

CHAPTER 16

The Future of the University — Preparing for Change: Building a Nimble and Responsive University

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KEY DEVELOPMENTS FORCING CHANGES

In the next decade or so, many societies will have to manage the impact of an accelerated pace of technology changes which are often disruptive structurally to the workplace. The impact of these challenges will continue to evolve and will be different in different countries depending on the readiness to address them. We are already witnessing impact at varying levels of severity in different places, for example, in the form of an increasing pool of frustrated workers unable to participate effectively in an increasingly technologically complex economy.

For those of us in education, especially at the university level, we have a mission to deliver an education that will prepare well the next generation to meet these challenges. Some of the more discernible issues especially in the more developed economies include:

1. Fewer “ordinary” jobs left — jobs that are routine and predictable will continue to be replaced by technology or designed out of the systems. While new jobs will be created, they will need a higher level of skills, both hard and soft; or the so-called hi-tech or hi-touch skills and often, a blending of both. This continuing shift will also mean more frequent churning of the job market. How do we help virtually

- everyone acquire the requisite skills and receive an education that can help them to navigate that future will be a challenge?
2. Reluctance of companies to invest in the development of new talent pool, relying instead on market forces to provide the increasing sophisticated workforce needed (Cappelli, 2011). While universities traditionally view their role as providing an education, there is an increasing pressure to help the expanding cohort of students get their first jobs. Even for those universities which are aware of the needs to provide an education that also helps the graduates get their first job through some degree of specialization, there is the added pressure and worry about these very skills getting obsolete due to technological changes. But the truth is that increasingly, no matter how much you teach now, it is going to be a case of never enough!

IMPACT ON THE EDUCATION SECTOR IN SINGAPORE

Singapore is one of the most open economies in the world, and thus is subject to the full brunt of the forces of globalization and technological disruptions. Adding to the challenge is the fact that it is also one of the smallest in terms of population or area. While smallness is beneficial in some ways, it poses severe challenges to generate enough capacity, capability and buzz to deal with all the impending changes and challenges, foreseen and unforeseen, so that the economy can continue to be vibrant.

Singapore has moved from third world to first world in about half a century. Its economic development during this period can roughly be divided into 5 distinct stages of about a decade each (Agency for Science, Technology and Research, 2011), namely the labour-intensive 1960s, the skills-intensive 1970s, the capital intensive 1980s, the technology intensive 1990s and the current knowledge/innovation-intensive new millennium. The education system has also evolved during this period to keep pace with the economic development.

The development of the polytechnic sector

Up until 1990, Singapore had only two polytechnics, Singapore Polytechnic and Ngee Ann Polytechnic. A notable difference of Singapore's polytechnics from most polytechnics elsewhere is that studying in a polytechnic is an alternate pathway to a 2-year pre-university education in junior colleges. The polytechnics train the students to be work-ready on graduation, but with adequate foundation for further education if they choose to do so. To be able to do this competently, the polytechnic education is over 3 years, a year longer than the pre-university education.

In 1990, after their secondary education (10 years), only 22% of each cohort attended the polytechnics, while about 26% would go to junior colleges and 11% went to vocational schools. This means roughly 60% of a cohort would receive more than 10 years of education (Ministry of Education, 2016a). To keep pace with the technology intensive period of the 1990s, the polytechnic pathway was ramped up rapidly. Temasek Polytechnic was set up in 1990, followed by Nanyang Polytechnic in 1992 and finally Republic Polytechnics in 2002 to increase the pool of people who would receive more than 10 years of education with an emphasis on skills that were needed by industry. By 2015, the picture had shifted dramatically with the 5 polytechnics accounting for about 47% of each cohort, while 28% would go to junior colleges, hardly changed from the 26% in 1990 (Ministry of Education, 2016b). Combined with the Institute of Technical Education (ITE), which took in about 24% for vocational training, the professional/vocational route accounted for close to two-thirds of the cohort (some double counting as a number of students from the ITE would continue their education in the Polytechnics). This emphasis on the professional/vocational education as the main pathway over the last quarter of a century is a shift towards the German/Swiss system, though, in Singapore's case, the professional/vocational education is school-based with structured internship, and not apprenticeship based.

This shift to get more young people to attend polytechnics and ITE played a key role in providing the necessary skilled manpower during the technology intensive period of the 1990s and early 2000s when Singapore became a global power house in electronic, chemical, offshore and marine manufacturing. More importantly, even up to this day, it has ensured low youth unemployment as polytechnic graduates are well sought after with high employment rates and good starting salaries. In the latest 2016 employment survey for polytechnic graduates, the overall employment rate is 90.6% six months after graduation with a gross median salary of SGD\$2,200 (Graduate Employment Survey, 2017). This shift towards a polytechnic education was the realization since the early 1990s that senior high school leavers, without any further education or skill training, would find it increasingly difficult to land good jobs in a modern technologically oriented economy.

