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Thinking: Time for a Rethink?

The theme for this year's Redesigning Pedagogy Conference was *Thinking: Time for a Rethink?* Co-convenor Dr Kerry Lee tells us why we need to take a closer look at thinking, especially in education.

Dr Kerry Lee has noticed something curious about the field of psychology: Thinking doesn't come up as often as we might expect it to in the research literature.

"It's strange that you don't hear much about thinking or read very much about it," he comments. After all, psychology is "what's happening between your two ears and how thinking affects your behaviour".

In contrast, thinking is a big thing in the education literature, with a number of journals devoted to thinking.

It comes as no surprise that educators are so concerned about it. In order to learn, we need to think. And it seems that more than ever, our students need to be strong thinkers.



Strong Thinking Skills and Dispositions

The theme for the Redesigning Pedagogy Conference 2013 was *Thinking: Time for a Rethink?* At the opening ceremony, Senior Minister of State for the Ministries of Law and Education Indranee Rajah described a new world order that our students will face when they graduate.

It is one characterized by immense technological advancements, which results in a high degree of change in the way we live, work and interact.

"This change will not be comfortable," she observed. "The world that our students will inherit will become increasingly complex, and so will the problems they will encounter."

What we as educators can do to help students now is to cultivate in them a strong set of critical and inventive thinking skills and dispositions.

"Every Student, a Thinking Student"

Senior Minister Ms Indranee Rajah summed up MOE's vision for critical and inventive thinking as "every student, a thinking student". To fulfil this vision, we need to rethink our beliefs, classroom practices and learning environments. She described the three principles underlying that vision:

- All students can develop good thinking.
- Good thinking should be deliberately developed within the context of subject disciplines and the total curriculum.
- Schools and classroom culture must consistently support and develop students' thinking.

Ms Indranee defined good thinkers as those who can "exercise sound reasoning and reflective thinking to make good decisions underpinned by values such as respect". Such thinkers are able to think of novel ideas and manage complexities and ambiguities in the face of challenges.

It is important for educators to believe that all students can think well and be creative, and they cannot leave the development of such abilities to chance.

She urged schools to deliberately infuse thinking processes into school life and the curriculum. Also, the classroom environment should be a "safe" and open one where students can voice their opinions and see mistakes as learning opportunities.

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Different Perspectives

Kerry, who is the co-convenor of this year's conference (along with Associate Professor Manu Kapur), was trained as a psychologist and is now studying cognitive development in the context of education. He is well aware that thinking is a wide-ranging concept and different fields study it rather differently.

The five keynote speakers were thus carefully chosen for the different perspectives they bring to the conference theme.

For example, Professor Neil Mercer adopted the psycholinguistics perspective in looking at how language and talk can help students think together (see "[The Value of Talking](#)" in this issue).

This year, educators and researchers also got to hear what the youth of today have to say about education. Adora Svitak, a 15-year-old American youth, writer and public speaker, was invited to talk about the potential of youth digital culture in enhancing learning.

What Is Thinking?

Kerry has his own take on the conference theme: There's a lot more to thinking than we need to think about!

For example, how do we measure thinking? He explains that researchers and scholars had come up with terms such as critical or inventive thinking in order to organize thinking into smaller, manageable chunks that they could study and measure.

And really, what they measure isn't thinking itself, but manifestations of thinking. In the same way that researchers need to operationalize, say, creative thinking, teachers should also be clear about what they're looking for when assessing whether students are being creative.

What we called "mugging" is not blind learning; it's not mindless. A lot of thinking has to be involved if you were to remember anything at all.

- Kerry Lee, Centre for Research in Pedagogy and Practice

What is creative thinking? Are there different exemplars of it? Is one better than another? These are all questions that teachers should consider as they take their students through the thinking process.

Thinking and Learning

Another question for us to think about is the role of thinking in learning. Their relationship may not be so obvious in certain instances. For example, we assume that students are not actively thinking when they're mugging for exams. Kerry begs to differ.

"What we called 'mugging' is not blind learning; it's not mindless. A lot of thinking has to be involved if you were to remember anything at all," he points out.

Here, Kerry points to the popular perception that Asian students prepare for exams by doing one practice test after another and how it is often viewed negatively.

"It's been found in some schools in Mainland China that they do practise a lot. But they do not blindly practise, and they practise on problems that are quite complex," he says.

"What the practising does is that it helps them to be attuned to the complexity and variations in different patterns and problems, so that they become more flexible in the application of knowledge."

