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Subject: Speech by Minister Teo Chee Hean, 7 Jan 2000, 6.35pm

Singapore Government

PRESS RELEASE

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**Address by RADM (NS) Teo Chee Hean,
Minister for Education and Second Minister for Defence at the Alumni International
Singapore (AIS) Lecture
on 7 Jan 2000 at the NUSS Guild Hall @ 6.35 pm**

**“Education Towards the 21st Century”
- Singapore’s Universities of Tomorrow**

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Good evening ladies and gentlemen, and a Happy New Year to all of you.

The Knowledge Economy and Universities

1. Since the first universities were founded, the world has undergone dramatic changes, and so too the universities. In an agricultural society wealth was created by what you could grow or mine from the land. With improvements in transportation, man became more mobile. New wealth was created by trading goods and being at junctions of trading routes. Advancements in science and technology, and innovative management methods followed, bringing about the green revolution and the industrial revolution. Mass-production became the key to great riches. Today, the basis for competition has again been re-defined. The road to prosperity is now based on the ability to create knowledge and to use knowledge creatively.

2. In a knowledge economy, intellectual capital is a prized resource. As traditional seats of scholarship and learning, universities are now seen as valuable sources of "brainpower" needed to drive the new economy. University education is not only the preserve of a very tiny minority, but has expanded to encompass between a quarter and a half of each cohort of young people in developed countries.

3. Universities are no longer seen as ivory towers, where distance and detachment from the real world were seen as essential to objectivity and scholarship. They are now valued as key nodes in the complex network in which ideas clash and intermingle, get refined and commercialised, or consigned to the dust-heap. The players in such a network include academic staff, who are in touch with the newest ideas, their fresh-faced students eager to make a mark on the world beyond, seasoned financiers and venture capitalists out to spot a good idea before anyone else, engineers and managers ready to turn ideas into products and services. In short, universities have been dragged into the real world, and are beginning to enjoy it.

Boston of the East

4. For the network to buzz with activity, the conditions must be right. We need a critical mass of diverse talents in a relatively compact area to achieve an impact. Social scientists have a rather cumbersome term for this - the benefits of agglomeration. This agglomeration has to be physical to a large extent. The rise of the Internet and virtual communities has yet to supplant the excitement of human interaction. Exchanging e-mail does not have the same meaning as having a power breakfast with a venture capitalist, or exchanging the latest gossip with a colleague along the corridors in the university, or quite commonly, in the men's room.

5. Singapore definitely has some things going for it - we are small and compact. We also have good "hard" infrastructure to plug into other networks, in Silicon Valley, Cambridge (Boston and UK), Hsinchu, Cyberjaya. We are working on developing the soft infrastructure.

6. Our vision, in shorthand notation, is to become the Boston of the East. Boston is not just MIT or Harvard. The greater Boston area boasts of over 200 universities, colleges, research institutes and thousands of companies. It is a focal point of creative energy; a hive of intellectual, research, commercial and social activity. We want to create an oasis of talent in Singapore: a knowledge hub, an "ideas-exchange", a confluence of people and idea streams, an incubator for inspiration.

7. We will be doing so through a two-pronged approach. The more visible one to most of you is our strategy of attracting top foreign universities to Singapore. We have had some success in this. INSEAD and Chicago Graduate School of Business have set up branch campuses here. They will take in their first students this year. Our universities have also actively formed partnerships with top foreign universities. NUS, NTU and MIT are collaborating in the field of postgraduate engineering education and research through the Singapore-MIT Alliance. NUH and Johns Hopkins University are conducting joint PhD and Masters programmes in clinical research. The youngest of the fold, Singapore Management University is working with the Wharton School of the University of Pennsylvania to set up the Wharton-SMU Research Centre.

8. The other strategy is to develop our local universities into world-class institutions. We

have a firm foundation to build on. Our two "older" universities, the National University of Singapore and the Nanyang Technological University, have well-deserved reputations in education and research in the region and beyond. NUS has been ranked 2nd in academic reputation among comprehensive universities in Asia while NTU has been ranked 3rd in Asia among science and technological universities "Asia's Top Universities" by Asiaweek April 23 1999, pgs 47-65..

9. Both universities have made their mark in research. In terms of research equipment and laboratories, they are now first-rate. We have world-class researchers in specific fields such as advanced materials and high-performance computing. By "world-class", I mean that their work is widely acknowledged to be among the best by peers working in similar fields.

10. In NUS, researchers in carbon nanotubes have found a way to store, absorb and release a large amount of hydrogen in multi-walled carbon nanotubes doped with potassium or lithium. In plain layman's English this means that they have found a way to store hydrogen efficiently and safely for fuel cells in electric cars and for other uses. The major car companies have all expressed interest in this technology.

