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A MARRIAGE OF COMMITMENT AND COMPETENCE

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Teach the way you want others to teach your own children, says Dr Daniel Tan. He shares practical insights into what makes a good Science teacher in today's changing educational landscape.

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BECOMING A THINKING TEACHER

Think of a lesson you want to teach your students. You've got to first decide on the best way to present it. To do that, you've got to know what kind of learners your students are. And to know this, you've got to be a good learner and thinker yourself.

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THE MAKINGS OF A GOOD TEACHER

What makes a good teacher in the 21st century? And how do we bring out these qualities in our teachers? Teacher educators at NIE unpack what it means to be prepared to be teaching professionals today.

"Education is a long-term endeavour. A child entering Primary 1 next year will start work around 2030. What must we do right in education now and in the next 20 years, so that our children will have a bright future and can fulfil their aspirations?"

This was the challenge posed by Education Minister Heng Swee Keat at last year's MOE Work Plan Seminar. The goal of education today is to enable our students to be ready for the long term.

For NIE Director Professor Lee Sing Kong, the key to achieving this lies in quality teachers: "Teachers are ultimately what make education succeed."

This has been echoed in many education research studies. In fact, good teaching has been shown to be the most important determinant of student outcomes (e.g., see McKinsey & Company, 2007, 2009, 2010).

**21st Century Teachers**

So, what makes a good teacher?

"Good teachers impart knowledge, but great teachers are able to ignite the love for learning," says Prof Lee. "The mastery of content, the ability to teach it well, being able to size up their pupils' needs - all these qualities are still needed in teachers today."

But the changes brought about by technological advancements have challenged many of our taken-for-granted notions of good teachers and good teaching.

"With the Internet, the role of the teacher has changed," notes Prof Lee. No longer seen as the sole purveyor of information, the teacher now needs to function as a facilitator to guide students to access, evaluate and use information.

There is also growing awareness that the teacher's role goes beyond imparting knowledge, to developing values and skills.

Minister Heng noted that if we are able to build strong values and the right competencies in our students, we can then foster an education system that is student-centric and values-driven.

Echoing the same sentiments, Prof Lee says: "Every teacher must equip his students well to survive and succeed in the new global landscape. And the new landscape demands that teachers develop the whole child - not only intellectually, but also socially, morally, physically and aesthetically."

Trained To Teach

How does someone become a good teacher? "There is no such thing as a born good teacher," says Prof Lee. "Even the most genetically blessed teacher must be trained to become a good teacher."

The training of future teachers is what Lee Shulman, Emeritus Professor of Education at Stanford University, would call being "prepared to be professionals".

It is something that has concerned him and his colleagues from the [Carnegie Foundation for the Advancement of Teaching](#) in recent years.

What do teachers need to know in order to teach well? How can teachers best be educated?

Speaking at an NIE seminar in September 2011, the originator of the concept of pedagogical content knowledge (or PCK) offered the following description of the work of teacher educators:

Good teachers impart knowledge, but great teachers are able to ignite the love for learning.
- Prof Lee Sing Kong, Director,
National Institute of Education

"An educator of teachers is someone who uses both *knowledge of pedagogy* and *knowledge of content*, along with a strong dose of *moral values*, to mess with the development of future teachers by educating them." [| Print |](#)

These are concerns that matter to teacher educators at NIE as well. Any teacher education programme needs to answer three key questions: *Why teach? What do we teach? How do we teach?*

From Good To Great

New teaching techniques, new learning environments, new educational research - all these require teacher educators and teaching practitioners to be relevant and responsive.

As the education landscape quickly shifts under our feet, we must also ask: *What else needs to change?*

For NIE, this means striving to constantly evolve our teacher education programmes to keep up with the changing learning environment because we believe the teaching profession plays a crucial role in building the future of our nation.

This ever-changing environment also turns the tables on teachers, making it necessary for them to be learners too.

"A good teacher is constantly looking for more effective ways to teach and learn," says Prof Lee. "It is something we emphasize in teacher training and hope it becomes an in-built thing for teachers we send out to schools."

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Lee Sing Kong is Director of NIE and has pioneered many initiatives that have greatly impacted teacher education in Singapore and internationally.

