

“What’s wrong with Australian Education” or “Is PISA data telling the whole educational story?”

Introduction

Over the past ten years according to the Australian newspapers and commentators on education there has been a gradual decline in the success of Australian students in International tests such as the Program of International Student Assessment (PISA). While other OECD (Organisation for Economic Cooperation and Development) countries including Finland, Singapore and provinces such as Shanghai and even in some areas of analysis New Zealand have moved and established themselves at the top of these rankings, Australia seems according to populist press and educational studies to be slipping down the rankings.

As educators what aren’t we doing? Is our curriculum, teaching standards and student engagement such that we are no longer able to compete on the International stage? Many educators would indicate that this is the case. There are more of Australian Year 9 students (or 15 year olds) falling into lower percentiles than these other countries and fewer being found in the top percentiles for reading, mathematics and science.

Rationale

In 2018, I travelled as part of the “Leaders in Education Across the Planet” (LEAP) to Singapore where I had the opportunity to participate in workshops conducted by the National Institute of Educators as well as visit a diversity of secondary and primary schools. I was also provided with a wealth of information from colleague Liz Diprose, the principal of Willoughby Girls High School who also participated in a similar LEAP program to Finland in 2017. Furthermore over the past ten years I have visited schools in Beijing and Shanghai as well as hosted delegations of principals from China, the Netherlands and Korea. This has provided me with understanding of the educational systems operating in these jurisdictions. These experiences and the knowledge I have gained from them are referred to in this paper.

2015 PISA data analysis

The most recent OECD International Assessment in 2015 had Singapore (admittedly a smaller jurisdiction) outperforming all other countries in science and mathematics and was second only to Finland in reading.

While Australia continues to be above the OECD mean in reading, mathematics and science is this cause for celebration: when 20% of students in OECD countries do not attain the baseline level of proficiency in reading?

Analysis of PISA data shows that one in four students in Beijing, Shanghai, Jiangsu and Guangdong, Hong Kong, Singapore and Chinese Taipei are top performing students in that they can handle mathematically complex tasks using symbolic representations.

Data shows that thirty four school systems including Austria, Belgium, Croatia, France and Germany have students who do not attend science classes regularly and this is attributable to these students attending socio-economically disadvantaged schools. Does this have a message for educators in

Australia? Considerable discussion is occurring in Australian educational forums relating to needs based funding.

Wellbeing

The 2015 PISA test also looked at student wellbeing; where 11% of students indicated that other students made fun of them at least a few times per month. However in schools with better discipline and where teachers were perceived to treat students fairly, the students stated that there was less incidents of bullying.

In Australian schools over the past ten years the occurrence of anxiety has increased for students (Behaviour Research and Therapy, Volume 36, Issue 5, May 1998 Pages 545-566; *A measure of anxiety symptoms among children* Susan H. Spence). 2015 PISA data indicates that 64% of girls and 47% of boys reported feeling anxious even when they felt they were well prepared for a test.

Financial Literacy

PISA assesses financial literacy and sadly Australia was grouped with ten other countries or economies including Canada, Belgium, Chile, Italy, The Netherlands, Poland, Spain and the US. In these countries 22% of students scored below the baseline level of proficiency for financial literacy. Many 15 year old students in Australia study a “commerce” elective. This type of subject is not offered in high performing countries/jurisdictions including Singapore and Shanghai. It is therefore surprising that despite many Australian students studying as part of the curricula units relating to financial literacy the student achievement is poor.

Collaborative problem Solving

Where data in the past has focused on individual student performance, now collaborative problem solving is being explored in the PISA testing process. Across all OECD schools only 8% of students were top performers in collaborative problem solving. Collaborative problem solving involves team members following their agreed roles, taking initiative and monitoring progress towards the solution of a problem.

