



## LanguageED

## Look Who's Talking in Your Classroom

*Teachers are concerned about making sure everything is crystal clear for students. But sometimes student misunderstandings can be just as important as student understandings. Exploring misunderstandings can be a crucial part of classroom discussion and learning.*

"Teachers often guess what students will understand, and they try to pre-empt misunderstandings by making sure that everything's very clear," says Dr Rita Silver.

While this may seem like a good lesson from the teacher's point of view, it may not be the best learning experience for our students. "They actually miss learning opportunities because the teacher tries to make everything very clear."

Challenging the traditional pedagogy for reading comprehension, Rita's project team explores how letting students talk more in class can improve language learning.

**Challenges to Comprehension**

"What we see so far is our teachers rely on explaining a lot, without necessarily knowing what the students did or did not understand," notes Rita.

The problem with this, she says, is that students don't have the opportunity to engage in *negotiation for meaning* (NfM).

"Within any conversation, there is always the potential for misunderstanding or lack of understanding. Often the meanings evolve as the conversation moves along, through people asking questions or making statements and rephrasing what has been said."

This is true in the classroom as well, says Rita. Based on prior research in second language acquisition, she believes that NfM can help in language learning, especially in the reading comprehension classroom.

It's more powerful if teachers prompt students to explain what they mean each time they ask a question or make a comment. Rita explains, "It helps learners comprehend better, and because it pushes learners to try to explain their ideas more, they have to stretch their language resources."

## Article highlights

- Why should we get students to talk more in class?
- What strategies can teachers use to promote negotiation for meaning?
- How can this improve reading comprehension?



**(Our students) actually miss learning opportunities because the teacher tries to make everything very clear.**

- Rita Silver,

English Language and Literature  
Academic Group

**Redesigning Pedagogy**

- >> How can student misunderstandings be turned into learning?
- >> How do we make learning Math more positive for low attainers?
- >> What does an animated fish have to do with Science teaching?
- >> Can Design Thinking help to foster 21st century competencies?
- >> Why is teaching not just about the science of pedagogy?

All these and more at <http://singteach.nie.edu.sg>

There has to be a moment in the lesson where the teacher allows the student to show they didn't understand it.

- Rita on the importance of student misunderstandings

### Negotiating for Meaning

Negotiation helps address learners who may be at different levels in language development. "The learning isn't dependent on the teacher explaining everything in the same way to everyone," explains Rita. This approach is especially helpful in the Singapore context, where we've got students whose home language may not be English.

Such conversations also give teachers a chance to find out what students are thinking, whether or not they truly comprehend the lesson.

"You get small bits of assessment throughout the lesson, instead of waiting till the end of the term for the formal assessment, or even waiting to the end of the lesson for the worksheet. By then it's too late, the class is done."

This process can further help students learn how to think more academically. "One of the things you have to learn, especially as you move into upper primary, is how to explain your ideas. And if teachers do all the explanations, students don't learn how to do that."

### Prompting Learning

A good lesson plan is one that builds in possible prompts and open-ended questions. This requires teachers to anticipate how students might reply.

Rita suggests four useful prompts:

- "What do you mean by that?"
- "Can you tell me more about that?"

- "Why do you think so?"
- "Can you give me an example?"

She cautions, however, against pre-empting students' comments.

"You want to let them express those misunderstandings," says Rita. "You don't know what your

students are thinking unless you give them a chance to tell you."

Another pointer she offers is to wait. "Teachers often think we wait very long but, in fact, we really don't. Just take a step back and try to look relaxed. Wait three times longer than you're comfortable with."

### Managing Classroom Conversations

Rita points out that it is important to let the students' thinking—and especially their misunderstandings—play a bigger role in classroom discussions.

"Teachers have to step back and sometimes let the students fail a little bit. There has to be a moment in the lesson where the teacher allows the student to show they didn't understand it. And teachers have to make it safe for them to show they didn't understand it."