Seeds of Curiosity

We're still looking for answers to many big questions about thinking. But Kerry hopes that the conference this year has at least given teachers a better understanding of the different ways to perceive thinking.

"I hope that they had the opportunities to hear what the teachers of other schools are doing, and that they gathered some ideas and practices that they can use in their schools," he says.

"Ultimately, you can't expect overnight changes. But I hope it planted the seeds of curiosity."

Redesigning Pedagogy Conference

Organized by NIE, the Redesigning Pedagogy Conference provides a global forum for practitioners, researchers, education leaders and policymakers to share cutting-edge research and best practices across schools and cultures.

The biannual conference has proven to be very popular with Singapore teachers and school leaders since it first started in 2005. This year, 1800 participants from 17 countries gathered at NIE to discuss a full spectrum of educational concerns with an overarching focus on thinking.

Other than the keynote speakers, Academic Groups in NIE were also invited to hold symposia on thinking-related issues from the perspective of their disciplines.

More information about the conference can be found here: <http://conference.nie.edu.sg/2013>

Useful Resource

The speech that Ms Indranee Rajah gave at the Opening Ceremony of the **Fifth Redesigning Pedagogy International Conference** can be found on the Ministry of Education website: <http://www.moe.gov.sg/media/speeches/2013/06/03/speech-by-ms-indranee-rajah-at-the-opening-ceremony-of-the-fifth-redesigning-pedagogy-international-conference.php>

Kerry Lee is the Guest Editor of this issue. He is the Head of the **Centre for Research in Pedagogy and Practice**, Associate Dean of the **Office of Education Research** and Associate Professor with the **Psychological Studies Academic Group** in NIE.

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Popular Media in the Physics Classroom

Can students learn anything about science from the media content they consume every day? The answer is a definite yes, and here's how it can be done.

Do your students ever ask, "Why do we have to learn Physics?" Physics is all around us, but this may not always be obvious to them.

To help students make connections more readily between their everyday life and what they learn in class, some teachers use the context-based learning (CBL) approach.

Context-based Learning

"The idea is to move away from learning isolated and unrelated concepts," explains Dr Tang Kok Sing.

Instead, concepts are learned in relation to common and real-world situations. For example, the nuclear accidents in Japan and Russia can be used to introduce the topic of nuclear activity to students.



The approach certainly makes learning more relevant and meaningful. But there are some limitations to how CBL is being implemented.

One is that the contexts in the curriculum are usually chosen by the teachers and curriculum planners. "Underlining this is an assumption that teachers know what kinds of contexts genuinely appeal to youth," Kok Sing says.

Rockets, aeroplanes and balls are commonly used to illustrate Physics concepts, such as projectile motion. But Kok Sing finds that some students don't relate well to such real-world examples.

Examples from the Media

What, then, might students be interested in? To find out, he and his research assistant Jeslyn Lee asked Physics students in Innova Junior College to each choose a media artefact with content related to both their personal interests and a Physics concept. It could be anything, from a newspaper article to a YouTube video.

"It's also a test for them to recognize the connection between what they're familiar with and what they're learning in Physics," Kok Sing notes.

The diversity of what students chose was an eye-opener for the researchers. They were interested in sports, martial arts, skateboarding and dance, music harmonics, forensic science and sci-fi shows, just to name a few.

The students came up with a scientific question based on the media artefact they had chosen, devised an explanation for their own question, and also critically evaluated the media they had chosen.

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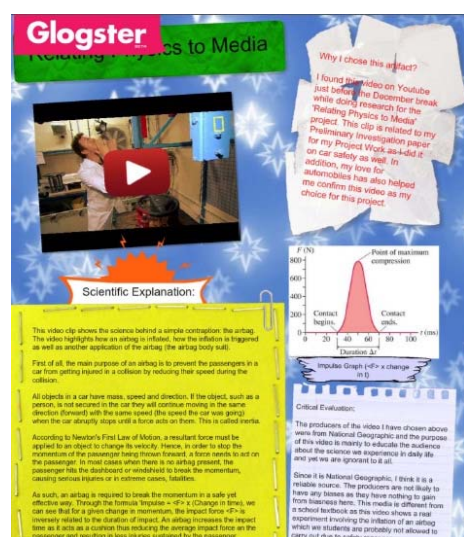
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"They know that in a lot of media, some content isn't accurate or scientifically correct," Kok Sing says. How to critique the media content that they encounter in their everyday life thus becomes a learning point too. Kok Sing and his team are now working on identifying the strategies students employ to interrogate media content and evaluating their facility in doing so.

