

# CHAPTER 4

## The changing nature and character of research universities: New Paradigms

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### **WHY NEW PARADIGMS ARE NEEDED FOR RESEARCH UNIVERSITIES**

**T**he research university in its current form represents a remarkable and successful model where education and research and its application are brought together in synergistic ways that produce valuable new ideas, insights, products and services, as well as thought-leadership that informs policy and action (National Research Council of the National Academies, 2012).

However, the world in which research universities have thrived is changing fundamentally and rapidly. As a result, many businesses, social enterprises and public agencies have had to respond by transforming their strategies and operations (UNDP, 2013). Research universities will not be immune to the need to adapt to these changes and to seek fresh ways to remain relevant and contribute significantly to the advancement of society.

### **GLOBAL DRIVERS FOR CHANGE IN HIGHER EDUCATION**

Potent global drivers for change in higher education include the following:

- (a) The massive ongoing explosion of information and its ready availability anytime and anywhere. This has been driven by the dramatic advances in information technology and disruptive models of information creation, dissemination and use (such as Google, Wikipedia, open innovation). The

introduction of Massive Open Online Courses (MOOCs) has been accompanied by predictions of potential disruptions to the current models of delivery and credentialing in higher education.

- (b) New generations of students who are highly IT-savvy and network through social media, and who would expect the same in their education. They are already making use of on-line learning resources and materials to supplement (or in some cases, replace) what they are being taught in their respective universities.
- (c) The changing nature of work due to the forces of globalization, the demands imposed by rapid obsolescence of knowledge, and the ever-growing impact of technology (Brynjolfsson & McAfee, 2011). For example, the U.S. Department of Labor reported that in the U.S., men and women with a Bachelor's degree would have on average held 11.4 jobs and 12.2 jobs respectively, between the ages of 18 and 46 years (Bureau of Labor Statistics, 2012). As these jobs could be in very different sectors, educators need to consider how to give the best grounding to university students, which would enable them to re-skill more easily to meet the demands of different types of work in the course of their careers.
- (d) Increasing complexity and volatility. The major challenges the world faces are truly complex and cross-disciplinary. Our graduates will need a broader intellectual base and the intellectual and personal abilities to deal effectively with complexity. Universities will need to reshape the way they pursue research and collaborate across borders in order to address complex research questions more holistically.
- (e) In the U.S., some commentators are increasingly questioning the value of the research university model, arguing that it is too costly and of declining relevance relative to the changed needs of the economy and of graduate employability (Research Universities Futures Consortium, 2012).

Many of these drivers and trends are being perceived and framed as challenges. It is crucial to recognize, however, that they will also present many exciting new opportunities for research universities to innovate to create distinctive new educational models and value, and fresh approaches to tackle the large-scale complex problems the world faces.

## **MAJOR IMPLICATIONS FOR RESEARCH UNIVERSITIES**

In an environment where information is so readily accessible, university education will need to go beyond content mastery. It needs to help students develop the intellectual scaffolding by which they can cope effectively with information overload by being better able to categorize, place and connect new knowledge. The ability to ask relevant and appropriate questions is more critical than ever before, as is the capacity to make sense of complex data and

to think imaginatively and differently about issues. In our tightly interconnected world, interpersonal skills such as teamwork, communication and cross-cultural effectiveness will also become increasingly important.

For research universities, there is the added dimension of creating greater synergies between research and teaching activities that take place within the institution, so that the former has a clearer positive impact on the education being provided.

The increasingly global nature of education and research is greatly intensifying competitive pressures on universities. However, the key drivers of change, while pervasive, will likely present individual research universities with different challenges. Each research university will need to reconsider its distinctive value proposition to its students and the community it serves, and this would clearly vary in different regions of the world, with their different contexts and aspirations.

In most countries, the value proposition of research universities often extends to playing important roles in driving and supporting local economic growth and development. In this context, the changing global environment makes it more urgent and crucial for more effective linkages to be developed between education and research in the university, and local and regional economic activities, sectors and industry.

## **WHERE NEW APPROACHES MAY BE ESPECIALLY IMPACTFUL**

In responding to these fundamental external drivers, research universities may need to consider new approaches that represent much larger qualitative or step-wise transformations in their activities. This is particularly pertinent for rapidly growing countries that are in the process of ramping up investments in research and higher education, the best example of which is China. Given the scale of investment and ambition, appropriate innovations could potentially enable research universities in these countries to “leap-frog” forward in their development. The same is true at the other end of the spectrum — for small countries with no natural resources such as Singapore, continued investment and bold educational innovation are also important for universities to remain competitive and maintain their relevance in a dynamic global economy.