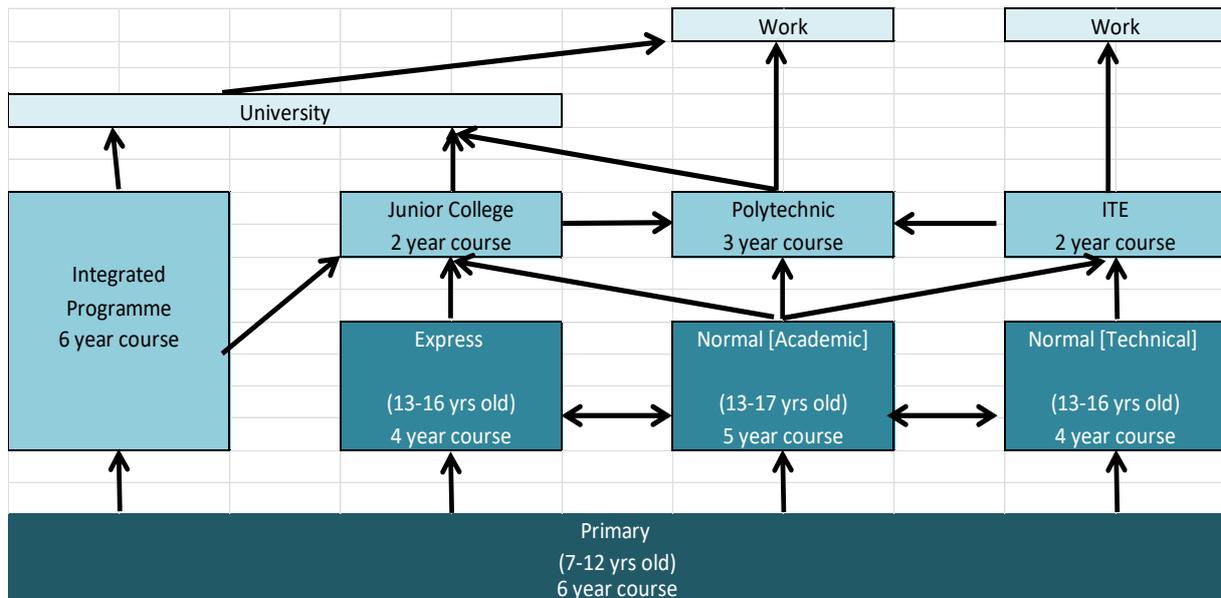
Some may not be surprised that girls significantly outperformed boys in every country/economy in collaborative problem solving.

On a recent educational visit to Singapore, I noticed a large sign on a downtown skyscraper stating “Be innovative or die”. The sentiment is perhaps extreme, but Singapore students are surrounded, even immersed in science, mathematics and learning in well-disciplined schools with parents who value education and where innovation is a focus of the Singaporean Ministry of Education.

Educational Pathways including Singapore

All students at the end of primary school in Singapore sit a standardised test which determines which type of high school the students will attend. There is a six year integrated program for the most able students that leads directly to university, a four year express program followed by two years of secondary college also leading to university, a five year normal course that leads to a polytechnic (equivalent to a high level TAFE) and a four year technical program that leads to basic

TAFE style courses. All students attend school until at least Year 10 and then follow a tertiary pathway depending on their ability.



tongue. This language varies depending on the background of the student. These subjects form the basis of assessment that determines which secondary school the student will enter.

Unlike many Australian students and affirmed by PISA data (2015) no student studies a vocational course prior to Year 10. This is also true for students in Finland.

It must therefore be asked “Is it the curriculum and teaching practice that is causing the drop in Year 9 student attainment in Australia compared to other countries including in our area, or is that too simplistic an approach to the issue”? Or are we as educators in Australia following such a different curriculum to these countries that comparison is not worthwhile? Certainly there is overlap in the core subjects of English, mathematics and science across all countries and jurisdictions but analysis shows that differing times are spent in teaching these subjects and further the approach to teaching varies from directional in some countries to using an inquiry approach in others.