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Article highlights

Is the Math classroom very different today?
How can Math teachers impart values?
What is required of Math teachers in the 21st century?

"Love Math and love teaching Math". That is what makes a good Math teacher, according to Associate Professor Ang Keng Cheng, who heads NIE's Mathematics and Mathematics Education (MME) Academic Group.

Living Math

It goes without saying that we expect our Math teachers to have mastery of mathematical content knowledge. But content alone is not enough, says Dr Ang. A good teacher needs good "pedagogical sense".

"Teachers need to balance content mastery with the craft skills in pedagogy. Having the pedagogical skills to go with the content mastery will add a lot more value to a classroom teacher."

Adding value to students' lives remains fundamental, despite the many new challenges we've seen in the classroom. One of the challenges has come in the form of technology, which has also made students more savvy in many ways.

But Dr Ang reminds us that the role of the teacher hasn't changed: It is always to facilitate and motivate learning. While technology has made it easier for students to access information on their own, it has also reinforced the need for teachers.

"The fact that the technology can deliver the content doesn't mean that the learner can learn," he says. "Learning can be, at times, a complex and dynamic process."

"For different people, learning is different. The teacher is in a better position to assess these differences, compared to any form of technology. It is difficult to have a one-size-fits-all computer software to facilitate learning."

Valuing Math

For Dr Ang, who started out as a Math teacher in the 1980s, there is more to teaching Math. For him, what intrigued him to teach was the way Math could be applied to solve real-life problems.

In a classroom, we have to deliver well. But it is not enough to be successful as a professional. A teacher has to go beyond the classroom.

- Assoc Prof Ang Keng Cheng,
*Mathematics and Mathematics Education
Academic Group*



"It has always been my personal wish to see teachers not only talk about formulae, algorithms and methods, but to also explain mathematical concepts, and how they can be used in real life."

Making Math come alive has become all the more relevant to 21st century teaching. These days, a teacher has to do more than just teach content knowledge - we need to impart values and skills.

And there are a lot of values in the teaching of Math, says Dr Ang. He calls this a "hidden

curriculum" in the training of Math teachers.

"We have been doing these things, for example, building character and developing perseverance. We put our trainees in a situation where they have to solve problems, and it takes time. This builds perseverance. This is part of the value system a person has to have in order to be successful in doing Math."

Success Factors

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For all pre-service teachers, MME's aim is to make sure our Math teachers are "functional" and able to "hit the ground running" from the day they step into a classroom.

But unlike their subject, there is no standard formula that determines success for Math teachers. Dr Ang goes back to the basics: "A good Math teacher should have passion for both the subject and for teaching children."

Dr Ang stresses the importance of continual learning and hard work in all this. "If one were to just sit down, do routine work and the bare minimum, there is little hope that one will do well."

"If you think you are lacking in some areas, you will make the effort to make up for it if you are really passionate about it," he adds. "When you are passionate about teaching, you would want to do well and other things will naturally fall into place."

Looking on the bright side, Dr Ang says, "It is exciting in a sense, that the teachers' job is no longer routine. That may be the perception in the past, but not anymore."

Ang Keng Cheng is Associate Professor and Head of NIE's Mathematics and Mathematics Education Academic Group. Besides being passionate about teaching and learning Math, his interest extends to mathematical modelling in biological and medical settings.

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Article highlights

How does the changing profile of students affect MTL teaching?

What is the place of bilingualism in the MTL classroom?

What qualities should an MTL teacher possess?

"If you ask me, between being a teacher and an Academic Group Head, which do I prefer? Of course, teaching!"

Without a doubt, Professor Goh Yeng Seng enjoys teaching. His eyes light up when he recounts his teaching days in schools and at NIE. He taught Chinese Language and Literature in secondary schools and at the junior college level from 1986 to 1992.

These days, however, he's busy leading the Asian Languages and Cultures Academic Group in NIE, a role he assumed in 2006. The AG comprises three divisions - Chinese, Malay and Tamil Languages - and oversees the training of Mother Tongue Language (MTL) teachers.