The teacher can then pick up on these misunderstandings and help students work through them. Asking questions also helps them learn to think more academically and independently.

"Right now they are quite dependent on the teacher. The teacher is always telling them what information to look for and how to answer the question. But we need to push the students to become independent readers, and that goes along with becoming independent learners."

The most important thing is how teachers manage the classroom conversation. "Keep the discussion centred on the objectives but open enough for the students to have the opportunity to speak."

### Transforming Language Pedagogy

The NfM classroom may look the same from the outside, but listen closely and you'll notice a difference in the kinds of questions being asked, and who's asking them.

Rita admits that this can be quite scary for the novice. "It takes a lot of preparation and a certain amount of practice. But you don't give up control of the class, just some control of the discussion."

We still have some way to go before we see a change in classroom culture.

"Right now, the teachers ask the questions, and the students try and answer what the teacher wants to hear. But if you keep working on this, what you hope is that the students will start to ask more questions, and the students will start to give more explanations," notes Rita.

"Over time, what you hope is who's asking the questions will change."

### Further Reading

For more on questioning techniques, Rita suggests: *Improving Comprehension with Questioning the Author: A Fresh and Expanded View of a Powerful Approach* by Isabel L. Beck and Margaret G. McKeown (Scholastic, 2006).

**Rita Silver** is Associate Professor with NIE's English Language and Literature Academic Group. She is the Principle Investigator of the project *The Impact of Negotiation for Meaning on Reading Comprehension among Singapore Primary Students*.

## Helping Low Attainers to Keep Up

*Singapore pupils ace Math in international studies so often that it's easy to forget there are some who struggle with the subject. How we can make their experiences in learning Math more positive for them?*

In every school, there is a small group of pupils who frequently fail their Math assessments. They may be slow learners, less able or under-performing. Whatever the case, if not attended to, these "low attainers" will continue to fall further and further behind their peers.

Professor Berinderjeet Kaur and her research team set out to study the characteristics of these pupils and their experiences in learning Math. They also wanted to know how schools identify such low attainers and address their learning needs.

### Problems with Math Learning

The team asked the Primary 4 pupils in their study to journal how they feel about learning Math. These were some of the common responses:

- "I hate Maths. I found that it was very difficult because Maths needs a lot of thinking."*
- "I love Mathematics when I understand, like when I first started whole numbers."*
- "I feel sad about mathematics because I don't know how to use a protractor."*
- "When I am learning mathematics, I feel confused...because Maths is hard for me to learn. Problem sums is the hardest."*

They found that most of these pupils actually enjoy the subject initially. Math is easy and fun when they can understand the topic. But as it gets more advanced, they cannot keep up. Boredom, stress and even sadness are mentioned in their journal entries as they begin to find the subject more difficult.

The teachers also noted that most of them are easily distracted during Math lessons. Only a third are always on-task and able to complete class work on time, and the rest are unable to cope due to their difficulties in understanding the lesson.

### Motivation to Learn

The team found that pupils' belief in their own ability is a good predictor of how well they'll do in Math. (See related article in Issue 29: *Strong Links Between Self-Confidence and Math Performance.*)

This group of low attainers is often not confident of doing well. When asked if they think they are good at Math, more than half said no, while most of the rest said it depends:

- "50–50, my family tells me I am good in maths, but I always make careless mistakes."*
- "Sometimes. Maths is very hard and I make careless mistakes."*
- "Sometimes. Doing word problem I am no good."*

They are, however, eager to do well in the subject. When asked if they can do better in Math, pupils were optimistic despite their past failures. Most of them felt they could improve if they put in more time and hard work:

- "Yes, focus during math lessons and not talk to friends."*
- "Yes. Studying hard and not play games. Do more problem sums."*
- "Yes, by asking my parents to buy assessment books and revise everyday at home."*

The Math teachers, the team observed, were very positive towards the pupils. They were generous with their praise and did not reprimand the pupils even if the answer was wrong.

