praised as contributing factors to their success. However, as previously described, these characteristics have some negative consequences. Policies and actions have been implemented to ease student academic burdens, reduce the amount of time devoted to school subjects outside school, and reduce the pressure of schoolwork on students.

China has been battling against the academic burden on students for a long time. In 2013, it issued *Ten Regulations to Lessen Academic Burden for Primary School Students*, which reinforced the numerous efforts it had taken previously.

1. *Transparent admissions.* Admission to a school cannot take into account any achievement certificates or examination results. Schools must admit all students based on their residency without considering any other factors.
2. *Balanced grouping.* Schools must place students into classes and assign teachers randomly. Schools are strictly forbidden to use any excuse to establish ‘fast-track’ and ‘slow-track’ classes.
3. *‘Zero starting point’ teaching.* All teaching should assume all first-grade students begin at zero proficiency. Schools should not artificially impose higher academic expectations and expedite the pace of teaching.
4. *No homework.* No written homework is allowed in primary schools. Schools can, however, assign appropriate experiential homework by working with parents and community resources to arrange field trips, library visits, and craft activities.
5. *Reducing testing.* No standardised testing is allowed for grades one through three; for fourth grade and up, standardised testing is only allowed once per semester for Chinese language, maths and foreign languages. Other types of tests cannot be given more than twice per semester.
6. *Categorical evaluation.* Schools can only assess students using the categories of ‘Exceptional’, ‘Excellent’, ‘Adequate’ and ‘Inadequate,’ replacing the traditional 100-point system.
7. *Minimising supplemental materials.* Schools can use at most, one type of material to supplement their textbooks (purchased with parental consent). Schools and teachers are forbidden to recommend, suggest or promote any supplemental materials to students.
8. *Strictly forbidding extra class.* Schools and teachers cannot organise or offer extra instruction after regular schools hours, during winter and summer breaks and other holidays. Public schools and their teachers cannot organise or participate in extra instructional activities.

9. *Minimum of one hour of physical exercise.* Schools are to guarantee the offering of physical education classes in accordance with the national curriculum, physical activities and eye exercise during recess.
10. *Strengthening enforcement.* Education authorities at all levels of government shall conduct regular inspection and monitoring of actions to lessen student academic burden and publish findings. Individuals responsible for academic burden reduction are held accountable by the government. (Zhao, 2013)

Additionally, China has issued many policies to reduce tutoring outside school. Similarly, Korea has instituted regulations to limit the operating hours of tutoring services, launched awareness campaigns, and reformed assessment and the curriculum to help reduce the burden on students (Bray & Lykins, 2012).

Improving equity in educational opportunities

All four national systems have been working on major reforms to address two major issues in equity. The first is the resources and quality of schools. For various reasons, East Asian systems have always had different tiers of schools whose quality varies a great deal, resulting in fierce competition for spots in good schools. East Asian systems have been working to equalise the quality of schools using a variety of strategies. For example, China announced a teacher rotation policy in 2014; it requires at least 10 per cent of teachers in urban and high-quality schools to be reassigned to rural and poor schools each year. To prevent schools from sending less qualified teachers, the policy requires at least 20 per cent of the rotated teachers to be ‘backbone’ (high-quality) teachers. The policy also requires rotation of principals and deputy principals after two terms in one school. Teachers from rural schools and or poor schools have greater opportunity to fill the vacated positions in urban schools and better-quality schools (Zhao, 2014a).

Another equity issue is the historical legacy of meritocracy, which in essence defines merit as test scores, thus favouring individuals with talent and/or the resources to perform better in examinations. Policies in East Asian countries that aim to end the use of test scores in deciding admissions have had tremendous impact on this problem. For example, in Korea, the government followed a policy of exam-free entrance to middle school using a lottery system instead of test scores; this led to a rapid increase in the number of students attending middle schools (K.-k. Kim, 2010).