11. In the field of Chemistry and Medicine, NUS has developed a unique technology to synthesise phosphine-based gold drugs. These anti-cancer drugs show promising anti-tumour activities with minimal side-effects, even in mice with advanced stages of cancer. This is a breakthrough which was widely reported world-wide and NUS has filed a patent application for it.

12. NTU's Microelectronics Centre has achieved a world-first in the field of artificial diamond thin film technology. This has a wide range of industrial applications ranging from biomedical implants to protective and tribological coatings for disk drive media and read-write slider heads. Major MNCs have negotiated with NTU to buy this technology.

13. The Cardiovascular Research Group in NTU has also made great strides in biomedical engineering, especially in the area of heart valves, coronary and vascular stents. They hold 2 major patents on their inventions – one is for a bi-leaflet mechanical heart valve and the other for autologous tissue heart valve moulds. Two more patents are pending.

Challenges Ahead

Universities as Excellent Singaporean Institutions

14. These are commendable achievements for our universities. But we cannot be satisfied with what we have achieved so far. Our universities will continue in their quest for excellence. In striving for excellence as world class institutions, our universities will continue to keep in focus their unique roles as Singaporean institutions in shaping the economic and social development of our country.

15. There are three main roles. First, they produce the graduate manpower for our high-tech, knowledge economy. Second, they educate Singaporeans to be global workers but local citizens

contributing actively to Singapore. Third, they are creators of new knowledge and new applications needed to help Singapore become a Renaissance City in the fullest sense, with a blossoming of advances in science, technology, commerce, and the arts.

16. These are very high expectations. Our universities need to play each of these roles with distinction. There are formidable challenges if we are to do all of these well. How can NUS and NTU which were both founded in the 20th century, and SMU, perhaps the first university to be founded in the 21st Century, hope to topple institutions with a few hundreds of years of history behind them? There are lessons that we can learn from top universities around the world as we chart our own course.

17. First, we must understand the context in which our universities operate. If we look at university systems around the world, almost all are much larger than Singapore's. In these larger systems, there is usually a division of labour. A few top universities attract the very best students while a wide range of other institutions cater to the needs of other students of varying abilities and talents. For example, France has an open-admission university sector where everyone who graduates from high school can enrol, and a highly selective grandes écoles sector which admits only the crème de la crème – the top 2%. Even among the grandes écoles, there is a pecking order. I recently visited one institution in Paris which admits only the top 0.1%. If we scale this to Singapore's size, this translates to an intake of just 50 students per year.

18. To take an even more extreme example, China's prestigious Tsinghua University admits 2,500 students a year, which if scaled to Singaporean terms, translates into 5-6 students per year. This is like NUS or NTU picking only each year's President's Scholars for the freshman class.

19. Since Singapore has the advantage of being small and compact, we cannot at the same time hope to have the selectivity of Tsinghua or the grandes écoles. But even with a relatively large intake, it is possible to achieve world-class excellence if we put our minds to it. Selectivity alone does not guarantee excellence. It has been done.

20. I will cite only a couple of examples from the US which has perhaps the widest range of tertiary institutions in the world - University of Illinois-Urbana Champaign and the University of Michigan-Ann Arbor. These are large state universities in the US. Enrolment is about 37,000 in each, of which about 8,000 – 10,000 are postgraduates. They are even larger than NUS and NTU who have 28,000 and 20,000 students, of which 8,000 and 6,000 are postgraduates respectively.

21. The state universities are obligated to reserve the majority of their places for in-state students. Yet, both universities maintain a healthy proportion of out-of-state and international students among their undergraduate classes - 21% in Illinois and 35% in Michigan. NUS, NTU and SMU are working towards 20%. (See Table 1 in Annex for detailed information).

22. Although both of these state universities take in students from among roughly the top 50% of the age cohort, compared with about 30% for NUS and NTU, they have built up formidable reputations in certain fields. *USNews and World Report* has ranked Michigan at 25th place and Illinois at 34th place among the US universities, putting them in the top 2%. There are

about 2000 4-year degree-awarding institutions in the US..

23. Both these universities have established niches of excellence. Michigan is particularly strong in the social sciences. Its anthropology programme is considered top in the US while its political science and psychology programmes are in the top 3. Its professional schools such as business, engineering, law, public health and social work are all among the top 10.

24. Illinois's strength is in engineering and economics, library and information science and accounting, crop science and kinesiology, advertising and architecture. 10 of its doctoral programmes are ranked in US's top 10 as assessed by the National Research Council. These are in the engineering fields, science, computer science, music, and psychology.