The teachers were similarly positive when asked whether these pupils were motivated to learn: a majority of them thought the pupils were trying their best to learn and were capable of improving.

Despite this, only 15% of the pupils always sought help from the teacher when they were in doubt; more than 40% seldom or never did. It's also hard for teachers to tell which students are having difficulties as they often elicit choral responses from the whole class during the lesson.

### Article highlights

- Why do some pupils struggle with Math?
- How do low attainers feel about learning Math?
- How can we motivate them to learn better?



(From left) Berinderjeet Kaur, Foong Pui Yee and Koay Phong Lee

**Pupils' belief in their own ability is a good predictor of how well they'll do in Math.**

## Meeting Pupils' Learning Needs

Pupils may not be paying attention in class because of a mismatch between how teachers teach and how learners learn.

When asked how they would like to learn Math, many of the pupils said they'd prefer to do activities in groups, rather than individual work. Such collaborative learning allows them to consult their peers when they feel unsure.

However, teachers tended to use direct instruction most of the time. It was observed that teachers didn't spend enough time consolidating the learning. This is important to ensure that pupils have understood the lesson before moving on to a new task.

The findings also suggest a need to rethink the way Math assessments are designed. The team found that teachers tend to set repetitive and procedural questions, which heightens the pupils' sense of failure.

"If the pupils cannot do one question, there are 10 other questions they cannot do as it's the same type of question over and over again," notes Research Assistant Masura Bte Mohamed Ghani. "They would be making the same mistake 10 times."

It only requires a little bit of extra effort to make learning Math more manageable for our low-attaining pupils. If we can be mindful of how they learn and take their needs into consideration, success in Math will soon be within their reach.

This article draws on findings from a research project led by Professor Berinderjeet Kaur entitled *An Exploratory Study of Low Attainers in Primary Mathematics*.

## ScienceED

### Article highlights

- What does an animated fish have to do with Science learning?
- What are the characteristics of a good Science lesson?
- How can we better impart the traits of Science inquiry?



**N.E.M.O. encapsulates the gist of what a good lesson is.**

- Tan Kok Siang,  
*Natural Sciences and Science  
Education Academic Group*

## Finding N.E.M.O. in the Science Classroom

*Inquiry is the cornerstone of the Science curriculum, but teachers may have problems trying to implement it. Here's a handy way to plan Science inquiry-based lessons and impart the spirit of inquiry at the same time.*

"Inquiry is a big area—there are several models and interpretations," says NIE Lecturer Dr Tan Kok Siang. Many teachers find it difficult to implement. "They think it's quite broad and they're not too sure whether they are doing the right thing or not."

Kok Siang came up with a pedagogical framework to help teachers plan Science inquiry lessons effectively. It all began when he was asked to do an in-service course for teachers. This prompted him to reflect on his own teaching experiences.

"I thought of the four very important steps I did when I was a school teacher. After going through these four steps, I found the letters *N, E, M, O*, and the movie *Finding Nemo* came to mind!"

Finding N.E.M.O. wasn't what Kok Siang set out to do. "N.E.M.O. encapsulates the gist of what a good lesson is," he says. "I've been doing this all my professional life as a teacher, but never thought of it in terms of N.E.M.O."

With such a catchy acronym, teachers will also remember better what they must do before, during and after class.

### What is N.E.M.O.?

N.E.M.O. represents a four-step procedure to plan a good inquiry-based Science lesson.

1. **Needs.** Before the lesson begins, you must know the learning needs of your students as well as the needs of the syllabus. "All the needs must be clearly thought through first," says Kok Siang.
2. **Expectations.** Teacher expectations strongly influence student performance, so let your students know the learning goals you've set. "Needs and expectations are very important in a good lesson plan. Without these two things, you're shooting in the dark."
3. **Manage.** For maximum learning, you need to manage the students, the learning activities and the time spent on each. "Don't spend all the time managing

behaviours, neither all the time teaching. You have to manage the lesson so that there's optimum learning and optimum use of resources."