The University Sector

In the public university sector, the growth has been equally spectacular, albeit a little later than the development of the polytechnic sector. In 1980, there was only one university, the National University of Singapore (NUS) and only 5% of each cohort was able to enter NUS. In 1982, Nanyang Technological Institute was set up and became Nanyang Technological University (NTU) in 1991. By 1990, 15% of each cohort entered the two institutions.

But as the economy shifted towards being knowledge/innovation intensive since the new millennium, more university graduates were needed and this led to a significant growth in the university sector with Singapore Management University formed in 2000 and the cohort participation rate increased to 21%. In 2006, all the public universities were corporatized and became known as autonomous universities (AUs), to signal that they would operate “autonomously” with significant independence on academic matters subject to annual performance review by the Ministry of Education and also an external review once every five years (Ministry of Education, 2005). In 2011, Singapore University of Technology and Design became the fourth autonomous university, and Singapore Institute of Technology (SIT) became the fifth in March 2014. The latest addition is UniSIM, the only private university in Singapore. It is now the sixth autonomous university and has been renamed as Singapore University of Social Sciences (SUSS). The cohort participation in the autonomous universities continues to increase, with 26% in 2010 and 32% in 2015. The current plan is to expand the cohort participation rate to 40% by 2020, with the growth mainly catered to by the two latest autonomous universities, SIT and SUSS. Together with a history of a significant number of students going overseas to receive their university education as well as attending degree programs offered by overseas universities through private education institutes in Singapore, the number of graduates from each cohort who will receive a university education is likely to exceed 50%.

BUILDING A NIMBLER AND MORE RESPONSIVE UNIVERSITY – SINGAPORE INSTITUTE OF TECHNOLOGY

In the early 2000s, some of the polytechnics began to forge twinning programs with overseas universities to offer their degrees through the polytechnics for their own students only. But, towards the end of the 2000s, there was an increasing realization for the polytechnics not only to stay true to their original mission to train students to be work ready with skills that were sought after by industry, but in fact to strengthen this. So a decision was made in 2009 to set up the Singapore Institute of Technology (SIT) to take over that role to provide twinning programs for polytechnic students but managed at the national level instead of by the individual polytechnic. In this role, SIT had a number of unique characteristics:

- It was NOT a university in its own right, but partnered with various reputable overseas universities to develop twinning programs in Singapore. The students were admitted by SIT and their education subsidized by the government just as if they were attending the other autonomous universities.

- The students were almost all from the polytechnics students where there was pent up demand.
- SIT operated with a distributed campus, with a presence in each of the polytechnics (altogether 5 nationally).

This model allowed SIT to ramp up almost immediately. Though it was set up in September 2009, a year later it was able to take in the first 500 students through 5 partner universities offering 10 programs. The growth continued to be rapid with about 1,000 students in 17 programs from 7 universities in 2011, and about 1,500 students in 27 programs from 11 universities in 2012.

In August 2012, a high-level government committee, known as the Committee on University Education Pathways Beyond 2015 (Ministry of Education, 2012) recommended that Singapore should increase its cohort participation rate in university education to 40% by 2020 from the 30% target that was set for 2015, and SIT together with UniSIM (now SUSS) would cater to this growth. A very significant proportion of the increased participation would come from the polytechnic students. To do this well, the Committee also recommended that SIT develop a differentiated pathway from the other autonomous universities in Singapore and build a pedagogy that would place a greater emphasis on applied learning. This is to align with the earlier decision to get the polytechnics to refocus on training students with deep skills needed by industry. To drive this transformation, the Committee felt it was necessary for SIT to evolve from its original role of “aggregating” overseas university degrees to become an autonomous university in its own right. A new management was put in by early 2013 and, by March 2014, SIT was gazetted as the fifth autonomous university in Singapore and, in September of that year, offered 3 programs under its own name, the first that were not done through one of the overseas partners.

SIT’s Strategies

In charting its future, SIT took the cue from the recommendations of the Committee on University Education Pathways Beyond 2015. The Committee envisaged that SIT would offer a new applied degree pathway and formed a close nexus with industry to produce graduates equipped with a strong foundation and a keen understanding of its real-life applications. Thus the management, together with its Board of Trustees, crafted a vision for SIT in 2013 to be “a leader in innovative university education by integrating learning, industry and community” to align with the Committee’s recommendations. Further, given its partnership with overseas universities then, the trustees also challenged SIT to develop a nurturing learning environment “that is uniquely enriched by world-class partners”.