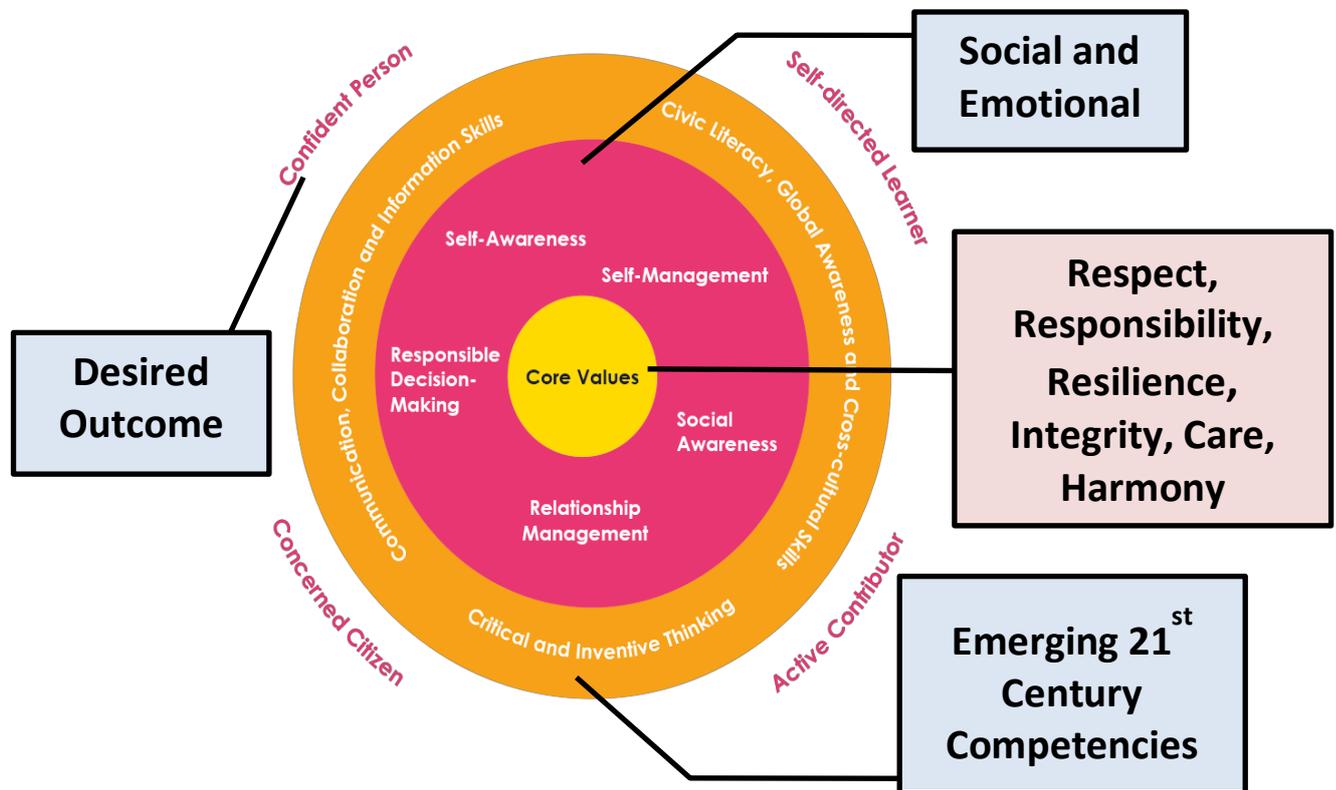
Do all countries have a similar system practice? Is the engagement in education similar from pre-school through to Year 9? In other words are we comparing apples with apples? Dr Paul Brock in a number of addresses in various educational forums, including his keynote address “Transitioning into Change: Looking Forward; Looking Back” indicated that in fact PISA results were being used without taking into account the many differences in the educational systems in these countries /economies and therefore the simplistic league tables and comparisons were not valid without a detailed explanation of the difference in systems practice.

Pre-schooling

In Singapore for example, it is conventional practice for children to have over five years attendance at pre-school, while in Australia the average is considerably lower at approximately two years (2015 PISA data). The Ministry of Education in Singapore has recently taken over the management of pre-school education to ensure the quality of delivery and consistency of educational practice.

Thus before attending primary school, children in Singapore already have developed patterns and behaviours of learning.

The following diagram refers to the core values and expected outcomes of education in Singapore.



A deeper analysis

A deeper analysis of the OECD data from PISA 2015 supports the conclusion that in comparison to for example Singapore, Finland and New Zealand, Australian students are more likely to be found in the lower performing bands than the top performing bands; with mathematics being the area of most concern. In fact Australia was only just above the OECD average for low performers in mathematics.