4. **Outcomes.** It is important to reflect on the learning outcomes but be open to how they align with your expectations. "If you want to have a very impactful lesson, you need to have a feedback loop. You need to know what you've done and evaluate whether it's right or wrong, good or bad, strong or weak, and then you make improvements."

**Note:** Permission for the use of "NEMO" was given by Fun Characters Pte Ltd, the Licensee for Disney/Pixar.

The significance of Kok Siang's framework isn't so much in what teachers should do, but the need to be aware of how the lesson is conducted.

## Teaching the Spirit of Inquiry

While Kok Siang's framework has no direct relation to the Disney/Pixar animated movie, he realized the story of a young clownfish's adventure exemplifies the spirit of inquiry in many ways.

In the movie, the characters learn new things about the ocean, humankind and themselves. While their *curiosity* gets them

into trouble, they have to *solve problems* and *persevere* to find their way back home.

These are good traits of inquiry that students can replicate in their own learning, suggests Kok Siang.

"It is useful to highlight things like *responsible curiosity*—that you may be curious about the surrounding

environment but you must be responsible and not be rash or you will get yourself into trouble."

"The story has a lot of creative problem solving," he adds. "There were failures, heartfelt despair, and confusion, but eventually, they could solve the problem. I think it's a powerful message for our students."

## Valuable Life Lessons

Apart from Science lessons on inquiry, Kok Siang has also gleaned many other life lessons from the movie *Finding Nemo*. He has even found use for his N.E.M.O. framework in his daily life.

"It's a very useful four steps not just in classroom lessons, but it's also good for reflection in real life, whether it's projects or personal relationships. It's easy to remember and effective to implement," he says.

Perhaps you'll find N.E.M.O. useful for your teaching and learning, too! "It has gotten into my life quite naturally. It's a wonderful feeling."

**Tan Kok Siang** is a Lecturer with NIE's Natural Sciences and Science Education Academic Group. He was a chemist before he became a secondary school Science teacher.

# TeacherED

## Design Thinking for the 21st Century

**Design Thinking has been making waves in the business world and is now making inroads into education. We explore the promise of this new approach and its potential for fostering 21st century competencies in our students.**

In the 1990s, big companies like Apple and P&G found themselves facing competition from smaller players. To stay ahead, they looked to design consultancies for help to improve their products and services.

*Design Thinking* as an approach has since spread through the business and government sectors. Educators have also begun to explore ways to infuse Design Thinking into students' learning.

### What Is Design Thinking?

Design Thinking is a "deeply human" process (IDEO, 2011a), even evident in the earliest inventions by mankind. At its most basic, Design Thinking is a problem-solving process. It's thinking like a designer to create an innovative solution that addresses people's needs.

"We should always place the people we're trying to help at the centre and think not just about solving the technical problems, but also how people will feel when they use the solution," says NIE Teaching Fellow Wong Yew Leong, an advocate of Design Thinking in education.

### Article highlights

- What is Design Thinking?
- Is Design Thinking relevant to education?
- How can Design Thinking foster 21st century competencies?

Creativity, technology and empathy all come into play as “designers” brainstorm ideas, even the most outrageous ones. The best solutions are generated through repeated trial and error, and the testing of prototypes.

### Design Thinking in Education

Design Thinking is the confidence that everyone can be part of creating a more desirable future, and a process to take action when faced with a difficult challenge. That kind of optimism is well needed in education. (IDEO, 2011b)

Yew Leong believes Design Thinking holds the key to effective learning experiences that can equip our students with 21st century competencies.

He contends that what distinguishes the 21st century from the 20th century is that we have evolved from a knowledge economy into a *design economy*. “Possessing knowledge and the ability to use it in effective, efficient and predictable ways to produce reliable outcomes and incremental improvements is by itself no longer sufficient for success in the 21st century.”