‘No loser’ is one of the five principles of reform in Hong Kong⁴. The Education Commission adamantly believed that:

we should not give up on any single student, but rather let all students have the chance to develop their potentials. The aim of the education reform is to remove the obstacles in our system that obstruct learning, to give more room to students to show their initiative and to develop their potential in various domains. (Education Commission, 2000, p. 36-37)

Efforts to create a more diverse education system to meet the individual needs and interests of students in East Asian educational systems are a strong indication of their motivation to reduce inequity based on talent.

⁴ This does not mean complete abandonment of the tradition of meritocracy. In Hong Kong, for example, former Chief Executive Tung Chee-hwa advocated for a merit-based educated elite in 2001. His comments drew much controversy (South China Morning Post, 2001).

Capitalising on technology

The four East Asian education systems have a strong future orientation. They have consistently and constantly prioritised the use of emerging information and communication technologies (ICT) for improving education and developing digital literacies. Singapore, Korea, Hong Kong and China have all devoted tremendous resources to exploring and deploying ICT for educational uses.

Singapore has been exemplary in this area. Since the 1990s Singapore has invested heavily in the use of ICT in education, developing four Master plans. Master plan #1 in 1997 built the foundation, Master plan #2 began to seed innovation, and Master plan #3 in 2009 elevated the uses of ICT by strengthening and scaling success practices (Ng, 2010b). In 2014 Singapore announced a new Master plan, which is likely to bring more educational innovations.

China has been using ICT to improve educational quality and address inequity since the 1990s. In 2000, the Chinese Ministry of Education issued a policy to mandate the teaching of ICT in all schools. It also set the vision of connecting 90 per cent of all schools to the Internet by 2010. The policy envisioned the use of technology to promote high-quality education and sharing of excellent resources across different regions and schools. It included provisions for teacher professional development and training in the use of ICT as well (Jiaoyubu (Ministry of Education), 2000).

■ Learning the lessons: Implications for Australia

It is apparent from the findings of this study that East Asian education systems, have taken on massive reform efforts over the past few decades despite high performance in international assessments.

China, Hong Kong, Korea and Singapore are proud of their educational achievements but understand very well that past accomplishments are insufficient to prepare their children for a future shaped by technology and globalisation. They recognise the strengths of their traditional education systems, culture, and values but are unafraid of challenging, changing or even abandoning them in order to create a new education needed for the future.

To meet the challenges of the future, the four East Asian systems understand that they need much more than can be measured with test scores in a few academic subjects. Instead, they need creative, innovative and responsible individuals with the capacity for, and interest in, life-long learning, effective communication, productive collaboration and proactive social engagement. They need their future citizens to be socially adept, emotionally sound, psychological healthy and physically fit. Thus they have been working hard to broaden definitions of outcomes and develop policies and practices to transform their education systems in order to achieve these goals.

Educational authorities in the four countries are keenly aware and extremely knowledgeable of contemporary research on human nature and learning. They understand the importance of individual differences in education, so have been working hard to create education systems that are oriented toward and focused on all students. They have taken actions to reduce rigidity and expand the scope of their curricula. They have invested in supporting teachers to transform their pedagogy. They have also worked on removing historical and cultural obstacles that hinder the development of student-oriented education.

The East Asian systems want an education that is open, flexible and conducive to the learning of all students. They have added new elements to the education process, such as extra-curricular activities, arts and music, creativity and ICT, while removing outdated content, reducing reliance on testing, and increasing local educational autonomy. They have been working on integration, reconsidering how curricula should be structured, how the new and old can be combined, and how to balance mandates and choices.

In contrast, reform efforts in the West, such as in Australia, England and the United States, seem to be moving in the opposite direction – towards centralised control and prescriptive curricula, more emphasis on standardised testing, narrowing the definition of education outcomes, shifting to direct instruction, and reducing student choices. The goal of these reforms is to ‘catch up’ to the Asian systems. Meanwhile, the reforms in the Asian education systems are undoubtedly oriented to the future – the same one that faces Western education systems.

If the goal of Western education systems is the same as that of East Asian systems, that is, to prepare all children for the future, it seems reasonable that they should have the same vision. Otherwise, even if current efforts undertaken in Western education systems succeed, the outcome will be an obsolete version of Asian education; a version that the Asian systems themselves are eager to move away from.