PISA focuses only on reading rather than other aspects of literacy. Further it covers many aspects of science including scientific knowledge, watching scientific television programs and completing scientific tasks. In science results it does not seem surprising that students scoring higher in science correlated positively to the time the students spent in science lessons.

An analysis of success, in this International study based on gender showed that Singapore had no difference in achievement between girls and boys. However, in Finland girls achieved at higher levels across all three subject areas! In Australia there were only slight differences in achievement based on gender, with boys performing a little better in mathematics and girls performing better in reading.

Generally boys across all countries studied were poorer readers than girls, however the boys in Singapore outperformed the girls in Australia in reading. Reading was a significant strength of girls in Finland.

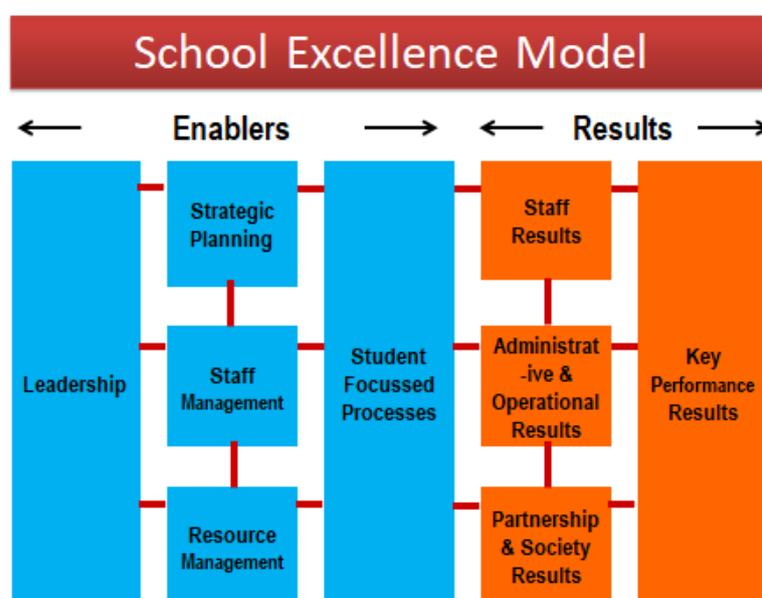
11% of Australian 15 year olds were low performers in all three subject areas compared to 6% in Finland and 5% in Singapore.

Australia is a first world country that prides itself on its education systems and has put into place many strategies at school, system, state and national level to increase the strength in performance in literacy and numeracy of its students and yet despite this, International data is indicating that Australian students are under-achieving in reading, mathematics and science.

What does the data indicate might be some of the reasons for this?

In all the top performing jurisdictions including Singapore, Shanghai and Finland over 93% of students attend government or public schools. In Australia only 57.5% of 15 year old students attend government schools, with 27% in government dependent or private schools. Singularity of an educational system allows for a uniform, consistent and sustained approach to teaching and learning; and as we have seen in the diagram above, a consistency of values and desired outcomes. I suggest this consistency is not evident across Australian educational jurisdictions.

It was evident in Singapore when visiting both secondary and primary schools and also from the Ministry of Education publications that all principals and staff had a clear and easily articulated educational direction underpinned by values. All schools followed and actively engaged with the Schools Excellence Matrix which is similar to the NSW Schools Excellence Framework. However the Singapore matrix was awarded points in which schools could achieve a maximum of 500 points. Thus each school achieved a ranking by the end of the year. Further, all teachers were trained at the National Institute for Education (NIE) and this institution provided Professional Learning on a regular basis for all teachers.



Professional Learning

An interesting and highly valued aspect of Professional Learning in Singapore involved all prospective principals receiving three months training by NIE out of their school prior to their appointment as a principal. Thus there is a consistency of leadership and teaching practice across the jurisdiction. In comparison with Australia it is important to note that Singapore is a smaller jurisdiction than Australia. In Australia the difference in achievement and access to support of students in metropolitan areas compared with students in rural and remote is well documented. The geographical size of Australia creates educational challenges.