Adopting A Bilingual Approach

A prominent scholar in bilingualism, Prof Goh's research interest stems from his own experience as a Chinese teacher. He remembers vividly, as a trainee teacher, facing a class where the majority of students came from English-speaking homes.



"I faced a big challenge: How to teach them? When I speak Chinese, they can't understand me. But at that time, we can only use the monolingual-direct approach, namely, Chinese only." Speaking English in a Chinese classroom was prohibited.

The situation has become more critical now because of the rapidly changing language backgrounds of students in Singapore. MOE surveys show that in 2010, 61% of Primary 1 Chinese pupils speak English at home, while only 39% speak Mandarin.

This poses a big problem for Chinese Language teachers because many of their pupils have no foundation in spoken Mandarin. "Even if they do know basic Chinese, it's not enough to cope with the school curriculum," he says.

The challenge is even more acute for Tamil Language teachers, because an even higher proportion of Tamil families no longer use the language at home.

In 2001, Prof Goh had an opportunity to make a unique contribution when he began researching an approach where both teachers and pupils are allowed to use Chinese and English in selective contexts in the CL2 (Chinese as a 2nd language) classroom, particularly at the early stage of learning.

This bilingual approach has received positive feedback from pupils, teachers and parents. "My research in CL2 can be applied to Malay and Tamil. These three mother tongues face the same problems."

Training Bilingual Teachers

Prof Goh's bilingual approach to MTL teaching was inspired by an observation he made while studying in Taiwan - all the Taiwanese linguistics professors who did their PhD study in US universities were bilingual. This gave him new impetus to master his second language.

He has the same vision for our MTL teachers. He wants them to not only be proficient in their MT language, but also become effectively bilingual. "If you want to teach L2, you must be bilingual."

He makes a distinction between acquiring a first language (L1) and learning a second language (L2). "L1 and L2 teaching are totally different," he explains. "The teacher must be bilingual and know how to make full use of English as a resource," rather than to see it as "taboo" in the MTL classroom.

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"Teacher training also becomes different. Our new challenge is that training bilingual teachers is truly new territory," he adds. "We train teachers with bilingual tools- -even if you're bilingual, it doesn't mean you know how to use bilingual resources to teach."

More Than Mastering Basics

To be a good MTL teacher, a strong foundation in the MT language is a given, says Prof Goh. He lists the must-knows for language teachers: general linguistics, phonology, orthography, vocabulary, syntax, and development of L2 skills in listening, speaking, reading and writing.

To this list, he adds a new skill: translation. "Learning MTL as a second language can help in translation. Students are asked questions in Chinese and they reply in English."

"This bilingual approach to MTL teaching - including learning the skill of translation - helps to equip our students with the language ability to navigate the increasingly globalized world, between the East and the West."

Our new challenge is that training bilingual teachers is truly new territory.

- Prof Goh Yeng Seng, Asian Languages and Cultures Academic Group

With the emphasis on 21st century skills, teachers also need to think critically in order to mould today's students into critical and independent thinkers. "When I teach students in my class, I wouldn't give them standard answers. I'll ask them many, many questions again and again."

"My students always say: Why do you have so many 'whys'? After I've finished answering your why, you go and ask me why again!" he recalls with a laugh. "Well, I tell them: It's because you didn't think about the topic deeply enough."

Pride In The Profession

Enjoyment evidently plays a very big part in his teaching. "My students always say: You look like you enjoy the class more than us. But of course, if I don't enjoy my class, how can I inspire them? How can they enjoy my lesson?"

"Through these interactions with them, I can learn a lot too. I want to make the lessons challenging for them, rather than use a prescriptive form of teaching. And you will enjoy it too, as a teacher."

When asked what advice he would give to new and aspiring language teachers, Prof Goh has this to offer: "I always say you must be proud of your profession. Enjoy it! Enjoy your lessons! Enjoy your profession! Be proud of that!"

Goh Yeng Seng is Professor and Head of the Asian Languages and Cultures Academic Group. In 2001, he was appointed by MOE to pioneer a pilot project, *Bilingual Approach to Teaching Chinese*, empowering teachers to use English to facilitate the teaching of Chinese in primary schools.

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Article highlights

What matters most in Science teaching?