While this paper will focus on new paradigms in education and research, it is worth noting that new approaches are also required in other important areas.

For example, in a complex and volatile world, “new” models of university governance that increase nimbleness and the ability to create and seize opportunities are critical. To be successful, these would need to be accompanied by greater diversification of sources of funding for the universities. While these concepts are not new, as exemplified by long-standing practices in the leading

universities in the United States, they are not the norm in many other parts of the world, and, certainly, in Asia.

New paradigms are also required that more effectively and efficiently bridge the gap between knowledge creation and its application and commercialization, since these represent important dimensions of the overall value-proposition of research universities.

## **NEW PARADIGMS IN EDUCATION AND RESEARCH FOR RESEARCH UNIVERSITIES**

Some proponents of MOOCs predict that on-line learning will completely disrupt the traditional university educational model (Forbes, 2012). Meanwhile, the report “An avalanche is coming” (Barber, Donnelly & Rizvi, 2013) warns that the functions currently served by universities are at the risk of being “unbundled” with each being better and more efficiently delivered by alternative providers or forms of delivery.

While there is little doubt that educational approaches and pedagogies will have to change substantially in research universities, it seems unlikely that there will be a “one-size-fits-all” model that would apply ubiquitously.

As the strategies and responses of individual research universities will have to be appropriate and relevant to their particular contexts and the needs and aspirations of the wider community that they serve, I would discuss three such new paradigms by referencing the example of the National University of Singapore (NUS), as the institution that I understand the best.

### **‘GLOBAL EDUCATION’**

While there are many definitions of “global education”, at NUS this concept encompasses three main ideas.

First, that being effective in diverse cross-cultural settings, international and Asian, would be one of the distinguishing features of our graduates, and that this quality can only be gained through experiential immersion. This is particularly relevant for Singapore, which is a key hub for many large multinational companies, a major trading nation and a global shipping and logistics centre.

Second, NUS is not just a physical campus in Singapore that offers a rigorous education, but also a portal and bridge to excellent academic programs and professors in renowned universities around the world. In other words, our students would not just have the benefit of an NUS education in Singapore, but, through NUS, will also be able to study in some of the best, and complementary, programs overseas. For example, about 30% of NUS undergraduates currently spend six months or more on overseas student exchange programs,

with a further 30% having at least one overseas educational experience, which may be for 3-8 weeks.

Third, a related concept is that of “mutually beneficial academic outsourcing”. In regular student-exchange-programs (SEPs), students typically choose from a menu of courses, but the sum may lack academic coherence and relevance and may miss out on areas of particular academic strength in their host university. An alternative is for two institutions with complementary academic strengths to develop programs of study that deliberately exploit these complementarities, hence providing a distinct new value proposition for the students and universities. An example of this more structured approach is the NUS-University of Toronto’s joint minor programs in environmental studies that leverage on the academic strengths in environmental biology and environmental chemistry at University of Toronto, and in environmental biology and nanoscience at NUS. In a similar way, joint-, double- and concurrent Bachelors-Masters programs between universities represent structured academic offerings that create new educational synergies, while providing students with an immersive overseas experience. In line with this philosophy, NUS currently has a significant number of such programs, in a range of disciplines, with partner universities around the world.

In such structured programs, the sharing of on-line learning materials and resources, and the use of video-conferencing to conduct joint classes across countries, can be readily, coherently and usefully integrated into the overall curriculum.

The NUS Overseas Colleges (NOC) program represents a different variation of the “mutually beneficial academic outsourcing” concept. Through the NOC, NUS undergraduate students have the opportunity to intern for a year at small start-up companies in the world’s most entrepreneurial hubs, while taking courses at partner universities at these sites, namely Silicon Valley (Stanford University); Philadelphia (University of Pennsylvania); Shanghai (Fudan University); Stockholm (KTH); and Beijing (Tsinghua University); and for 3 to 6 months in social enterprises and high-tech start-ups in India and Israel respectively. The goal of the NOC program is to provide an experiential entrepreneurship education for a selected number of entrepreneurially inclined students. We judge this 10-year-old program to be very successful — for example, NOC students and alumni have founded 163 start-up companies (of which 99 are in operation) and are in high demand by employers both within and outside Singapore.