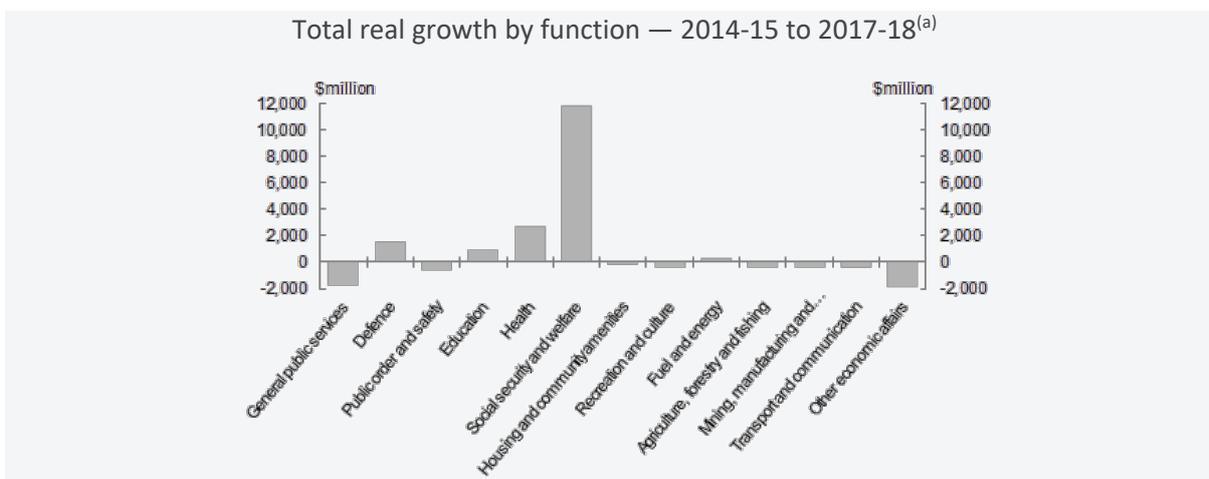
Vocational Programs

Students in Finland, Singapore, Shanghai and also New Zealand at age 15 years do not attend pre-vocational or vocational programs, yet 13% of Australian students do attend these programs.

However I observed in Singapore that in the last six years, two vocational schools “Crest” and “Spectra” have been established. These two schools cater for those students who are not successful in their final primary school examination. The students may have learning difficulties or come from dysfunctional families. These students study in the secondary setting the four compulsory subjects but the remainder of their curriculum is vocational. This program is provided when the students leave primary school. The schools are exceptionally well funded by the Ministry of Education at a rate of 1.7 times that of students in normal high schools. The facilities for student learning in these two vocational schools were exemplary.

Government Funding

Data shows that the improvement of achievement for 15 year old students relates to the amount of government spending. In Singapore, government spending on education is second only to spending on the military, while the proportion of government spending on education in Australia continues to decrease as a percentage of GDP. In Singapore, Finland and all high performing educational jurisdictions, the national government values education. This is evidenced by schools with modern infrastructure and world class learning spaces, small teacher student ratio and the continued support for educators with a focus on improved and consistent professional learning.



The “Straits Times” one of the main Singaporean newspapers continuously publishes positive articles about educational initiatives provided by the Ministry of Education. On Saturday 24 April 2018 the headline was “Singapore tackling inequality from pre-school level”. The article suggested that:

“... the best chance of addressing inequality is during the child’s pre-school years. The government is putting in more resources to give every child a good start and the chance to succeed from a young age” said the Law and Home Affairs Minister K. Shanmugam. ... Spending on the pre-school sector will double to \$1.7 billion by 2022 while 40,000 more child care places being added. Mr Shanmugam said that inequality is one of the most serious issues facing Singapore today, one that if allowed to grow and left unchecked will impact on social cohesion.

Standardised Testing

A regular testing regime is also a focus of high performing jurisdictions. Unlike Finland and Singapore, Australian students are not regularly assessed using mandatory standardised tests where in Singapore and Finland mandatory standardised tests are used at least once a year. Finland also uses non-mandatory standardised testing as well as teacher judgement ratings, while in Singapore the focus is on teacher developed tests with teacher judgement being less a focus.