What are the competencies of a good Science teacher?

How can a Science teacher develop these competencies?

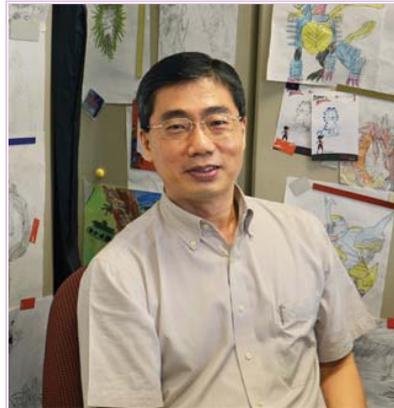
"Teaching is like marriage," says Associate Professor Daniel Tan. "You have to be committed to it."

He had never thought of becoming a teacher, until a scholarship interview changed the course of his life. "They asked if I would like to teach and I said I'll try."

This leap of faith launched Daniel's teaching career. A Science teacher for 7.5 years before joining NIE's faculty 13 years ago, he now holds the position of Deputy Head for Teaching and Curriculum Matters in NIE's Natural Sciences and Science Education Academic Group.

Competent To Teach

"You need ability and opportunity for expression of ability, to fine-tune your ability and learn from experience. What to do and what not to do, even what to say - these come with experience."



With an emphasis on 21st century competencies today, the ability to think critically has come to the fore. "Science teachers need to be able to think critically themselves, to question what they have learned. If they themselves can't think, then they can't expect the students to do likewise."

In today's Science classroom, for example, ICT is used to present concepts through simulations and animation and to enable collaboration among students. But Daniel reminds us that technology is merely a tool to facilitate learning.

Daniel believes "the basics remain the same - getting students to think about what they are learning. And there are many ways to do this. The trend now is more group and collaborative learning."

Much can also be learned from more experienced teachers. "Teachers can reflect on how a good teacher influenced him or her in the past. Look for mentors in school, as they will help you gain experience much faster."

Caring To Teach

Beyond competence, Daniel believes the one quality that sets a good teacher apart is care for students.

"Treat your students as persons of worth and don't give up on them. And students know you care for them; even when you have to punish them, they will know it's for their own good."

The way a teacher interacts with the students matters because teachers are role models of values and behaviours. "Whatever you want to inculcate, the teacher must show it and embody it. Teach your students the way you want other teachers to teach your own children!"

These are the most valuable lessons they will take away from the classroom. This commitment to care is also what facilitates learning and creates a joy for learning.

"A good teacher must be able to touch the hearts and minds of the students, to inspire a love for learning of Science. If the students know that the teachers care for them, they will be more motivated to learn."

Committed To Teach

"A teacher must want to teach," he says. "The challenge is to wake up every day and want to go

A good teacher must be able to touch the hearts and minds of the

to school, to teach, to share knowledge and skills."

Passion for the subject also matters. "Pass the passion to students," urges Daniel. "If they are interested, they will be motivated to learn."

This enthusiasm is sometimes hard to maintain - and there will be hard times - but Daniel's encouragement is to press on. "If you have already made a decision to teach, make the best out of it," he says.

"Believe in yourself. Hard times will soon be over. Like a marriage, it comes down to passion and commitment. Even after the initial passion wears off, the commitment keeps you going. It will pull you through the ups and especially the downs."

His experience has proved that there are more ups than downs, though the rewards may only be realized much later. "At that time, you may seem harsh. Only later will your students understand and they will appreciate what you had done."

"It boils down to commitment to continue with the journey," Daniel reiterates. The experience earned and lessons learned through this journey are what eventually make a good teacher great!

Daniel Tan is Associate Professor and Deputy Head of Teaching and Curriculum Matters in NIE's Natural Sciences and Science Education Academic Group. He has conducted research in students' understanding and alternative conceptions of science concepts, science curriculum, practical work, and the use of ICT in science learning.

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students, to inspire a love for learning of Science.

- **Assoc Prof Daniel Tan**, *Natural Sciences and Science Education Academic Group*

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BECOMING A THINKING TEACHER

Think of a lesson you want to teach your students. You've got to first decide on the best way to present it. To do that, you've got to know what kind of learners your students are. And to know this, you've got to be a good learner and thinker yourself.

