

AHISA and ISCA National Schools Conference
EDUCATION: BETTER TOMORROWS.

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Looking at the program for today's event, I was reminded of something Noel Pearson said at the National Press Club a few weeks ago.

Every galah in every pet shop is talking innovation.

As I recall, Noel went on to talk about the need for innovation in social policy. He was right.

I suggest to you that we need a bit of that in our sector, too: innovative, intelligent, purposeful, supportive, funded.

Real reform in other words: change for a purpose: an anticipated and articulated improvement, rather than just change.

And the call is repeated as often as it is because we rarely act on it.

Last year I tried to work out how many forums I attended as Chief Scientist with the words 'innovation' and 'education' in their titles.

We gave up somewhere in the middle of 2012. There were a lot.

Then I tried to work out how many Ministers I'd known over the years with some sort of remit in these fields. And there were a lot of them, too.

Since I was first appointed a Deputy Vice-Chancellor in 1986, we have had 18 federal science ministers and 23 ministers for education and/or higher education.

Over those 30 years, the average tenure for a science minister has been almost exactly two years. But for the past six minis-

ters, the average dropped to just over half a year (and half of them have been named Chris which might hint at a prerequisite).

In the five years I was Chief Scientist the average tenure for education ministers has been just over one year.

So yes, there were many. Some were dedicated to the task - determined to do a good job. Others thought how do I do something **before** I get moved - and yet others thought how do I do something **in order to** get moved. And then there was the rest. I saw them all.

As I've said before, (they)...had views, opinions, and aspirations. Not all the same. Not always pursued with the same vigour, but they were the Minister and they all had influence. Sometimes the point of it all, the end game, the 'what are we doing it for', was lost.

And then there was us - the education sector - in the middle and having to be sensitive to it all. We at least learnt that it takes time for the education sector to work out how to respond to the Ministerial inclinations it has to deal with, and by the time it does, there is a change and we start again.

Maybe it explains why we need now to get very, very serious. Time is passing. Other countries are moving fast and if we do too little, we will be left wallowing in the wake. Not, I suggest, where we want to be.

It is time to act - comprehensively, cogently, intelligently and purposefully - in the interests of the nation and its future - all those tomorrows.

If you were a newcomer to this discussion, you might wonder why I am saying this. After all:

- We all think children are important.
- We all think the future is important.

- We all think that education is the important bit that comes between the two, and some of us at least think that STEM education has a particularly important role to play.

So we seem to have a fairly limited repertoire and a high level of consensus.

How then can we both agree, and argue, for the better part of the last three decades? For that matter, how come we are still doing it?

I don't think it's just an argument about who gets what, and how – the classic definition of politics. I think the fundamental argument is really about the why. So that's what I want to put to you today.

What is the end point we're aiming for when we require every child to sit in a classroom for a not insubstantial period of their lives, at not inconsiderable expense to their parents and the rest of the community?

Are we trying to prepare the children to **fit a future**?

Or are we also trying to prepare them to make a **future - one fit for them to take and build** – a future that is better than it would otherwise be, because we stretched ourselves to reach one we wanted?

A small difference in words – a million opinion column inches apart in practice.

But they are the two paths that I see, the options we have: children fitting a future, or a future fit for our children. And I have a view - which you will be able to sense.

On the first path, we put on the blinkers and imagine that every child is headed for an economy that other forces will bring about - over which we have little control except for how we spend our money.

We might try to imagine it by extending forward the current trends. Or more likely we don't try to work it out at all (and criticise those who try) – we just leave it to the market in the hope that it will 'pull through' all the capabilities we need, as and when 'the market' feels they might be required. Neglecting, of course, the fact that building skills and talents takes longer than it takes to turn on (or off) a tap.

In practice, this means that we leave it up to seventeen year olds and their advisors to guess where the big money, or the jobs, or the community interests, will be in the future.

Now I was never seventeen years old. As I remember it, I progressed from innocent babyhood to enlightened adulthood without any sort of interruption on the way.

But I do know some seventeen year olds and I respect their interest in working out how to be employed in five years' time.

If I were seventeen, now, I could if I wanted start with the list of the 200 wealthiest people in the country today; and work backwards to see what they did... to learn from them.

If I did, I would see that just over 100 of these 'role models' got there by doing property deals, digging mines or flogging financial products. Or inheriting the proceeds of those activities from someone else. Added together, those people account for the overwhelming bulk of the pool - more than 80%, indeed.