A further difference between Australia and higher performing systems is the publication of achievement data. In Australia almost 70% of schools have this data published while in Singapore 24% of schools publish test data and only 5% in Finland.

Australia and for that matter Singapore (though not Finland) track student data over time and in Australia 92% of the results achieved by students are communicated directly to parents. This is significantly greater than the other jurisdictions.

Australian students are challenged by public and family accountability and also with a resourcing model that does not compare with other jurisdictions and therefore does not seem to take into account the needs of those with learning difficulties or socio-economic disadvantage causing a detrimental or negative impact on student learning.

In Singapore almost all students are assessed at the end of primary school and this determines one of four main learning pathways that a student will enter for their secondary studies. For many students in Singapore they can access these four learning pathways in their local school. In Australia 34% of students sit a selective or private school test. This may require the students to travel considerable distance from their local community. In Finland less than 5% of children sit a test to determine the secondary school they will attend as students’ progress from their community primary school to their community high school.

Class sizes

While it is often considered that class sizes in Singapore are high that is 40 students in a classroom compared to the Australian maximum of 30 students in Years 7 to 10, in fact the teacher student ratio is better in Singapore; that is 12 students per teacher compared to 13 students per teacher in Australia. This is due to the larger number of teachers employed in each school and the flexibility

that the principal has to put more than one teacher in a classroom. Many Singapore classrooms may have two teachers working together. In Finland the ratio is even better with 10 students per teacher.

Allocation of time

As mentioned earlier the time spent in learning science is reflected in science achievement. On average Singapore students spend 5.5 hours per week in science lessons compared to Australian students spending 3.5 hours and Finnish students spending 2.8 hours per week.

Singapore students also spend 5.1 hours in maths classes compared to Australian students 4.0 hours and Finnish students 2.9 hours. Reading follows a similar pattern though less overall in all jurisdictions.

Thus Singaporean students spend 28.6 hours per week learning in classrooms compared to Australian students 25.7 and Finnish 24.2. Furthermore the balance of mathematics, science and reading compared to other subjects is also greater in Singapore compared to Australia.

The achievement of students in Singapore one might suggest is due to the increased hours provided for learning in these core subjects, the better teacher student ratios and that students commence their learning at an earlier age.

While Finnish hours of instruction do not match those of Singapore nevertheless their teacher student ratio is the highest in the OECD for high performing jurisdictions. Could the hours studied in a subject as well as the reduction in the number of students per teacher account for the differences? The data seems to support this conclusion.

Student expectations

However despite Australian students not performing as well as their Singapore, Finnish and Shanghai counterparts in test achievement, their expectations or aspiration of working in science-related or ICT fields is higher than any of the highest performing jurisdictions and this is a consistent expectation for both boys and girls. This indication of self-belief could be a positive outcome for Australian education; however it could also cause issues for students where their self-belief does not correlate with their ability.

Interestingly the number of computers accessed by Australian students was greater than in other jurisdictions. Many Australian schools are embracing technology and using that technology to support differentiation of learning in the classroom. As a consequence of the Australian Federal Government's Digital Education Revolution (2008), schools have adopted a "Bring Your Own Device" approach which has impacted on the approach to learning, ensuring in many cases a more student centric approach. This student centric approach is also identified by the Ministry of Education in Singapore as a desirable outcome for Singaporean schools. Increasingly Australian classrooms are identified as being student centric where the teacher is no-longer "the sage on the stage" but more the facilitator of learning.

Australian students also reported that they enjoyed learning about science and this was only eclipsed by Singaporean students. This may reflect the focus in Australian science classes and science syllabuses on experiments or first-hand investigations.

Attendance

Attendance is another area assessed by PISA and again Singaporean students had exceptional attendance at 86%, while Australian student attendance averaged at 71% and Finnish students were considerably less at 63%. However the OECD average was 80%. Australian students also reported arriving to school later than both Singapore and Finnish students.

Teachers frequently observe that for student learning to be maximised, consistent and punctual attendance in the classroom is required. Schools in China and Singapore usually have one entrance to the school with security at the entrance. This security has a variety of purposes including monitoring of students walking into and out of the school. Many Asian schools also have a welcoming group at the gate at the start of each day supporting the school as a welcoming place to be.

