



An advocate of hands-on learning, school principal Dr Hang (centre) working with Year 3 students (from left) Lin Xinyi, Gerlynn Yap, Lim Jia Qing, Ivan Ng and Bernard Lim. ST PHOTOS: ALPHONSUS CHERN

# NUS High to spread maths, science success

It will share its methods,  
Start student exchanges

DR HANG Kim Hoo still counts the greatest achievement in his 24 years in education as seeing his Normal (Academic) class in New Town Secondary School through their O-level Additional Mathematics examinations.

It was 1986 and the 20 students were the first in the school's Normal stream, for less achieving students, to take the challenging subject.

The results were sterling: 19 out of 20 passed and five had distinctions.

Now he oversees some of the country's brightest young minds in maths and science, but he holds to the same principle – that students will do well if teachers teach to their abilities.

The first batch of 88 graduates from the National University of Singapore High School of Mathematics and Science all scored well enough to get into university. Some have already secured places in top schools such as the Imperial College London. NUS High School's top student scored 4.86 out of a maximum 5 points.

Dr Hang, 49, who has two master's degrees in statistics and mathematics education and a PhD in mathematics, took

over as principal of NUS High School in August last year.

He stepped in as the school, which aims to nurture 13- to 18-year-olds talented in maths and science, was still establishing itself. When it opened in 2005, at its temporary campus on the former Raffles Junior College grounds at Mount Sinai, its six-year diploma programme was not backed by any university.

It moved to its permanent \$55 million, 4.7ha campus at Clementi Avenue 1 the following year. But backed by NUS, which said in April last year that it would recognize the school's diploma, the school kept at it. It opted for a curriculum and teaching methods that encourage self-directed learning and research.

Dr Hang said the key challenges that the school had to overcome were to gain "confidence and recognition" from parents and other institutions. "We were unable to get recognition immediately when we started the school as we did not have a track record to show," he said. "But we managed to overcome this with the backing of NUS and worked hard to build up a good track record. It also helped that our parents had faith that a Ministry of Education school like ours would provide a good education for their children."

The school's diploma is now accepted by NUS and top overseas institutions such as Oxford and Cambridge. And in the last two years, its students have been excelling in international competitions and challenging tests, such as Advanced Placement papers administered by American non-profit organization College Board.

Last year, 71 NUS High students who took the Calculus AB paper got an average 4.99 out of 5 points. The global average was 3.65 points. The exams test higher-level content knowledge and is used by US universities as a gauge to exempt students from introductory coursework.

NUS High School is now ready to look outwards, and spread its passion for teaching and learning maths and science to others. By the middle of next year, it will be rolling out a programme to share with principals and teachers of other schools ways to teach difficult concepts to young students, guide research and use the inquiry approach in classes. Details are still being worked out.

And the school is looking beyond Singapore students. It will be starting exchange programmes with the North Carolina School of Science and Mathematics, Oklahoma School of Science and Mathematics and Korea Science Academy by end next year.

By 2010, it will synchronise its curriculum with one of China's top schools, Beijing No.4 High School, to allow each other's Year Five students to study for a semester abroad. The 101-year-old Beijing school has produced top scientists, writers and politicians. One notable alumnus was astrophysicist Fang Lizhi, whose liberal ideas inspired the pro-democracy student movement in the 80s.

Sharing is the only way everyone wins. Dr Hang said: "When we share with others what we have developed, questions will be asked. Our teachers will have to reflect and respond to the questions. This is like the study of maths and science. Only through questioning can we improve."

Teachers at the school agree. Physics teacher Lim Kim Yong, 31, said: "The students often pose difficult questions which make me go back to the textbooks. But this pushes me to improve. It has been an exciting journey and I believe it will continue to be one."

It is this “no limit to learning” philosophy that has attracted no lack of children to apply for the school’s limited places. Maths whiz and third-year student Ryan Chan, 15, gets bonus questions in class tests written specially for him. He has been topping maths Olympiads since he was in Primary 6. “My teachers source for these questions, which are harder, to challenge me,” he said. “I feel very encouraged. They push me to improve myself.”

The school also ensures that the children get to exchange ideas with working scientists. Student Gregory Lau, 18, said he liked the opportunities to work with physicists from the Massachusetts Institute of Technology during a six-week research programme and Singapore’s Defence Science Organisation on quantum optics, the study of light at its particle level.

“Quantum optics is introduced as a module in universities and has not been researched in detail,” he said. “But the school saw that I was interested in it and supported me to pursue research in it. I feel very motivated because of this.” Gregory wants to study physics at MIT and work as a researcher in the future.

Parents said the school has helped their children develop both intellectually and emotionally. Gregory’s mother, a school vice-principal, Mrs Lau Fatt Yong, 45, said: “As there are so many things to do in the school, Gregory has learnt to manage his time and priorities. Seeing how he has matured makes us happy.”

What makes Dr Hang happy is nurturing children who may one day do great things. “We know it takes a long time to produce a Nobel Prize winner. But I hope the seeds to grow them will be planted at the school.”



A passionate educator, Dr Hang often jots down ideas to improve teaching methods on a board in his office.

## Educator scouts maths talent

DR HANG Kim Hoo started his career in 1984 as a mathematics teacher at Raffles Institution. He became principal of Clementi Town Secondary School in 2000 and ran the school till 2004.

Before joining NUS High School, he was manager of the Ministry of Education’s School Cockpit Administration Centre, which manages Web data and the information management systems used by schools.

Dr Hang, who holds two master’s degrees in statistics and maths education, and a PhD in maths, has been the vice-president of the Singapore Mathematical Society since 1994, a position he enjoys as it lets him talent-scout budding mathematicians.

During one-hour sessions, he sits down with children to discuss maths problems. He wants to continue doing this and attract these children to enroll in NUS High School.

“There are few children who have raw talent in maths. I come across only about one every two years... We need to catch them when they are young and hopefully they will come to our school where we will develop their talentg,” he said.

His office is filled with maths textbooks from France, Russia, China and the United States. Beside his desk is a writing board which he uses many times a day to note down ideas on how teaching methods can be improved.

Dr Hang is married, with three children aged 15 to 19 years. His eldest child, Hao Chuien, wants to follow in his father’s footsteps and teach maths. He has received a teaching scholarship from the Education Ministry and will be studying maths either at Cambridge or Imperial University.

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## *Achievements*

- **2005:** The students win 5 gold, 13 silver and 29 bronze medals in their first participation in the Singapore Mathematical Olympiad (SMO). They also win medals at the World Youth Mathematics Intercity Competition and the American Mathematics Contest.
- **2006:** The school betters its performance at the SMO, bagging 27 gold, 41 silver and 50 bronze medals.
- **2007:** The school starts to feature prominently in international maths competitions, winning medals at the American Mathematics Contest, World Youth Mathematics Intercity Competition, Asia Pacific Mathematics Olympiad and China Western Mathematical Olympiad. It also wins medals at science competitions such as the Singapore Science and Engineering Fair, International Junior Science Olympiad and the Singapore Chemistry Olympiad. It is judged the top school at the Singapore Physics Olympiad, winning three golds, one silver and three bronzes.
- **2008:** The school amasses seven medals at international Olympiads in maths, physics and chemistry. Again it is top school at the Singapore Physics Olympiad and wins best overall individual performance.  
NUS High students Zhao Ye and Zhai Weichao represent Singapore at the International Science and Engineering Fair, the largest pre-college scientific research event in the world. They are the only students in Singapore to win the First Award, one of the top prizes in the fair.