On the other hand, about five people on the list (of 200!) had invented something or got there by the classic technology start-up dream.

Which would make me think – not unreasonably – that the hard ways of making money, involving invention and innovation and advanced mathematics, assessing and managing risk, are not the path to opportunity in Australia.

So I'm 17; I gravitate to Commerce and Law. And so does the boy next to me, and the girl next to him.

And we produce a generation prepared to carry on the economy the way it functioned before: dig it up, flog it on, write it off; or inherit something.

We could call it a service economy and be proud of it, not thinking for a minute that while we might have a lead in some areas presently, it is no comparative advantage. We could feel so good about it that we don't think about what we would have left if and when some country muscles in on our lead?

But I'm 17. I think to myself, don't do something new and different, or something I am told is hard. There is little reward for that. Do something that will earn wealth if the rules and regulations and decisions of governments are favourable.

At least that's the best case scenario we reach on the first path. There's another scenario – in which robots and algorithms do the work of lawyers and financial planners today; and other countries are far better at building and harnessing them; and all my perceptions at seventeen were wrong because the magic rays from today's market, infusing my spirit as magic rays do, did not last the time it took to train me for today - let alone for tomorrow.

Maybe our trading partners don't need the things we dig out of the ground any more. Maybe we can't supply the things they do want, in a way that turns a profit for ourselves.

Maybe then we decide that a few more people who can make things might be useful. But by the time we feel we see the need... we're a generation away from putting them to work.

And then some in the economics commentariat would tell us they were right all along. Because wherever we are is where the market says we were always destined to be.

But there is another way. Not one bogged in the present or the recent past. But different - and better.

On the second approach, we say that the economy is going to be different. Then we actively set out to make it into the version we want.

We **don't** stand idly by and watch when participation in mathematics and science at senior years in school sinks to the lowest levels observed in the past two decades.

We **don't** accept that a school without a science teacher is a school an Australian child ought to attend. Nor is it one in which important subjects are taught by teachers 'out of field.'

We **don't** outsource all the brainwork for the future economy and the skill profile of the workforce to the collective wisdom of teenage girls and boys making choices today.

We **do** try to push them to the frontiers of something very different, arming them appropriately first. Not with **our** tools – but with the wherewithal **to make their own**.

We **don't** stay one of the few countries where the notion of priorities is a dirty word. We **do** learn from other 'free-market' democracies and we make judgement calls about where and how to get ahead - identify our advantages, support them - and grow.

Along the way we work to ensure that every child leaves school with enough science and mathematics under their belts to see how they might be used. Or to understand how our scientists go about doing what they do; equipped, in other words, for an informed debate when they have to decide whether the science we **could** use is appropriate **to** use.

We would want many of these young people to have the skills and enthusiasm to seek higher study.

And those who do will graduate with the capacity to seek and win roles right across the economy.

And they will build new start-ups or bring new technologies to existing firms. And make things.

And while some of the old jobs don't need to be done by humans anymore – there are rewarding and interesting jobs in entirely new industries to take their place.

And their children see them working in those jobs – and want to have jobs like them – so the culture of the country changes.

In time we build a system in which capability makes opportunity, and opportunity pulls through capability.

We prosper. And some of the commentariat will say that doesn't fit the theory so it must be wrong; while others might say they were right all along – because this is where we always going to be.

On the road to that point, of course, the commentary from the backseat is very different.

There are all sorts of names we apply to things we don't care to argue about in substance.

Here are a few: "social engineering". 'market interference'. 'interventionism', 'canberra knows best' (**why** do we have a national government at all if it does not seek to identify a national interest and build policies and programs to it?) and the ultimate pejorative 'picking winners.'

They are the Harry Potter Curses of public policy. Invoke them - and any possible debate about the merits dies.

Those who use them know, as we know, that you don't need to put up a solid barrier on the road to progress.

They know that you just need to throw enough gravel for the traffic to be diverted down Sideshow Alley. Stop thinking, just let the theory rule.

But today we are the people in the four-wheel drive, and we can grind the gravel to powder beneath our wheels.

Where do I think we should be going?

FIRST – Let's set out in the belief that STEM subjects are rewarding to teach and awesome to learn.

We all start that way in life – banging things together, sticking things in our ears, looking at the world as an interesting place.

