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SPEECH BY MR HENG SWEE KEAT, MINISTER FOR EDUCATION, AT THE 2011 A*STAR SCHOLARSHIP AWARD CEREMONY
ON THURSDAY, 4 AUGUST 2011, 3:00 PM AT GENEXIS THEATRE, FUSIONOPOLIS

Mr Lim Chuan Poh, Chairman of A*STAR,

His Excellency Olivier Caron, French Ambassador to Singapore

His Excellency David Isaac Adelman, United States Ambassador to Singapore

Scholars and parents,

Distinguished guests,

Ladies and gentlemen,

Good afternoon.

1. I am delighted to be here for the A*STAR Scholarship Award Ceremony and to address 121 of our most passionate youths in Science.

2. In his invitation to me, Chairman A*STAR Mr Lim Chuan Poh played the emotion card, and recounted how we had launched the A*STAR scholarships ten years ago while I was at the Ministry of Trade and Industry. I thus agreed to the invitation as I remain committed to the idea that we have to groom young Singaporeans to secure a good future for Singapore. **To allow our most passionate youths to pursue their dreams allows them to develop to their maximum potential**. It gives me great joy that now, at the Ministry of Education, my colleagues and I are able to continue to invest our efforts along these lines.

3. This was also a poignant reminder to me that both Singapore, and the many cohorts of scholars before you, had invested so much energy and effort just so that we can embark on this voyage of scientific discovery. Singapore's future is in creating a knowledge-based economy like Silicon Valley, and **one of the essential pillars of such an economy is a strong foundation of research performers – both public and corporate**.

4. To further pave this foundation, Singapore has continued to make firm and long-term commitments to R&D. **The recently-announced Research, Innovation and Enterprise 2015 Plan will provide a $16.1 billion boost to R&D for the next five years**, which is a 20% increase from the preceding five years.

5. Moreover, on top of this foundation, the RIE2015 plan will also allow peaks of excellence to emerge in the Singapore research landscape, in areas such as Sustainability research in NTU or Cancer research in NUS. These peaks will be magnets for knowledge industries who are looking for their next breakthrough, as well as candidates for spin-offs and technology transfers **that benefit the whole of Singapore**. These peaks will allow Singapore to complement, and not get lost in, the burgeoning growth of industrial powerhouses like China and India.

6. Moreover, this will allow us to accumulate a reservoir of cutting-edge scientific know-how and develop rigorous systems to deal with the problems of the future. We will also form wide-reaching international networks. These are the essentials that a small country like Singapore needs for a more globalised and knowledge-intensive 21st Century. **These benefits will diffuse into other parts of our universities and research landscape, our polytechnics, and our technical education sector**, allowing us to nurture Singaporeans who are skilled knowledge-workers and highly networked with an international talent base. It is a competitive advantage that we must continue to nurture.

7. Which brings me to my next point – the importance of our scientific talent. Recognizing this, Singapore has been steadily growing our pool of research scientists and engineers from less than 5,000 in 1990 to more than 25,000 today. We have done so by investing heavily to build up our local talent pool and by attracting the best and brightest scientific minds from around the world.

8. From the start, we realised the importance of grooming our own local community of scientists and scientific leaders as **Singaporeans must play a central role in creating our R&D future.** To identify such Singaporeans, we look for two things. First, and most importantly, the burning passion for science and the pursuit of knowledge; and second, the desire to take Singapore's scientific enterprise forward.

A Vibrant History of Nurturing Singaporeans in STEM

9. It is this belief that Singaporeans must be a key pillar in our R&D enterprise that led us to create the A*STAR Scholarships as well as a whole gamut of policies designed to nurture Singaporeans in Science, Technology, Engineering and Mathematics, or STEM for short. **Hence, as we celebrate the 10-year anniversary of A*STAR's scholarship drive, we also celebrate Singapore's long history of STEM education in Singapore**.

10. Singapore's approach to STEM education is to start our children on the journey when they are young. Our students spend significant amount of curriculum time mastering the basics of numeracy from Primary One, before embarking on the study of Science from Primary Three. In their secondary and post-secondary years, this focus on STEM continues. All our schools are well equipped with learning resources and facilities. Our teachers are trained to teach for understanding and not just by rote. Our curriculum is progressive, rigorous and relevant, and is often a benchmark that other countries use.