If SIT wants to focus on applied learning and form a close nexus with industry, and if industry has to adapt to the many disruptive changes, a key strategic imperative is that SIT itself must be nimble and responsive, so that it is able to help its students and its industry partners to meet those challenges. For a university, this is not an easy task. Throughout 2013 and part of 2014, a series of debates and discussion led to a number of key strategies, some of them not commonly found in universities. The key strategies were

- Forge a symbiotic relation with industry as the central strategy for a university of applied learning
- Build an extended eco-system with overseas university through strategic partnerships
- Develop a flatter structure that promotes greater collaboration among academic themselves and with professional colleagues
- To develop a SIT-Industry continuum where its graduates can return, time and again, for upskilling and reskilling — adopting the motto of Once a SITizen, Always a SITizen!

SIT has been executing this set of strategies in the past 3 years and thus the success of this model is yet to be proven. More importantly, these strategies are continually being refined when problems arise during implementation. In spite of its young age, SIT has continued to grow, rapidly taking in 2,560 new students in 2016 out of a pool of 13,000 applicants, a vast majority from the polytechnics (over 90%). By the size of its intake, it is already the third biggest university in Singapore after the National University of Singapore and Nanyang Technological University, even though it is the youngest university (SUSS is the sixth autonomous university, but its predecessor has been a university since 2007). The current plan is for SIT to increase its intake to about 3,500 by 2020. Works to build a brand new centralized campus have just begun.

By redefining the admission criteria, SIT admits students on the basis of a demonstrated interest and passion for specialized program areas, for example, by having completed specialized diploma courses in the Polytechnics or through a portfolio of work and achievements. This results in a lower leakage rate, which is already apparent from our early Graduate Employment Survey results.

Forge a symbiotic relation with industry

In developing a university of applied learning, SIT spent much effort to examine the success of the universities of applied sciences in Switzerland, Germany and Austria. But it was clear that the approach by SIT would have to be different due to significant differences in the cultural context. A key

difference that makes the job of setting up a university of applied learning in Singapore much more challenging is the fact that, historically, all the three countries mentioned above have a culture of strong apprenticeship with significant ownership by industry. An example of such an approach is Dual Hochschule Baden-Württemberg (DHBW), a university of applied sciences in the German state of Baden-Württemberg which has about 34,000 students and where its admission policy requires students to sign a training contract with a workplace training provider, most often an accredited company, before they can read a program at DHBW. In Switzerland, most students who enter the universities of applied sciences would have typically at least 3 years of apprenticeship.

In contrast, the ownership of apprenticeships by companies is not strong in Singapore. Many companies take in interns but the standard of supervision is highly variable and often without structured learning objectives. So, SIT decides to build a platform called the Integrated Work Study Programme (IWSP) that will be compulsory for all students reading either SIT's own degrees or SIT-overseas partner joint degrees. This platform helps students to integrate learning and acquisition of knowledge in real work situations and SIT has devoted significant efforts to convince employers that IWSP is more than internship. To strengthen the learning outcome of the students, especially those that are attached to smaller companies without strong supervisory capability, SIT also makes an institutional commitment to provide support to the students to ensure learning outcomes are met.

A few things work in favour of SIT in developing this applied learning platform. The most important one is the fact that the polytechnics students are trained to be work-ready after their graduation. Each year, a large number of polytechnic students do enter the job market instead of going to university. Thus most companies are comfortable in employing these graduates as borne out by annual surveys of the graduation outcome of polytechnic students, which has been consistently high and also with increasing wages.

Second, in the last four years, there has been a big push in Singapore to get more students to spend more time with industry. A national committee known as ASPIRE was set up in 2013 (Ministry of Education, 2014) and this was then subsumed into a bigger effort known as SkillsFuture which was launched in 2015 (Government of Singapore, 2015). The motivation for this push was more complicated. Under ASPIRE, the key push was to get polytechnic students to have enhanced structured internships in industry while they were studying and to encourage more to enter the job market instead of heading straight for university without any idea of the needs of the workplace or their own. Together with this was an effort to push companies to recognize and pay for skills mastery instead of relying on academic qualifications as a proxy, especially in jobs and professions where skills mastery counts. If this

push is successful, it will slow down the trend where more and more young people yearns for “any” university degree immediately after graduation from the polytechnics.

Another motivation, and one that has become more relevant recently, is an effort to get workers used to the idea of lifelong learning for upskilling and reskilling to cope with increasing disruptions at the work place. Thus getting more to work first and then return to university at a later date will help these students have a clearer idea what they want to pursue and seed the idea of returning to school after working for a while. A big part of this push is to encourage greater ownership of this effort by companies with incentive for companies to work with institutes of higher learnings (both universities and polytechnics) to offer work-study programs (Today Online, 2017). In these programs, the student can choose to alternate trimesters between university and the workplace, or alternatively spend 3-4 days at the workplace and 1-2 days at the university, much like the dual programs in Switzerland or the DHBW model in Germany. This push has helped to make SIT’s IWSP more attractive.