For our students to thrive in this new economy, they need to be able to create innovative breakthroughs by integrating ideas from diverse fields to meet complex human needs. And since real-world problems pay no heed to disciplinary boundaries, neither should the solutions.

Yew Leong gives the example of AIDS: It is not just a medical problem for which we have to research for a cure. There are also social issues such as how to prevent AIDS from spreading in the first place.

“Design Thinking should be human-centred,” says Yew Leong. “It is to consider the entire human experience. Unless you empathize with the people whose problem you are trying to solve, you’ll be solving the problem from your own perspective rather than theirs, and they may not buy your solution even if it works.”

“Design is not airy-fairy—it’s very realistic and grounded. We always look at what our constraints are and function within that,” he adds.

### Design Thinking as a Pedagogical Strategy

Yew Leong describes Design Thinking as “the new frontier” in education. He sees potential in Design Thinking especially for cultivating 21st century competencies in students—skills like civic literacy, global awareness and cross-cultural skills, critical and inventive thinking, and information and communication skills (MOE, 2010).

“Because Design Thinking projects are so rich, they allow you to hit many educational objectives at the same time.”



At its most basic, Design Thinking is a problem-solving process. It’s thinking like a designer to create an innovative solution that addresses people’s needs.

- Wong Yew Leong,  
Policy and Leadership Studies  
Academic Group

## The Design Thinking Process

The Nueva School, a school for the gifted in San Francisco, came up with the following Design Thinking process for their students (The Nueva School, 2008).

**Research:** Students collect information about the problem by locating the experts and users, asking the right questions and keen observation.

**Focus:** After collecting the information, students will immerse themselves in the experiences of the users.

Besides exercising empathy, they also define the challenge to ensure it won’t be too complex to tackle.

**Generate Ideas:** Brainstorming of ideas is encouraged within a set of rules.

**Make Informed Decisions:** Students are exposed to different methods of analysis for decision making.

**Prototyping Cycle:** Prototypes are built and tested and

feedback is collected from users. Students then decide if they should proceed, or if they need more information and ideas.

**Collaborate:** Students hone their social-emotional skills in team dynamics, leadership, and project and time management through working in teams.

A more detailed chart of the process is available at <http://nuevaschool.org/programs/i-lab>

However, he cautions that it doesn't work for all subjects and all topics all the time. This is because to design, students must have in-depth understanding of fundamental principles. It shouldn't be used to teach basic knowledge, but is particularly suited for Project Work and Community Involvement Programmes.

Yew Leong's advice to teachers attempting this approach is to give students room to fail. "In Singapore, we don't like to fail, but if you want to create a solution that really works, you have to fail early—that's where you get new insights to improve."

"You mustn't be so concerned about protecting students from failure. A lot of teachers are protective but we must learn to step back and let students fail, and then they can learn," he explains.

Students must also be encouraged to explore their ideas fully, and not be overly critical of themselves. They should be able to go backwards to better understand the problem and try again when their ideas and prototypes fail.

"What Design Thinking suggests is that it doesn't matter whether your idea sounds stupid or clever or wild or crazy—put it out there and we'll look at it, because it might trigger off something, somewhere."

### Setting Our Minds on Change

Implementing Design Thinking may be challenging, and it is going to take time. Despite this, Yew Leong believes it is worth a try.

"If we recognize that 21st century competencies are something we must teach for and the matter is urgent, if we have found a teaching strategy that works, then surely we must do it. No matter how difficult it is, we must give it a shot."

## HotTOPIC

### By All Means, Teach

*"What I am going to tell you is my life story," began Professor Lee Wing On, Dean of NIE's Office of Education Research. What followed was a rich lesson in transforming teaching, inspiring learning and touching lives.*

"I was not a bright student at all, but one teacher changed my life," says Prof Lee, who grew up in Hong Kong. "I was very active in things other than my studies."

In a bid to help her distracted student, Prof Lee's teacher invited him into her home. She provided room and board for a month so that he could focus on preparing for the A-level examinations.