11. **With a broad-based approach to STEM, we have been able to boast high averages**, which are borne out by our performance in international studies. For example, in the Trends in International Mathematics and Science Study (TIMSS), we were among the top three in the world for both science and mathematics. In the most recent 2009 Programme for International Student Assessment (or PISA) which tests the higher-order reasoning ability of our students to apply their knowledge in unfamiliar

settings so as to meet real-life challenges, Singaporean students emerged second in the world.

12. **But we also have high peaks**. You may have read about the extraordinary performance of our teams in this year's International Science and Mathematics Olympiads. Singapore was placed first, third and third respectively in the International Physics, Biology and Mathematics Olympiads. In total, we won 12 gold medals – an unprecedented performance. One of our Secondary Four students, Lim Jeck, from the NUS High School of Mathematics and Science was ranked second internationally in the Mathematics Olympiad. Some of you seated here today may have participated in the Olympiads and I am sure you can appreciate how difficult it was for these young Singaporeans to perform so well.

13. We have also been able to build on our youth's passion for science by immersing them in research opportunities. In this aspect, our professors from our local universities and A*STAR have been excellent partners. Many researchers have taken the time and effort to actively engage and excite our school children in Science. Many of our Secondary School and Junior College students with a deep passion for science volunteer to spend their school holidays in laboratories working hand-in-hand with leading researchers. These opportunities give our students an early chance in getting real experience in research.

14. Our local universities have also worked with A*STAR in co-creating new science research subjects at the H3 level for our Junior College students. Our most passionate students can now conduct scientific research under the watchful guidance of researchers and receive credit for it at the A-Levels. Many of you seated here today are beneficiaries of these programmes.

15. As a result, Singapore students have been able to perform well. For example, at the recent 2011 International Science and Engineering Fair held in the USA, which is otherwise known as the Olympics of Science Fairs, our student Cheng Herng Yi from the NUS High School of Mathematics and Science won the First Award in the category of Computer Science for his research project *Composing Frusta to Fold Polyhedral Origami*. It is also a good reflection of the dedication of our educators that Herng Yi's teacher mentor, Mr Cheong Kang Hao, was awarded a Special Award by a selection panel for his excellence in guiding and encouraging his mentee.

Innovation in STEM Education in the Tertiary Sector

16. Other than through research, our local universities have found other innovative means to bring their students beyond the traditional boundaries of STEM education. For example, NTU has recently launched the Renaissance Engineering Programme which is a multidisciplinary, highly rigorous and fully residential programme that spans across engineering, business and the liberal arts. All undergraduates will spend one year at the University of California Berkeley, USA, which is usually ranked as one of the top three in the world in engineering. They will graduate with not only a Bachelor of Engineering Science degree but with a Master of Science in Technology Management.

17. Similarly, NUS has the Global Engineering Programme which involves specially tailored leadership programmes, flexible education through independent study modules and close mentorship by faculty members. Their students will also spend their fourth years at a partner overseas university. Both these programmes have redefined Engineering education, creating for their students global experiences at excellent partner overseas universities, as well as using innovative pedagogies.

18. Our fourth autonomous university, the Singapore University of Technology and Design, is also set to innovate in Engineering education, with its focus on design. It is such **innovative STEM education that positions our university graduates well for employment**.

19. I was reminded of this recently. You would probably be familiar with the company Rolls-Royce, one of the world's largest companies in the aerospace, marine and energy sectors. Their Regional Director for South-East Asia, Mr Jonathan Asherson, recently commented to us about graduates and postgraduates from NTU, whom they have a partnership with. He noted that "Rolls-Royce has had excellent experience with the quality of NTU graduates and PhDs over the last few years, and [they] will continue to use NTU as a source for world class talent". In fact, Rolls-Royce has already employed several graduates and ten PhD post graduates from NTU and found them to have had the highest level of training in preparation for a career in their company.

20. Another initiative to nurture RIE talent that will position our postgraduates well for employment is the upcoming Industrial Postgraduate Programme (or IPP for short). The IPP is going to be a collaborative effort between the Economic Development Board (EDB) and universities, and is open to Singaporeans and Permanent Residents. Under this programme, a participant will spend a majority of his or her time working on industry projects in a corporate R&D environment while being co-supervised by faculty members of our locally based universities.

21. The IPP will be different from the traditional form of PhD education, where students would pursue their training and research at universities. It provides IPP graduates with the best of both worlds, fostering interaction between academia and industry**.** I am pleased to note that about 200 students over the next 5 years will benefit from this novel form of PhD education.