In tandem with such study abroad opportunities, we feel it critical that rich opportunities to develop cross-cultural effectiveness should also be developed on the NUS campus in Singapore — a sort of “internationalization-at-home”. The NUS campus comprises a very diverse community of students and faculty, and we have introduced various approaches to enhance the peer learning

opportunities arising from this. The most notable example is the NUS's newly opened University Town, which includes four new undergraduate residential colleges, each with 600 students. Admission to each college is randomized to create the most diverse student body possible in terms of disciplines, backgrounds (including students who are financially needy where specific support is provided) and with the ~30% of international students coming from about 40 countries. To ensure that students interact academically, they take a number of courses together, in small groups over two years, within the college. The College-based modules are designed to encourage exploration, sharing and uncovering of perspectives and ideas from different disciplinary and cultural backgrounds.

## **INTERNATIONALIZATION IN SITU: CREATING NEW EDUCATIONAL MODELS THROUGH DEEP STRATEGIC UNIVERSITY PARTNERSHIPS**

NUS has pursued deep strategic partnerships with a small number of universities to establish major new programs in Singapore, which represent new learning approaches or novel models of education. These include the establishment of the Duke-NUS Graduate Medical School in partnership with Duke University, and most recently, the setting up of the Yale-NUS College. I will discuss the latter as an illustrative example of this approach.

### **Yale-NUS College: A new model of liberal arts education for Asia**

In 2008, NUS started studying the feasibility of establishing a liberal arts college within our university. This was motivated by our conviction that as the world became increasingly complex and volatile, we needed to offer very high-potential students from Singapore and beyond, an educational option which emphasized breadth of multidisciplinary learning, but which was combined with rigour and the nurturing of critical thinking. Our review concluded that these learning outcomes would be most effectively achieved through a liberal arts education. However, our aspiration from the outset was that we should not simply adopt existing practices, but instead, endeavour to develop a new approach. In particular, with the rapid growth of Asia, with its attendant serious challenges and exciting opportunities, we believed that it was critical that the graduates of such an educational program should also have a deep appreciation of the culture and perspectives of this vast and populous region of the world.

This concept resonated strongly with the visionary leader of Yale University, President Richard Levin. In April 2011, after more than two years of

detailed discussions and consultations, NUS and Yale signed an agreement to set up the Yale-NUS College, as an autonomous college of NUS in Singapore.

The partnership is founded on the strongly shared vision and excitement of re-imagining liberal arts education for the 21st century, and the unique opportunity to create an entirely new educational program in Singapore from scratch. The Yale-NUS College would therefore not be a wholesale “import” of the existing liberal arts model from Yale or the U.S., outstanding as this is, but would seek to break new ground. In particular, the College would endeavour to bring the major ideas, cultures and perspectives of the Western civilization into meaningful conversation with the intellectual traditions, cultures and contexts of Asia.

Groups of NUS and Yale faculty worked intensively and closely together to outline the broad contours of such a curriculum. Since the success of these new approaches would not just depend on the design of the curriculum, but on the actual teaching and learning that takes place, the College adopted a unique selection process for the appointment of the inaugural faculty. From the more than 2,500 applicants for the initial 50 faculty positions, shortlisted candidates were invited to workshops at Yale and at NUS, where they critiqued the proposed curriculum, suggested enhancements and described how they could personally contribute to its teaching. This process has enabled the College to identify faculty who are not just highly talented in their particular fields, but who have a passion for cross-disciplinary learning and a strong commitment to teaching outside of their areas of expertise.

With the progressive recruitment of the inaugural group of Yale-NUS College faculty in 2012, the faculty embraced the task of giving detailed form to the goals, directions and shape of the curriculum and developing the specific courses with impressive passion and commitment. Apart from curricula design, the faculty are also keenly working to introduce and innovate new pedagogies, including the integration of technology-enhanced learning. Besides the use of on-line learning resources and flipped classroom formats which free up face-to-face classroom time for conversation and argumentation, students and Professors in Yale-NUS College and Yale University could also be video-linked, encouraging dialogues across continents and providing opportunities to learn across institutions and cultures.

Beyond the formal curriculum, the College is dedicated to creating strong linkages between learning within and outside the classroom. To create a vibrant community of learning, the College will be fully residential and offer a myriad of experiential learning opportunities for its students that would enable them to grow intellectually and as well-rounded individuals. In a prospective world of technology-dominated education, one of the key differentiating factors for university education would be the opportunity to develop other dimensions of young people beyond the intellectual. Social and emo-

tional intelligence, resourcefulness and resilience of individuals are as important in society, economy and polity as knowledge, critical thinking and other intellectual capacities. Arguably, such social and emotional development is best achieved through opportunities such as residential living and learning. As this would include cross-cultural effectiveness, all students of the College will also have a significant global educational experience. The College's physical facilities, which are currently being constructed and which will be completed in 2015, have been carefully designed to support and enable the educational vision and desired learning outcomes.