Finally, the students presented their work in the form of a glog, which is a graphical blog or digital poster. They were graded for the quality of their question, the depth of their research, how they evaluated the reliability of the media source, and the design of their glogs.



Voices of the Students

The researchers and teachers were impressed by what the students came up with. One of the best glogs was by a student who investigated a murder case presented in *Fringe*, a sci-fi TV series.

In one episode, a woman was killed by an electromagnetic bomb, and the student wanted to find out if this was really possible. By applying his understanding of electromagnetic forces and reading up on it, he went on to hypothesize about the design and effect of the electromagnetic bomb. From his calculations, he concluded that the bomb is theoretically possible, but not practical in real life.

Some students were surprised at how relevant Physics is to their interests. "Skateboarding was something I didn't expect to be related to Physics," a student commented, "because in the lecture notes they always try to tell us to imagine an aeroplane or a ball in projectile motion."

Through this project, Kok Sing hopes to open up some space in the classroom for students to pursue their own interests. "Youths need to have the agency to search for and talk about their own interests," he says.

To the teachers, he advises that a good way to engage students would be to "listen to their voices and incorporate what they have learned outside the school into what they learn in school."

By creating the space for students to pursue their interests, he hopes they can make a stronger connection to what they learned in school and ultimately identify their own purpose of learning.

Listen to their (students') voices and incorporate what they have learned outside the school into what they learn in school.

- Tang Kok Sing, Natural Sciences and Science Education Academic Group; Innova Junior College teachers Ong Chee Wah and Alvin Ng E-hian; and Research Assistant Jeslyn Lee

Tang Kok Sing is Assistant Professor with NIE's **Natural Sciences and Science Education (NSSE) Academic Group**. He presented his paper "A Pedagogical Model of Context-based Science Learning Using Students' Everyday Media" at the **Redesigning Pedagogy Conference 2013**. Also involved in this project are **Lee Yew Jin** from NSSE and **Natasha Anne Rappa** from the **Learning Sciences and Technologies Academic Group**.

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Connecting with the Community

At Bendemeer Secondary School, the students don't just learn History from the textbook. Instead, they ventured into their neighbourhood to learn more about its heritage and interact with the community.

For Mr Samuel Goh, a History teacher at Bendemeer Secondary School, History lessons are not just about past events. History is, in fact, everywhere. So he decided to bring History out of the classroom and into the neighbourhood.

"At Bendemeer Secondary School, many of our students live in the Kolam Ayer area. They know the area, but do not really appreciate the rich heritage of the area they live in," says Samuel. "That is why I used this opportunity to bring them out of the classroom to learn about their heritage and also about values in the process."

Learner Independence

Students were asked to plan heritage trails for Kolam Ayer as part of their service learning programme.



Samuel refrained from telling them in a step-by-step fashion how to organize the trails.

"As a teacher, how much do I want to control them? I let them develop their own plan, let them fall and let them learn. So that's what we did in service learning," he explains.

"It's about teaching for independence, so I didn't want to spoon-feed the students."

But at the same time, it's also not about leaving them to do things on their own. Samuel balances his roles as a teacher and facilitator in encouraging independent learning.

"Learner independence means that you help students think of what they need to do and actions they need to take in their tasks. How to keep them thinking? How to develop students who are intrinsically able to be motivated and want to achieve something? How do we make them feel this?"

Community Involvement

Samuel gave students the freedom to plan their own trails also because he wanted them to be involved with the community and interact with the residents.

"That is why we brought our students out to their neighbourhood, to make them feel a connection with where they live," he explains. "They've got to see themselves as part of the community. By seeing themselves in this light, they were able to appreciate the learning."

As they connected with the residents to find out more about Kolam Ayer, the students also became aware of how important it is to behave and act responsibly.

"What is needed now is for them to know that there are consequences for their actions. We need them to take action and not to just be a sponge," Samuel explains.

They've got to see themselves as part of the community. By seeing themselves in this light, they were able to appreciate the learning.

- **Samuel Goh**, Bendemeer Secondary School

Rethinking Teaching

"When I was a student, I was from the generation when whiteboards were black and my teachers used overhead projectors," reminisces Samuel.

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But things have changed and are changing still. "Teachers are no longer a breathing textbook," he says. "We need to do more than 'you follow what I say'." In fact, he thinks that teachers have to be their students' biggest cheerleaders.