Ingredients for Success - Talent, Programmes, Attitude

25. Universities in Singapore will need to see how they too can build upon the areas of excellence they have already established, and strive to reach the top in others. I see three important ingredients in this venture - attracting talent, creating challenging programmes to get the most out of them, and encouraging the right attitudes and values.

26. First, attracting talent. At the heart of any university is top talent - faculty members, students and administrators. Much has been said about this already. NUS and NTU are perhaps fortunate in that they teach in English – something rather unique in our part of the world. This confers some significant advantages. They can compete for top talent – both staff and students - from all over the world where English is the native tongue or the most popular foreign language, which means virtually everywhere in the world. By being open to talent, regardless of their origins, our universities can overcome the constraint of a small population and build a much larger pool of talent. NUS and NTU have increased our international student intake while at the same time increasing their capacity to take in Singaporean students. Both universities are on track to achieving their target of having international students comprise 20% of their undergraduate intake by 2000. They are generally of higher calibre than our local students. The challenge is to continue to improve the quality of both our international undergraduate and postgraduate students.

27. Second, building programmes that will stretch and challenge students and staff. In teaching, our universities need to recognise the diverse needs of their students. They need a range of programmes that will provide a good solid education to all the students, while allowing those who can go beyond to stretch themselves. This includes such programmes as the core curriculum and accelerated masters programmes. Opportunities for our students to go on exchange to other top universities and to interact with top students from other universities on exchange here also add to their educational experience.

28. Third, attitudes and values. Talent thrives in an environment which stresses excellence,

promotes healthy competition, and provides timely recognition for those who achieve distinction. There are both hard and soft factors at work. Having an adequate level of funding and infrastructure support is a first step. Getting people to want to go that extra mile because they have passion and want to achieve is a bigger challenge. In research, what we are most in need of is not resources, but a rigorous system of review that directs resources to those areas that show the greatest promise while culling those that are unlikely to expand the boundaries of knowledge. The whole university – its administrators, academics, researchers, students must display those qualities that it is trying to build up in its students – an inquiring spirit, creativity, passion, entrepreneurship, an unrelenting drive for excellence.

29. As always, the devil is in the details. How NUS and NTU set out to achieve their goals will depend to a large extent on how the universities are managed and run. MOE and the universities are now in the midst of a review of governance, funding and human resource management. These systems are important because they affect the way in which the universities can bridge the gap between intention and practice.

30. It will take some months to complete the review, but the direction to take is clear. While the Government will continue to exercise influence over key parameters like intake and fee policies, the universities need to move towards taking greater responsibility for charting their own courses, deploying resources and in accounting for their best use in meeting national needs in education, research and service.

Conclusion

31. In the latter half of the 20th Century, our universities had the task of training professionals and administrators for industry, business and government. They have carried out this task well. From institutions that catered to a mere handful of students, our universities have expanded their intakes dramatically in the last 20 years while maintaining quality and standards. The university cohort participation rate rose from 5% in 1980 to 21% in 1999.

32. The 21st century will be exciting times for our universities. As we enter the knowledge era, our universities will have to move from imparting knowledge to creating knowledge and training creators of knowledge. They will become engines of innovation for Singapore. To do so, they will have to continue to re-invent themselves.

33. So far, the omens are good. Compared with august institutions like Oxford or Harvard, NUS and NTU may be relatively new and lesser-known runners in the race. But they are running well, keeping up with the pace, and are within striking distance of the front runners. I am confident that they can, and will meet the challenge.

34. I would like to thank the Alumni International Singapore for inviting me here this evening. AIS has brought together here graduates from many illustrious institutions. I understand that represented here are graduates from Singapore and all over the world - Australia, Canada, France, Hong Kong, Japan, New Zealand, Taiwan, UK and the US. In this respect, AIS plays a very important role in building bonds and sharing of knowledge and experience. Your far-sightedness is laudable indeed.

35. This is one aspect of “brain-circulation” which is a distinguishing characteristic of the new knowledge economy. While the majority of our graduates will be trained in our own universities, the knowledge, perspectives and attitudes that graduates like yourselves bring from your experiences from all over the world is a valuable contribution to Singapore. This is the way forward in the knowledge economy.

36. I look forward to hearing your views on how our universities can be further developed to contribute to building the knowledge economy in Singapore.

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Additional Data

Table 1: Comparison of Undergraduate Intakes of Universities

	In-state	Out-of-state	International	Top x% of cohort
U of Illinois- Urbana Champaign	79%	12%	9%	Top 50% of high School class
U of Michigan- Ann Arbor	65%	30%	5%	
NUS	85%	-	15%	Top 30% of age Cohort
NTU	77%	-	23%	

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