The length of the school day

Another feature of many Asian jurisdictions including Singapore, is the hours of learning students engage in after school finishes. In Singapore students spend 22 hours per week on average in learning after school. This was compared with 16 hours in Australia and 11 hours in Finland.

Recently while visiting Nanjing College in Singapore; a fine secondary college for students in their last two years of high school, I was told by the principal Mr Li that students often worked at school till 9.00pm and that the school would remain open to support those students in their learning. This would constitute a 12 to 15 hour day for these students. Australian principals and teachers would be concerned about work life balance and possible welfare issues.

Anxiety and resilience

While data from PISA indicates that Singaporean students have high resilience, and this is one of the core values from the Ministry of Education; I also note that the Singapore Ministry of Education has challenged all junior high school principals to address the increased anxiety that is evident in students.

This increase in anxiety is also evident in Australian students and is an increasing trend in both countries/economies.

Infrastructure

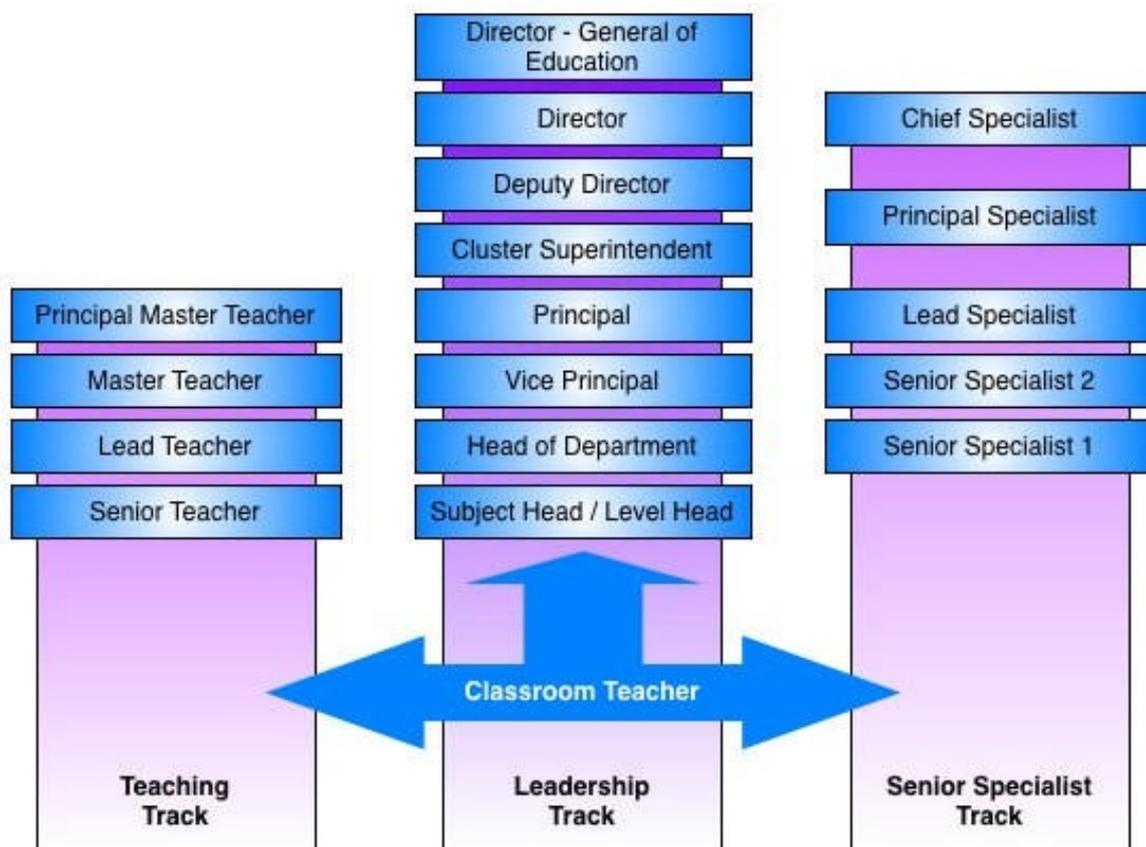
School infrastructure is another example of how high performing economies/countries indicate their value of education. In Singapore every school is completely refurbished and upgraded every three to five years. The schools are completely repainted and learning spaces are addressed after consultation with the principal. Singapore keeps a few empty schools so that if the refurbishment is significant, rather than disrupt student learning each day, the school is moved to these alternative sites while the refurbishment and maintenance occurs.