That is why even though his students took charge of their tasks, he didn't just stand by and watch. He pushed and encouraged them to think further and achieve more. "What can you do better? Is there any part of the task that can be better developed?" These were some of the questions he made his students think about.

"Nothing motivates and encourages our students more than a sense of achievement," says Samuel. "So that is why our roles as teachers have to change."

Values for Life

After the trails were planned, the students acted as guides and took people through the trails they had designed. The nearby community centres became involved as well, and Minister for Communications and Information and Minister-in-charge of Muslim Affairs Yaacob Ibrahim was invited to launch the trails. Through this process, they learned how important it is to be good ambassadors for the school.

"Teaching values is a lot about intentionality. As a teacher, I cannot tell them to learn respect. They have to exercise it to learn to respect others," explains Samuel. "In these trails, the values were caught by them rather than being taught to them."

Samuel was happy to see that the students collaborated very well with each other and took an interest in the history of Kolam Ayer. It was this that motivated the students to go beyond what they were supposed to do.



For these students, History lessons have become more than just another person's story. It's also about how these students develop as individuals as they learn about the past.

Mr Samuel Goh is a History teacher at [Bendemeer Secondary School](#). He presented his award-winning paper "Engaging the Head, Heart and Hands: Motivating the 21st Century Learner in Community Work through Independent and Collaborative Learning" at the [Redesigning Pedagogy Conference 2013](#).

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Reading Creatively

Creativity abounds at Pei Chun Public School, even when it comes to reading. At the school, pupils get to create and write their own mini-books. Some of them also design virtual posters for the books they have read. These are all part of a comprehensive programme to cultivate a love of reading in them.

Integrated Reading Framework

Delivering a sustainable approach to cultivate a love for reading in their pupils is the main aim of Pei Chun Public School's reading programme. Known as iREAD, the programme is a bottom-up initiative started by two senior teachers in 2010. One of them is Mrs Rachel Gan-Goh.

As a Special Assistance Plan (SAP) school, Pei Chun's pupils should be proficient in both the English and Chinese languages. But Rachel found that they tend to read more English than Chinese books.



To synergize the strengths of their library instructional programme for English language and the Chinese reading programme, she and her colleague developed the iREAD programme – *Integrated Reading for Enjoyment, Achievement and Development* – to bring about a balance in their pupils' reading diet.

Today, iREAD has become a whole-school programme that integrates reading in both languages and the use of information and communications technology (ICT).

Hands-on Reading

Every alternate week, the pupils look forward to going to the computer laboratory during their language lessons. That is where, among other activities, the upper primary pupils work individually to create virtual posters, or glogs, of books they have read.

We have to consider how best to leverage the love for reading rather than just having another add-on reading programme.

- Rachel Gan-Goh, Pei Chun Public School

"They use Glogster as a showcase of the books they have read," Rachel explains. "It allows children to put ideas together – things that children would otherwise just cut and paste on a paper poster."

Rachel strongly believes that Glogster, a free online platform, has a lot of curriculum potential. The features that pupils create in their virtual posters include audio recordings of their opinions on the book, links to other websites, and images of the books they read. The poster serves as a reflection tool for the pupils as well, as they also have to review the book and decide if they would recommend it to others.

For the Chinese iREAD programme, the post-reading activity involves pupils creating their own physical storybooks from scratch.

"It can be a one-page book for lower primary pupils, or it could be a four-page book that has orientations, a problem, a climax, a resolution for the upper primary pupils," Rachel says. "Or it could be in the form of what we call the big-mouth book." (See photo gallery)



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Books Come Alive

Pei Chun Public School strongly encourages her pupils to be creative and inventive during their reading time. Pupils put their creativity to good use by producing stories based on an existing book that they've read using the following two approaches:

Fractured tale: A fractured tale is usually a story that involves the tweaking of certain elements of an existing story. For example, in *Little Red Riding Hood*, the wolf could become the hero instead of the villain.

Parallel story: Students can model their story after a book they had just read. For example, when pupils read about a superhero, they can create a new one based on it.

Such efforts in developing critical and inventive thinking are beginning to pay off. A Primary 6 pupil, Gwyneth Low, submitted her story entitled "Life in the Old Castle" for the Young Author Award, a regional story-writing competition and was shortlisted as a finalist.

Learning through Reading

"I think the task of making books lends itself well to getting children to manage complexities," Rachel explains. "Because boundaries are not well-defined, they first learn to problem-find before making decisions."

The acts of determining the plot, drawing and colouring the characters, cutting and folding the book all stimulate creative and inventive thinking in these young readers.