The findings of this study have several implications for Western education systems in general, and Australia in particular.

Inventing the future, not fixing the past

Reform efforts in Australia and other Western education systems should learn from the East Asian systems and become future-oriented instead of trying to improve the traditional system. Human societies are facing another massive transformation akin to the Industrial Revolution. This transformation, brought about by technology and globalisation, presents both challenges and opportunities for education. One of the major challenges is how to cultivate the human abilities required to succeed in a world in which traditional jobs are rapidly being replaced by automation. Education can no longer prepare human beings for jobs that can be performed by machines. Another challenge is how to help future generations to live peacefully and productively with others, no matter where they are located.

Although the challenges we face are substantial, we also have great opportunities. We have a much better understanding of human beings than ever before thanks to modern science. We know much more than before about human learning due to advancement in the learning sciences. Furthermore, we have accumulated a large body of research that provides insights about educational practices and policies. Moreover, technology holds tremendous opportunities for improving education, as does globalisation.

We need to have the courage to invent a new education system that takes advantage of current and future opportunities. The new education system may look entirely different from the old one. Many of the essential components of the traditional system that have been the cause of concern and target of reform may disappear. For instance, a standardised curriculum has been one of the major targets of reform. Education systems have been working to strengthen curriculum through standardisation, as evidenced by the National Curriculum efforts in Australia and Common Core in the United States. However, if we begin to consider education as a personalised, student-centred experience, we realise it is necessary and possible, and we need not worry about a national or local curriculum for all students.

Likewise, improving the quality of teaching and teachers has been another major concern of policymakers and education leaders. But the role of teachers might be completely different under a new education paradigm, in which students take more ownership of their learning and can learn from a variety of sources beyond the classroom (which may itself not be a necessity). As a result, the quality of teachers and teaching may be different. Teachers, for example, may not be knowledge transmitters, but instead become curators of learning opportunities and mentors of individual students.

All aspects of education should be re-examined. Do we still need to organise students based on biological age? If not, does an age (grade)-based standard and curriculum still make sense? Do students have to be organised into groups and be expected to study the same thing in the same classroom? Does learning have to be defined as, and confined to, what is taught in school? What if we allow students to teach each other? What if we enable students to take courses from different teachers and institutions from around the world?

While we do not know what the future education system would look like – and it will vary across different contexts – we should begin inventing it. As a future-oriented institution, education cannot dwell on the past. All the successes we have seen through international comparisons are successes of the past, which may not have much to do with the future. Continuous efforts to improve the horse-drawn wagon are not likely to help us reach Mars. It is essential that educational authorities in Australia, and all other countries, work on policies and practices that will produce a new education system. The traditional system has served Australia well enough, but tweaking it is unlikely to bring significant gains and will certainly not deliver for the future.

Encouraging bottom-up innovation, reducing top-down planning

One way to begin creating the new system is to invest in and encourage bottom-up innovations and reduce top-down planning. If no one is working on new solutions and everyone is looking to imitate others' past successes, it is unlikely that a new system will emerge. To cultivate new models of education, a system must allow and invest in experimentation at the local level. It should enable individual schools, school leaders, teachers, students, parents and communities to seek new ways of education and create future practices.

China has been exemplary in creating future practices. The grand experiment of Shenzhen Special Economic Zone in 1980 allowed China to test a market economy within a socialist planned economy. The experiment not only transformed a little fishing village into a global cosmopolitan metropolis, but more importantly enabled China to experiment with new economic policies and practices. Shanghai has been a test zone for educational reforms; the 'green evaluation' scheme the Chinese Ministry of Education has decided to promote is one of the fruits of experimentation in Shanghai. China has now chosen Shanghai and Zhejiang as experimental sites for reforming the college entrance exam, and new ideas are starting to emerge.

While we do not know what the future education system would look like, we should begin inventing it.