"I became part of her family—she cooked for me and I had meals with her family, I knew more about her, and of course she knew more about me. That was an unforgettable experience in my life."

His teacher's efforts certainly bore fruit—this "average student" was the only one in his school to get into the University of Hong Kong that year. That experience changed the course of his life.

"I think she saved me," he says, "and because of that I decided to become a teacher."

### Inspiring Learning

His journey as a teacher wasn't easy. "I went through all the turbulence of a beginning teacher. I started off as a very strict teacher, and shifted to become a very lenient teacher. I went through very dramatic changes, but I grew and learned."

Many lessons were gleaned especially from teaching under-achieving students. They were a challenge, with their short attention spans and weak language abilities. He quickly developed a "quality approach" to teaching them.

"Before I went into the classroom, I always asked—what is the main message for this class? If I leave the classroom and they forget everything, what is the main thing I want them to remember?"

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**Wong Yew Leong** is a Teaching Fellow with NIE's Policy and Leadership Studies Academic Group. He taught Knowledge and Inquiry, General Paper and Economics at a local junior college before joining NIE.

**I started off as a very strict teacher, and shifted to become a very lenient teacher. I went through very dramatic changes, but I grew and learned.**

**- Prof Lee Wing On,  
Dean, Education Research**



Teaching is more than just the impartation of knowledge; it is life touching life.

- Prof Lee on the key to being a good teacher

He would spend the first quarter of the class time revising the previous lesson, then teach the next lesson, before spending the last quarter revising what he had just taught. His aim was for students to remember without having to do further revision.

“My students and their behaviour became better and better. They became more and more attentive because they knew what I was talking about, and they remembered what I taught them.”

To make things more interesting, he sometimes ran the class like a quiz. Dividing the class into two groups, students would take turns to ask the other group questions. His students were not only excited and engaged.

“I discovered something very interesting emerging—I found that the students began to ask very difficult questions because they wanted to win. They asked questions that were more difficult than what a teacher would normally ask.”

“I began to discover that they are not slow learners—they are smart learners, but they just did not learn, therefore they didn’t perform well.”

### Transforming Teaching

A self-professed “naughty teacher”, Prof Lee sometimes resorted to unorthodox methods to reduce his heavy workload.

Faced with the prospect of marking many poorly written compositions, he got the class to do group compositions. In groups of four, students took turns to suggest the next sentence. The rule was that everyone in the group had to agree to it.

The marking load was immediately reduced because there were fewer essays and shorter pieces. And to his surprise, most sentences were written correctly.

“Actually, the students know the correct answers. But if I ask them to write me something, they just try to complete their exercise without thinking. If they think, they can do it.”

Knowing that these “under-achieving” students could ask good questions if they put their minds to it, he got them to set their own test questions.

He asked students to create multiple-choice questions based on assigned pages from the textbook. They were told that the best questions would be included in their test paper.

“I found that their questions were no less capable than those from the commercial exercise books!” Over time, some of these “slow learners” gradually caught up with the average students.

### Touching Lives

In his 30 years as an educator, Prof Lee has come to an important realization: “Teaching is more than just the impartation of knowledge; it is life touching life.” He calls this “the human touch”.

The key to being a good teacher, he says, is to be a genuine one. Prof Lee was the kind of teacher who would give up 10 minutes of teaching time to let his tired students rest on a sleepy afternoon. He was the kind of teacher who would seek out unhappy students and ask what was wrong.

“We work excessively on the science of pedagogy, on the accountability of the school and teachers, and the measurability of their performance in tangible ways. That consumes a lot of our energy and efforts,” notes Prof Lee.

“Even if we do all those well, we are only doing half of the job. The other half of the job is intangible, but may be even more important,” he says. “If teachers really want to do a good job, they also need to be a good human being, rather than a good teacher.”

**Prof Lee Wing On** is Dean of NIE’s Office of Education Research. He is a world-renowned scholar in the fields of comparative education, citizenship education, and moral and values education.