The use of Glogster also helps to develop reflective thinking in pupils. At a tender age, these pupils get to practise how to see things from different perspectives. While designing glogs, they have to think like the author who writes for an audience. And when writing a review, they think like a reader who critiques a book.

"It's a complex task and they must actually think about how to manage it," Rachel adds. "It builds perspectives and helps to develop reflective thinking."

To ensure the success of the iREAD programme, which was also showcased at this year's MOE Excel Fair, Rachel says, "We have to consider how best to leverage the love for reading rather than just having another add-on reading programme because if it is a chore, children wouldn't like to read."



iREAD has proved to be a success with the pupils for the past 3 years, because it has made reading that much more fun for them.

The Four Literacies

The iREAD programme in Pei Chun Public School aims to develop four types of literacies in their young readers: information literacy, poetry appreciation, reading literacy and media literacy.

Information literacy: Pupils are introduced to call numbers of books and ICT tools to aid them in their search for books both online and in the library. They are also taught to use the encyclopaedia effectively.

Poetry appreciation: To inculcate a love of poetry in young readers, they are taught how to create short and simple poems that start with "I like". Pupils also learn how to create a *haiku*, a poem with a three-line format that was developed by the Japanese.

Reading literacy: Leveraging on National Library Board digital library, pupils register as a user to access e-books. This enables them to search for books without having to step into the library. They are also introduced to different book genres and text types.

Media literacy: Pupils learn how to use online digital media such as a blog, an online virtual poster. They learn how to embed videos, audios and links from external websites. The teachers also introduce pupils to child-safe search engines to help them in their research.

Rachel Goh is a Senior Teacher at **Pei Chun Public School** and she has been teaching for 18 years. Together with her colleague, Mrs Wong-Ngoo Ing Choo, she developed the iREAD programme in 2010. She conducted a workshop entitled "Rethinking iREAD" at the **Redesigning Pedagogy Conference 2013**.

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Let the Games Begin

Wouldn't it be great if students adopt the sports they play in school and continue to engage in it for life? To encourage students to do so, teaching them how to play the sport is only the first step – next is game organization.

"When it's Physical Education (PE) lesson, we set everything up, and we tell them, 'Now, come and play. We tell you the rules and this is how you do it.'" says Ms Saw Eileen, Subject Head (PE) of [Nan Hua High School](#).

"But if you want it to be a lifelong habit for them, they need to know how to take up our role as the organizer and put themselves in it, and then play. Now, we're teaching them how to *plan to play*."

Plan to Play

The PE department got together last year and brainstormed how best to get students to organize games.

As it happened, 2012 was the year of the London Olympics Games. The teachers thus posed this challenge to the students: If the Olympics organizer requested for your help to hold a handball tournament in the school, how are you going to do it?

In groups, students researched and planned the event collaboratively. Each group member was assigned a role to play, such as an umpire or a linesman. And then, they put their plans into action and got the games going during PE lessons.



Peer Evaluation

"It's a student-centred activity, so there will be mistakes and errors in the process," says Eileen. But the teachers didn't grade each group on their performance. Instead, they acted as facilitators and asked for peer evaluation during the debrief sessions.

"They critiqued one another. They highlighted how the referee had done well, how the linesmen had done a good job. So the assessment comes through the classmates acknowledging what was done well and what was not," explains Mr Jonathan Quek, Year Head (Lower Secondary) of PE at the school.

Students took turns to be both players and officials, so when they were critiquing their peers, they were also taking note of what needed to be done when it was their turn to oversee a game.

"They went through a few rounds of this, so we're hoping that each time, they'll learn more through being assessed by their classmates," says Mr Quek.

Self-discovery as Learning

The role of a timekeeper or a referee seems simple enough to adults, but it may not be so for some students.

"We realize that it's not as simple as we think. To them, it's very challenging to make a decision quickly," Jonathan observes. Some students hesitated when they had to make a judgement call on the spot.

"So we realized part of the learning is also about self-discovery of their character and qualities," he says. For this year, the teachers will focus more on character-building and imparting of values, such as sportsmanship and teamwork, as part of the activity.

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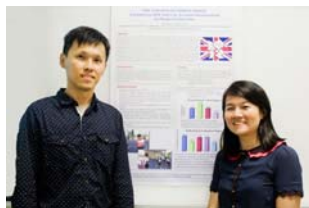
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Dealing with Ambiguity

A survey completed by the students at the end of the activity showed that they enjoyed themselves very much. Some students thought that the three sessions allocated for the self-organized games were not enough.