Of the schools in Singapore that I visited, they were well maintained with purpose built learning spaces that were colourful and engaging. Students seemed happy (though a little shy at first) and were very willing to chat to a group of visiting Australian principals. One young man who was a prefect at the vocational school “Crest” had just completed a retail class and told us that when he had first come to the school from primary, he was shy and rarely spoke but as a result of the program including vocational studies at “Crest” he was now confident. I might also add he was very articulate.

Principal and Teacher assessment/support

Singaporean schools engage in annual teacher assessment with an associated payment or bonus at the end of each year. Teachers are assessed on their practice and their potential and ranked with a grade from A to E. This ranking is extended to all executive including principals. Staff can receive up to a month’s salary depending on the grade. Teachers are counselled on their performance and identified with the potential to work at higher levels.

There are three pathways for teachers. The first focuses on remaining as a teacher and moving toward a lead teacher, then master teacher, then principal master teacher. The principal master teacher has the salary equivalent to the principal.



The highest level in the second pathway is the Director – General education (the highest level in education under the Minister) and can only be achieved through having been a principal, then cluster superintendent, then deputy director, then director. The third pathway is a senior track specialist with the chief specialist being equivalent to the Director in the second pathway.

Thus every teacher, principal, in fact all staff are ranked for their performance and potential. Another difference that could impact on Singaporean schools was the process of moving principals every six years. Rather than stay in a school for a prolonged period as occurs in many NSW schools, principals were aware that they would be moved after six years. The Ministry of Education consistently indicates that all Singapore schools are good schools and by moving principals from one school to the next and even between primary and secondary this supports this belief.

The principals I met with in Singapore would indicate that this is their second or third transfer and seemed happy with the process. This enforced transfer did not occur for deputy principals or Head Teachers. In many ways this ensures a consistency of approach across all schools and best practice.

Teacher efficacy or collaboration

For teachers in Singapore they have sixteen hours maximum of face to face teaching with built in teacher collaboration time. In Australia, teachers teach 18.6 hours per week and apart from staff or faculty meeting time, in the main do not have built in to their timetable opportunities for teacher collaboration. In Finland the opportunity for teacher collaboration is a feature of their education system.

John Hattie (Visible Learning for Teachers, Routledge, 2012) states the greatest driver of student learning is teacher efficacy. Teacher efficacy occurs when teachers have the time to discuss their practice within their teaching load. In Beijing teachers may have as little as six hour's face to face teaching with the remaining time spent on teacher collaboration and student mentoring.

Australian educators are focusing on student feedback and differentiation of the curriculum but based on the current teacher award do not have the time as other high performing jurisdictions do to engage within the timetabled time, in teacher collaboration to the same extent as Singapore, Finland and Shanghai.

Conclusion

Analysis of the 2015 PISA data certainly indicates that Australian students who are in Year 9, that is 15 year old students, are not performing as well in reading, numeracy and science as many other OECD jurisdictions or countries. There are clearly many reasons for this.

Analysis of the educational conditions in high performing jurisdictions/countries including Singapore indicates that Australia:

- lags behind in government spending on education
- has a lower teacher student ratio
- provides less time for pre-schooling
- has a diverse mix of educational providers where other jurisdictions are almost solely government run
- provides less time for teaching of science, mathematics and reading and less time for teaching instruction generally
- provides vocational education prior to Year 9
- does not assess principals or teachers, nor provide financial bonuses linked to teacher performance

- has poorer student attendance compared to the OECD average
- has a higher student aspiration relating to jobs in science and IT

This final point is important as it indicates that Australian students have a positive attitude towards achievement and if given the opportunity could make a significant contribution to the world of innovation.