22. To initiate and support this programme, EDB has lined up a host of leading local and multinational companies. One of my colleagues on the RIE Council, Professor Paul Herrling of Novartis, shared that programmes like the IPP reflect the importance that Singapore places in the creation of national leaders through supporting young local talents. His comment confirmed for me that **the IPP and other programmes like it represent the next step of how STEM education must evolve in Singapore.**

A*STAR's Scholarship Programme – A High Peak in STEM education

23. The A*STAR scholarships play a key role in this evolution. **They represent a firm commitment by Singapore to ensure that our best students are able to pursue their scientific interests beyond the mainstream school system, at the best institutions and research bodies around the world.** They are one of our highest peaks in our efforts in STEM education.

24. Over the last decade, the A*STAR scholarship programmes have identified, nurtured and developed outstanding students. I recall being present at the inaugural scholarship session held in Suntec City in 2001, and I am heartened to see that some of your seniors whom I had sent off are already back in A*STAR, and are proving themselves to be promising young scientists in their various fields. In playing a part in advancing scientific knowledge, they are, in their own ways, enhancing the lives of everyone in Singapore.

25. Dr Cheok Chit Fang is one such scientist. Chit Fang, a National Science Scholar from that very first batch in 2001, graduated with a PhD from the University of Oxford in 2006. She then joined A*STAR's p53 Laboratory, under the mentorship of Professor Sir David Lane. There, she made waves when she discovered a unique method of cancer treatment. This method taps on the properties of the tumour suppressor gene p53, also known as the 'guardian of the genome', to kill cancer cells more effectively while sparing normal cells.

26. Chit Fang was recently appointed by Italy's FIRC Institute of Molecular Oncology (IFOM) to head their first international outpost here in Singapore, to develop new targeted therapies against cancer. It is an exceptional achievement to be identified to head a lab so early in her career. Chit Fang will have the honour and unique responsibility of managing the dialogue across two institutes located over 10,000 kilometres apart, and combining their knowledge and technological expertise to accelerate the transfer of scientific findings from the lab to clinical practice.

27. Another A*STAR scholar who is making an impact with her research is Dr Lee Hui Mien, who pursued a PhD on an A*STAR Graduate Scholarship (AGS) in 2003. After graduation, Hui Mien joined Singapore Institute of Manufacturing Technology (SIMTech), as a post-doc, where she had the opportunity to work with Nanyang Optical to design the world's first spectacle frame from recycled materials. This product has won several international design awards and is now sold in markets as far away as Europe. Not one to rest on her laurels, Hui Mien is currently on a post-doctoral stint in Sweden, doing research on remanufacturing technologies to help companies minimise emissions, waste and toxicity in manufacturing.

28. Chit Fang and Hui Mien can be counted among the fruits of concerted efforts by A*STAR, MOE, Science Centre Singapore and other educational and scientific institutions to develop our youths passionate in STEM to pursue R&D careers. And they are just two role models of what you can aspire to become.

29. Moreover, I am heartened to note that **A*STAR has been developing, and continues to develop, RIE talent to support and develop Singapore industry**. Dr Gideon Ho, recipient of the A*STAR International Fellowship in 2003, is a case in point. Gideon is the co-founder of HistoIndex Pte Ltd, a spin-off from A*STAR's Institute of Bioengineering and Nanotechnology (IBN). His company provides stain-free, three-dimensional, quantitative imaging solutions for visualising diseases like fibrosis and cancer. HistoIndex was incorporated in mid-2010 and has attracted over S$2.5 million in funding from private equity investors and government agencies.

30. On top of this, Gideon serves as Director of the Technology Transfer and Enterprise Centre (TTEC) at Singapore Polytechnic, where he is actively involved in the management of technologies which may translate to commercialisable IP, technology out-licensing, and eventually, the creation of new ventures. Most recently, he is finalising a million-dollar deal with an institution to invest in one of Singapore Polytechnic's start-up companies.

Conclusion

31. So, as you embark on your own journey of education, what do you want to make of it? Over the last decade, more than 1,000 passionate Singaporean talents have been nurtured through A*STAR's scholarships and fellowships. Your seniors, like Chit Fang, Hui Mien and Gideon have set high standards. I would like to encourage you with the words of the notable educational philosopher John Dewey who noted that "every great advance in science has issued from a new audacity of imagination". Just like how the empires of old sent their most daring and courageous to sail in search of a new world, we too send you – our most passionate youths in Science – to captain Singapore's ships in search of hidden worlds of scientific discovery.

32. I wish you a fulfilling education ahead. Thank you.