For SIT, its effort to make the IWSP a central feature of its curriculum has two key objectives. The first, and the one that is aligned with the objectives of ASPIRE and later SkillsFuture is for students to be more work ready and also help to improve the students’ employability. A second motivation is really that when the students are on IWSP, the professors and professional officers will follow them and link up with the industry supervisor. This follow-up is much more intense than that in most universities offering internships as this is a structured part of the curriculum. This allows the professors and professional officers to form a closer relation with the companies and develop applied research projects with them. Further, through IWSP, SIT will receive a valuable continuous feedback mechanism from industry for its curriculum and a conduit to understand industry needs and develop collaborations. In that sense, IWSP is more a platform with an ideal is for industry to regard SIT as a true partner and for SIT to be a university that is “integrating learning, industry and community”.

Building an extended eco-system with overseas universities through strategic partnerships

A second challenge is Singapore’s smallness — one of the most globalized countries in the world but with a very small population of 5.6 million of which the resident population is about 3.9 million (Department of Statistics Singapore, 2016). Building capability to launch new programs to cope with the changing needs of industry will always be a challenge. The severity of this challenge increases with the pace of disruptions.

SIT started in 2009 by working with overseas universities. So when it became a fully-fledged university in March 2014, SIT had learnt how to work with a network of universities in a mutually beneficial way. A key strategic decision, made after it became an autonomous university in 2014, was to continue working closely with a network of selected overseas university partners to enable SIT to respond very quickly to new or morphing industry needs, and to mount new programs swiftly in response even when such expertise is not available in Singapore. Through this approach, SIT is able to build an extended eco-system. To be sustainable over the long run and consistent with the fact that SIT is now a public university in its own right, it was also decided that the nature of that collaboration would evolve from degrees offered directly by the overseas universities to one in which the degrees would be joint degrees. This approach of building a network of partner universities to create an extended eco-system is an innovation.

Building and managing such a network and to blend in the different culture brought by each university into a coherent one within SIT is a non-trivial challenge. If this effort succeeds even partially, it will provide a distinctive educational experience to prepare students for a globally-competitive economy and a unique feature among world universities. Over the last 2 years since the implementation of this strategy, three of the existing partners and one new partner have come on board to offer joint degrees to SIT students in Singapore. Discussion is now under way with the other partners about this evolution. This approach has already shown its versatility with SIT being able to launch new programs rapidly and ramp up intake number aggressively even though it is still a very young and small university.

In some way, this innovative approach is another form of the new “sharing economy” whereby different entities learn to share each other’s limited resources to ensure scarce resources are optimally utilized. Such an approach is probably more pertinent to small universities in small countries that still have to cope with the full force of technological disruptions and globalization. Another powerful possibility, and one that is just in progress, is an effort to integrate the faculty from the various partner universities that through SIT, can work with each other and with SIT in applied research projects.

Not A Traditional Academic Structure

From its beginning in 2009, SIT has recognized that it cannot organize its academic structure in the form of Faculties/Schools and Departments like traditional universities. SIT has to be nimble, cost effective, multi-disciplinary in applied learning platforms, and highly responsive to industry and community needs. Besides leveraging on overseas university partners to build an extended eco-system, another key strategy is to build an academic structure

that promotes inter-disciplinary collaborations and allows faculty to teach across numerous industry clustered or related discipline programs. A corps of professional officers complements the work of the academics.

As SIT aims to be a university of applied learning, it is necessary to build a pool of professionals who know industry and can help mentor students on projects within SIT as well as when they are out on IWSP. To use only academics for this purpose may not be the ideal solution. The strategy developed is to recruit working professionals, calling them Professional Officers, to complement the academics in mentoring students on the more applied side of their learning. To make the role unique and challenging enough to attract the right people, these professional officers will cover four roles as a group:

- To manage laboratories in shared facilities;
- To mentor students working on projects, especially, those that are more applied;
- To mentor students while they are out on IWSP, and to help them if they encounter problems at the workplace in which even their supervisors may not be able to help and
- To work on projects from industry wherever possible.

The development of a corps of professional officers has been challenging thus far, due mainly to difficulties in finding enough relevant professionals from industry and for those who joined, teaching them how to mentor students. But this is a strategic development and will continue to receive high level attention.

CONCLUSION

The confluence of technological disruptions and globalization is causing dislocations in society, in particular the disappearance of ordinary jobs. University has an important role to play to help more people acquire skills and an education that help prepare them for a continually changing future. To do so, the pedagogical approach and the way the university is organized must be able to response to those changes directly. This paper describes the early stage development of a new autonomous university in Singapore, the Singapore Institute of Technology. The strategies shared are meant to ensure the development of a nimbler and more responsive university. Singapore Institute of Technology is only just over 3 years old as an autonomous university and thus this development is still very much a work-in-progress. Thus far, we have started the journey and made some progress, but the hardest and perhaps the best part is yet to come.

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