Article highlights

How can teachers best cope with change?

What does it mean to be a Thinking Teacher?

How will being a model learner motivate students?

Change, they say, is the only constant. With over 30 years in education, Professor Tan Oon Seng has witnessed many changes in the field.

But these changes should not be cause for worry. The idea of globalization, the impact of technology, the need to be lifelong knowledge workers, even all that talk about 21st century competencies - these are not new.

"It's just that the Internet has made you highly cognizant of the changes around you," says Prof Tan, who is Dean of NIE's Office of Teacher Education. "It's not so much that there are too many things happening, but that the teacher needs to have a clear inspiration or goal of what he or she is doing."

The Thinking Teacher

Many things about the role of a good teacher have not changed. For example, acquiring the necessary skills to teach will always be important. But to Prof Tan, what we really need today are *Thinking Teachers*.



"If you're too skill-based, you become a technician, not a teacher," he says. "At NIE, we want to emphasize the Thinking Teacher." This is his answer to coping with change.

The Thinking Teacher knows that his ultimate goal is to help students learn, and keeps that in mind amidst the numerous shifts in the education landscape. A Thinking Teacher also understands what should be retained, and what needs to change with the times.

One significant change of our times is the change in the nature of knowledge, especially with increased access to content. Because the nature of knowledge has changed, the way of learning and teaching needs to follow suit.

"In education, you need a certain insight and wisdom to balance what are the key fundamentals as invariants, and what you need to constantly modify and change to optimize learning," he explains. "But for all that to happen, the teacher needs to understand the learner."

Understanding The Learner

Understanding the learner is an important starting point for any teacher. "The teacher must always have a strong awareness of who the learner is," Prof Tan emphasizes.

"When you teach a class, the first thing we ask is: Where are the students? We go to the level where the students are and bring them up, because one of the most important things for a student to experience is the sense of success, and success always breeds success."

Prof Tan is an advocate of using multiple pedagogies. "It is to the benefit of teachers and students that a teacher explores a variety of pedagogies, not necessarily one that fits your preferred teaching style or that fits a child's learning style."

With more pedagogical know-how at their disposal, teachers will also feel more equipped to innovate and switch their pedagogy to suit their students' learning needs, rather than enforcing one style of thinking.

Being A Model Learner

Adding to the list of what it means to be a good teacher, Prof Tan says: "A teacher should be one who is an exemplary role model of learning."

Prof Tan speaks from experience. When he was a secondary school Math teacher, the challenge he set for himself was to make lessons relevant and real to the students.

"I didn't believe in just a lot of drill and practice-type learning," he explains. "There's a place for that sort of teaching, but that was just not my way of teaching." Instead, he often went beyond the textbooks, and even asked his students to give him real-life problems to solve on the spot.

"I usually go to a class and form a task based on data from the students. That caused me to find out and read up on things pertaining to the subject so that I could introduce it into my teaching."

"I believe that a teacher must fully know the content well and have that dexterity of thought to solve the problem well. If the teacher does not have that content mastery of the subject, you cannot inspire the students."

Thinking And Learning Teachers

A teacher who constantly thinks and learns - this isn't an easy job, which is why Prof Tan says that teaching has to be a calling.

"There's no way for you to do teaching just as a job," he says. "If teachers invest in thinking in this way, then you find that every teaching experience is exciting."

Teachers may find this daunting, or they may say that they can't change the system. Prof Tan begs to differ. "It's about how generative you are," he says. "If you can't do different things, you can still do things differently."

To Prof Tan, being a creative and generative teacher who is always thinking will ensure that our students will always learn. This is the essence of good teaching.

"If you want to teach well, you have to learn well. And when you have that passion to help people learn, you yourself will really learn. Teachers can learn, students can learn."

Tan Oon Seng is Professor and Dean of NIE's Office of Teacher Education. He has authored many books and even textbooks that were used for Math and Physics in Singapore schools.

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If you want to teach well, you have to learn well. And when you have that passion to help people learn, you yourself will really learn.

- Prof Tan believes in the teacher as a learner

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