The inaugural class of 157 highly talented Yale-NUS College students has just been admitted, selected from a pool of more than 11,000 applications to date. The College and both NUS and Yale are looking forward in great anticipation as the College's educational programs formally begin in August 2013.

It is perhaps a little ironic that at a time when there are debates in the U.S. about whether liberal arts colleges still have a place, there is strong interest and growing recognition in Asia of liberal arts education as a valuable and complementary model of higher education. The reasons vary, but, in part, this has been driven by an increasing acceptance that the narrow, early specialization that characterizes much of higher education in Asia would not adequately prepare graduates for a world of much greater complexity, in which individuals would need a much broader intellectual base to make an impact. Others look to the liberal arts model as an educational program that fosters critical thinking and creativity, qualities that will be of increasing importance in rapidly emerging economies in Asia.

Within this context, the Yale-NUS College represents a bold, future-oriented initiative which has the potential to serve as a model for others in Asia and around the world, who have a similar interest and desire to respond to changing global and local circumstances by diversifying their higher education models away from a purely research-university only approach.

**'An international research collaboratory':  
Singapore National Research Foundation's Campus  
for Research Excellence And Technological Enterprise  
(CREATE)**

Over the past two decades, Singapore has progressively and substantially stepped up its investments in Research and Development, particularly in Science and Technology. The scale of this investment has been intensified since the year 2000, to help support and drive Singapore's development into a knowledge- and innovation-based economy and society.

As part of this overall effort, Singapore's National Research Foundation (NRF) launched a bold and novel initiative by establishing the Campus for

Research Excellence and Technological Enterprise (CREATE) in 2006. The goal is to internationalize and increase the diversity and vibrancy of Singapore's R&D ecosystem by forming collaborative research programs between world-class institutions and Singapore universities. This would eventually involve up to 1,200 researchers working physically together in a single 67,000 m<sup>2</sup> complex which is located in NUS' University Town.

At present, there are 15 collaborative research programs between Singapore universities (NUS and the Nanyang Technological University) and 10 overseas partners, namely MIT, ETH Zurich, University of Cambridge, University of California Berkeley, Technical University of Munich, Shanghai Jiaotong University, Peking University, Technion University, Hebrew University of Jerusalem and Ben Gurion University.

The 15 programs are in research areas of relevance to Singapore and similar cities, in four broad areas, namely Human Systems; Energy Systems; Environmental Systems; and Urban Systems.

Under Urban Systems, for example, researchers from ETH Zurich, Shanghai Jiaotong University, MIT and the Technical University of Munich work with faculty from NUS and NTU on developing solutions for the sustainable development of buildings, cities, districts and regions; developing decentralized waste-to-energy systems and building modelling and data management tools to track and mitigate emerging environmental contaminants; using modelling to develop a new paradigm for the design and operation of urban mobility systems; and developing electric vehicle technologies for use in megacities respectively.

CREATE's stated objectives are to "raise Singapore's research quality and to attract international research talent. Such international collaborations will allow Singapore to tap into state-of-the-art research overseas, while promoting knowledge spillover through cross-fertilization of ideas and enhancing efficiency through pooling of resources".

CREATE represents an exciting new paradigm that enables top researchers from Singapore and around the world to work in a cluster of research programs that, taken together, should contribute significantly to novel insights and solutions for some of the important and complex challenges that the world and Asia face. Another important dimension is that this arrangement greatly facilitates the joint supervision of PhD students from the partner universities and NUS and NTU, who will benefit from the unique experience of working within these cross-national, multidisciplinary research programs.

## CONCLUSION

Some may argue that the new paradigms described above still revolve around the traditional activities of the research university, and may not stand the test

of true disruptions to higher education that may be brought about, for example, by a revolution in on-line learning.

An alternative view, to which I also subscribe, is that these approaches, which may themselves involve the integrated use of on-line learning, can substantially increase the distinctive value-proposition of the face-to-face and experiential learning components within the university. In turn, this could more effectively motivate and prepare students for work and life in an increasingly complex and uncertain world. It is true that we would need to objectively evaluate the impact and outcomes of these new approaches. While this will take time, it should not detract from the need for research universities to continue to explore and innovate new ways in which their relevance could be extended or re-defined in a complex, fast-paced and volatile world.

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