Then we forget to be curious, or we get it knocked out of us. We find out that the subjects which teach us how to explore, which give us the power to create, which bring the amazing things in our mind a little bit closer... are just the broccoli on the plate of education.

We don't have to hide the broccoli in chocolate cake, the way that parents try to stuff vegetables into their children by stealth.

We just have to remember what we know by instinct: there's a love of science and numbers in every child, a real but basic curiosity. If we fail to ignite it – then shame on us.

So our target is not some children doing well, even more children doing well. **It is every child** getting the opportunity of doing the best they can.

SECOND – we must have a national strategy to recruit and support great teachers. This is a matter of extreme national importance.

A few years ago some researchers at the University of Oxford came up with a model for calculating the automation risk of certain professions.

In other words – how likely is it that a job we do today could be done by a robot or an algorithm in two decades' time.

For CEOs – to pluck an example from the air – the likelihood is 1.5 per cent.

For school teachers, the likelihood is 0.5 per cent.

So we are three times more likely to punt the people at the top than the teachers in the classroom. But neither is very likely to occur.

And I, for one, find it much easier to believe that a robot could scan company reports and market trends than to believe a robot capable of teaching science to humans.

But picturing the robot helps us to understand what we value in the human.

What could the robot do? It could deliver the textbook content, work through a set of instructions, administer and mark a test, write reports.

And it could do all of these things very efficiently.

If that is all that we expect our human teachers to do – then perhaps we won't need them.

But of course we expect more than that. We expect them to come with passion and find the same passion in every child.

It requires mastery of content, up-to-date knowledge and high quality teaching materials, and pedagogy to match.

So why don't we explain it that way, and resource it that way?

Of the 46 per cent of students who entered teaching courses using an ATAR in 2015, twice as many entered with a score under 50 as did with a score over 90.

Why? Because we let it happen.

Technology is only included in pre-service education in a handful of universities.

Why? Because we let it happen.

More than one in two primary school principals surveyed last year said that their graduate teachers 'could not teach mathematics to a reasonable level'.

Why? Because we let it happen.

Now, I have never argued that we can recreate South Korea in Australia. But, like them, I do believe that shifting the culture starts with a national strategy.

No-one wins when we train more teachers than we can employ, without expertise in the subjects we most need to teach, and limited opportunities for professional development for those in service.

So let's approach teachers as a national capability requirement deserving the same attention we would give to national defence. Let's give teaching the esteem that the profession deserves - let us recognise their importance and celebrate it, and them.

And THIRD – we need to talk to Vice-Chancellors.

I have a great deal of respect for Vice-Chancellors. I should. I was one for sixteen years and I know how tough it can be.

But I am also aware of what John Dawkins said when he was the Minister. He described *the unedifying responses from many of the brightest and best educated in our country (who) were as capable as anyone else of being narrow-minded, self-interested and, indeed ignorant.*

We have to be better than that.

But we do have a problem when the incentives in the policy framework lock the Vice-Chancellors into a race to the bottom.

I am talking about the stripping of pre-requisites for science and engineering courses, which gives little hint of their importance and little reward to those who take them on: why do something said to be hard when there is no reward for doing so?

I am talking about the over-enrolment of candidate teachers.

I am talking about the discrepancy between published ATAR cut-offs and the ATARs at which students are actually enrolled –

widely covered in the media this year - and the unedifying 'debate' that followed.

All of them explicable, possibly even inevitable, within the policy settings we have today.

Universities are a critical piece in the puzzle, not least because they are both the destination of many school students, **they are also the place where teachers are trained.**

We need to change the incentives (therefore the policies) to change behaviour.

And I am optimistic. I am always optimistic in an election year, when all sides have made significant commitments to STEM; and the state premiers have commenced an arms race of their own.

I welcome the National STEM Agenda agreed by COAG as a declaration of intent. I endorse its emphasis on teaching, collaboration and evidence.

We must pursue the goals of education, in the better sense – to make the nation fit for the children who will one day inherit it and which they will continue to build: a special nation, prosperous, secure and cohesive.

We have no time to be *narrow-minded, self-interested and, indeed, ignorant*. We have to lead.

We don't have the time to stand, and stare and defend and score small debating points and argue, again.

We have to be better than that.

Better than we have ever been before - starting yesterday because we have to be concerned with all those tomorrows.