Eileen says that this year, they'll refine the activity and implement it for 10 sessions. Each group will also create a scrapbook to chart their progress as a team.

For teachers who are thinking of doing something similar in their schools, she recommends that teachers learn to let go – “less hand-holding, more observing”.

“As a teacher you always want to control things. So, if you want to do something like this, especially if it's self-directed learning, teachers need to learn to let students discover on their own. Even if they fall, they need to learn how to get up.”

Jonathan shares her sentiments. “How do we trust that students will learn on their own? How can we tell if the students will collaborate well? We often use teacher-directed teaching but now we need to allow for uncertainty and let students chart their learning.”

“For me, that's the biggest takeaway,” he continues, “to trust the students that they can take charge of their learning.”

Ms Saw Eileen is the Subject Head for Physical Education (PE) at [Nan Hua High School](#) and has been with the school for the past 5 years. Mr Jonathan Quek, Year Head (Lower Secondary), has taught PE in the school for the past 7 years. Together, they presented their poster “The London Olympics Crisis: A Project on SDL and COL in Game Organisation in Physical Education” at the [Redesigning Pedagogy Conference 2013](#).

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Learning Math the Fun Way

Playing roulette and getting drenched is all part of learning the concept of probability. And why not? It's a great way to get students who struggle to understand Math to become interested in the subject.

"When I was studying, I could get my As but I didn't like Math, didn't understand Math," Ms Cheryl Chen confesses.



So when she was approached to implement a programme to help a group of at-risk students in Math, she readily took up the challenge.

"I thought: Since I was in the same predicament as my students who aren't performing in Math, maybe I can identify with them and address their issues better."

A former Institute of Technical Education lecturer who is now a doctoral student at NIE, Cheryl decided that the best way to help these students is to let them learn creatively and playfully to minimize their aversion to Math.

Every week, she works with a Math teacher to teach eight Secondary 1 boys, as part of *Jacob's Ladder*, a 2-hour after-school enrichment programme.

About the Jacob's Dream Programme

Jacob's Dream is part of *Jacob's Ladder*, an educational enrichment programme run by an educational consultancy that targets at-risk students. *Jacob's Dream* uses the concept of play (games, drama, etc.) to teach mathematical concepts and logical thinking. The programme helps students who are struggling with Math to develop various skills to better understand and apply mathematical concepts.

Playing with Math

Play – this was Cheryl's strategy to keep her students interested.

"How can we make Math as a subject appealing?" Cheryl asks. "I used play as an additional tool in my teaching, as a possible form of pedagogy."

During the first hour of the programme, students will do "Math-Math" with their Math teacher while Cheryl does "fun-Math" with them for the second hour. And for the fun-Math hour, she comes up with all kinds of creative games and ideas to engage her students in Math learning.

But there is a method to the playfulness in Cheryl's class. Knowing that these students don't "get" the logic of Math, she plays logical games that demonstrate the relevance of Math and reinforce their understanding of Math concepts.

An example was using *Wet Head* – an aqua roulette game – to teach students the concept of probability. This game involves the player wearing a helmet filled with water, with a roulette wheel attached to it. The player will spin the roulette, pull out one of its eight rods, and wait to see if they will get soaked.

"They thought more mathematically and said things like '50-50 chance, you sure *kenal*!' and they strategized using mathematical reasoning, logic and language," Cheryl explains. "The students were not even aware they were doing Math and that is the beauty of play – learning spontaneously!"

Other games that students played with Cheryl include *Dog and Bone* and *Mental Sums Hangman*.



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Making Math Relevant

In addition to games, Cheryl also uses a situated learning approach in her lessons. Her personal favourite method involves the use of a dramatic context to frame a Math topic. "It evokes both emotions and the intellect, which is a hook for the learners," she says.

"What I am doing here is to make it slightly easier for pupils who might be struggling with Math because we don't see the point of it," Cheryl shares, as she recalls how frustrating it was for her to learn Math in school.

She feels that bringing her students into a context where Math is logical and useful is crucial to their understanding and appreciation of the subject.

"We are very purpose-driven people. We need to know the why and the how."

Getting in the Mood for Math

To demonstrate the need to think mathematically and break down situations into component parts, Cheryl showed her class a stunt video of a Volvo truck advertisement.