Australia could take a leaf out of China's book. It could start with a national education innovation plan. Such a plan could include a variety of measures to stimulate a nationwide innovation movement. For example, it could establish an institute to coordinate and invest in new educational ideas proposed by local schools or individual teachers and students. It could also establish a platform to help innovative schools and teachers to share ideas and lessons.

Pursuing worthwhile outcomes

Current Australian education policies and policy-related discussions have been driven largely by results of international assessments such as the PISA and domestic measures such as the NAPLAN. However, as suggested by the Asian education reform experience, these assessments do not capture the full spectrum of outcomes an effective education system should produce, nor do they represent human qualities that matter for the success of individuals and nations. While these assessments may provide some indication of a small part of the state of education in a jurisdiction, their usefulness is very limited at best. At worst, they can result in significant damage to educational outcomes – such as confidence, creativity and diversity of talent – that matter much more to the prosperity of nations and the success of individuals. Australia and other nations should take action to limit the impact of standardised testing, international or domestic, on educational policy and practice.

Instead of focusing on standardised testing, it would be much more beneficial to develop policies and practices that aim to cultivate a broad range of educational outcomes, which have been generally recognised as valuable but rarely promoted (beyond lip service) in policy and practice. These outcomes have been referenced in different terms. Some of the more commonly used terms include "twenty-first century skills", creativity, non-cognitive skills and entrepreneurial thinking. Some of them are included in the Australian national curriculum but they are not supported in any substantive way that can drive actual practices in schools and classrooms.

Making worthwhile educational outcomes a priority in schools and classrooms requires several actions. First, we need to develop more comprehensive evaluation programs for schools, just like China's Green Evaluation initiative. Although widely accepted direct measures of many worthwhile outcomes are still lacking, it is possible to develop frameworks for evaluating the overall education environment of a school and a classroom, instead of simply focusing on test scores. Second, we need to accept the reality that most of the outcomes worth pursuing do not (and may never) have reliable and valid measures. What counts may not be countable. Thus in policy and practice, we should pursue more innovative ways to consider (not necessarily directly measure) these outcomes. Third, more effort should be applied to research and development that help us better understand how these outcomes are cultivated and how they relate to traditional educational outcomes, that is, test scores in a few core subjects.

Granting meaningful autonomy

Australia has a long history of school autonomy. But one of the most important aspects of school autonomy, what is taught and learned, is in danger. While schools continue to enjoy autonomy in operations and staffing, the national curriculum and NAPLAN are gradually and steadily reducing room for schools and teachers to exercise their professional judgment over what to offer and when to offer it to students. Asian systems have pursued broad and flexible curricula in order to cultivate the qualities they consider necessary for the globalised world that technology is altering drastically. Moreover, East Asian schools and teachers have been granted increasing autonomy with respect to curriculum and implementation. If Australia has the same expectations for a diversity of creative and entrepreneurial talent, it should work on expanding, rather than reducing, the curriculum autonomy of schools and teachers.

Australia should expand rather than reduce the curriculum autonomy of schools and teachers.

East Asian systems have worked on transferring responsibility for learning to students by lessening required exams and reducing required courses. Students have been encouraged to take more ownership of their learning and make decisions about what they want to learn. Australia and other Western education systems, should they have the same desire for capable individuals in the age of globalisation, must at least continue their tradition of a broad and flexible educational experience for all students instead of reducing it with a standardised curriculum.

Building on strength and responding to unique contexts

While education is deeply integrated with local society, it must adopt a global perspective. Learning from other countries is necessary and helpful. But being able to translate foreign lessons into local policies and practices is not easy. Every education system has its own history and highlights. Thus it is very important for Australia to look hard at its educational tradition and history; the shining examples of success within the system may be the foundation for building a better future.

It is also important to understand Australia's unique context. As a nation situated in close proximity to Asia, Australia needs to understand Asia and Asian education. But an Australian education should not and cannot be the same as education in Asia. If it were so, it is unlikely to produce talents to compete with Asian students, or to continue to attract students from Asia. An Australian education should be uniquely Australian. Reform efforts in Australia should be directed to create such a system.

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