Then, to give the learning an authentic context, she assumed the role of a job interviewer and said to her class:

Now gentlemen, thank you for coming here for your interview to join our stunt production team today. You have just watched a video and the star of the video didn't do it alone. We, as a stunt production team, helped make her a star. In the next 3 minutes, you will demonstrate that you have what it takes to join our stunt production team by listing 10 factors that you think made the stunt work.

The students discussed and then presented in groups their findings to their Math teacher, who took on the role of the stunt director in the advertisement.

"The video and dramatic context help – it produced tension and the boys were drawn into the reality of mathematical thinking," Cheryl notes. "They talked about mental and physical fitness, the kind of shoes the stunt actor wore, and then they told me the speed of the two trucks has to be the same. Their thoughts actually grew as they articulated them aloud.

"And from there, I could easily teach concepts on speed because the boys already knew the importance and relevance of the concepts and they wanted to know how it works. With their interest sparked, learning becomes self-directed and motivated."

The advantage of such activities is that there are no right or wrong answers, which reduces competition for the one correct answer and the fear of failure. For her learners, it helps when their intelligence and interests are affirmed, and they know that their answers will not be deemed as wrong.

Setting the Right Context

Being a Math sceptic herself, Cheryl never truly understood the logic of having to find the x in an algebraic equation. So she feels that bringing her students into a context where Math is logical is fundamental to their understanding.

However, she cautions against crafting problem sums that are not realistic. For example, do people talk about cookies divided into quarters in real life? Do farmers count the number of legs to find out the total number of cows and chickens they have?



While some students find it easy to grasp the concepts behind such questions, Cheryl's students struggle to connect the dots because the questions do not seem to make sense or have any relevance to the real world.

And without early intervention in Math, this group of at-risk students may lose interest in Math and may even drop out of school eventually. This is why Cheryl hopes her programme can help to change her students' perception of Math and realize that, yes, Math can actually be fun!

Cheryl Chen was formerly an ITE Lecturer in Life Skills and is currently doing her PhD in NIE. She has a Master's in Applied Drama and is also a freelance educator who uses applied drama techniques as a pedagogical tool to teach her students. She presented her paper "The Value of Play – The Use of Drama to Complement the Teaching of Mathematics in a Pull-out Programme" at the Redesigning Pedagogy Conference 2013.

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Toying with Science

At Greenview Secondary School, lower secondary Normal (Technical) students get to design and create toys as part of a Science-based project. Through this approach, students develop a more positive and confident attitude towards Science learning.

"Teaching Science to Normal (Technical) (NT) students is not an impossible task," says Mr Nazir Amir, a Science and Design and Technology (D&T) Senior Teacher at [Greenview Secondary School](#).

He believes that it starts with teachers getting to know their students, understanding their needs and customizing their teaching approach to generate interest in learning.

Given that NT students are predominantly kinaesthetic learners, teaching abstract concepts straight from the textbook isn't the best way to make them understand or learn Science.

The Science of Toys

Nazir decided to make use of hands-on design activities to engage these students and help them relate what they learn in school to their daily lives. He teaches Science to his lower secondary NT students through Science-based toy projects.



One of the projects that these students are involved in is called the *GVSS Junior Solar Sprint*. For this project, students are asked to design and create a solar-powered toy car. To do so, they carried out hands-on investigations in the areas of mechanics, electronics and structural testing during Science lessons.

"I need to convince them how knowledge gained in their Science lessons can be of use to them in their daily lives. The toy projects

offer an avenue for me to do this."

Multidisciplinary Learning

Nazir collaborates with the English, Art, and Computer Applications (CPA) teachers in a number of such projects so that his students see the relevance of gaining knowledge and skills in these subjects in the process of creating their toys.

Explaining the approach, Nazir says, "Immersing these students in such projects requires a merger of content knowledge and skills across these subjects, to pursue a design task that depicts a real-world setting."

Indeed, in the real world, tasks and problems are never subject-specific. Students need to know how to synthesize all that they have learned and make connections to come up with meaningful solutions.

"Through the Solar Sprint project, students are able to see for themselves how their knowledge of voltage affects the performance of their toy solar cars," explains Nazir.

"At the same time they acquire knowledge on recycling and global energy-saving in English lessons, pick up skills in sketching, working with tools and machinery in D&T lessons, use materials to create their toys in Art lessons and prepare instruction sheets in CPA lessons," says Nazir.

Building Confidence

While the purpose of these Science-based toy projects is really about building up positive attitudes in these lower secondary students towards Science, this also becomes a good starting point for teachers to guide students to perform well academically.

"To motivate and build the confidence of my students in answering questions in the Science exams, I will first test them on questions that are directly related to their Science-based toy projects," explains Nazir.

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"Students can see a direct relationship between what is presented in the exam questions and their experience in working on the projects."

In this way, students can link what they have learned through hands-on experience back to their academic study of Science. This approach will motivate students to learn more deeply.



And he believes these students need motivation more than anything else.

Once they are interested, Nazir believes they will be able to better meet the higher demands in the upper secondary levels, where they will learn more advanced scientific concepts.

A student made this comment at the end of the Solar Sprint project: "I used to hate Science in primary school, but now I love it!"

At the end of the day, that's the best learning outcome a teacher could ask for.

Nazir Amir teaches Science as well as Design and Technology at [Greenview Secondary School](#), where he is a Senior Teacher. He is also a Fellow with the [Academy of Singapore Teachers](#). He presented a paper entitled "Capitalising on Science-based Toy Projects to Make Learning Content across Several Subjects Relevant and Appealing for NT Students" at the [Redesigning Pedagogy Conference 2013](#) and it is based on one of his action research projects.

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The Value of Talking

Working in groups, solving problems, thinking creatively: These are capacities we want our children to have. But how do we encourage these? Simple, says Professor Neil Mercer. Just get them talking! This article is based on his keynote address at the Redesigning Pedagogy Conference 2013.

How Are We Designed to Think?



What makes the human brain distinctive from other animals? Well, we have brains that are designed to enable us to think collectively.

No other animals can do that. No other animals can come back from an expedition and reflect on what we can do differently tomorrow. This is what we inherited from our ancestors, and it's still working for us today.

One of the things that the people did was that they talked to each other. And it was through using language as a tool to construct an image of reality – past, present and future – that

they were able to make plans, get things done, and improve their joint performance.

So if we are to understand the nature of human cognition, we've got to understand the role of language in it.

What Do We Use to Think Collectively?

Language is integrated with cognition, and one of the most influential scientists in helping us to understand this is Lev Vygotsky.

To him, children are born into dialogues, and those dialogues mediate their understanding of the world. Thus, from the minute they're born, children acquire ways of thinking. By hearing how language is used to make sense of the world, they come to make sense of the world for themselves. He called this the *intermental* activity.

And as they do their own sense-making and carry out their own actions, they feed back into the social activity of their community. So you've got a continuing spiral of development.

He suggested that language was a cultural tool for thinking collectively – we *interthink*.

We're not instinctive animals; what we are born with are capacities. So although children have all got the capacity to learn languages, they still need to learn how to use it. And that's crucial for my theme today, for the teachers' role in schools.

Why Is Talk So Important?

We can't just do talk the minute we're born; we have to learn how to do it. I don't think children understand or appreciate how important talk is in getting things done.

Talking skills are rarely taught in school, and it's surprising given today's employment-oriented world. It has to change if we want people to achieve and realize our evolutionary heritage to interthink.

It's again another distinctive aspect of human life: We take responsibility for the education of our young people, enabling them to realize the capacities that they've inherited. For many children, they have a second chance in school. But if children are not being helped in schools, they're not being helped at all.

Furthermore, the notion of the lone solitary genius is pretty much shown to be incorrect. It's a myth. Mostly, people who are creative were working in a creative collective of some kind.

I think most group work is educationally unproductive. What is needed in group work is what we call exploratory talk.

- Prof Neil Mercer,
University of Cambridge

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They were able to draw on the efforts of other people to enable their own individual contributions to be realized. So, this is really the age which creativity is really a collective achievement. And the way to enable people to think creatively and collectively is through discussion.

What Is Exploratory Talk?

Talk is really important for the development of thinking. But what really makes a good discussion? I think most group work is educationally unproductive. What is needed in group work is what we call *exploratory talk*.

Exploratory talk is a creative and productive dialogue. It possesses these characteristics:

- Everyone offers relevant ideas and information.
- Everyone pursues the same goals.
- Everyone's ideas are treated as worthwhile but are critically evaluated.
- People ask each other what they think.
- People ask for reasons and give them.
- People try to reach agreement.

This kind of talk has several educational benefits, as research has shown.

First, it allows students get more involved in learning. Second, they become better at solving problems because they can learn from each other. Third, it improves their individual scores for reasoning tests. Finally, it transfers into better scores for other subjects, like Science and Math.

Just remember, you're always the expert – and the children need your expert knowledge. One of the things you're an expert of is how to use talk effectively and how to think collectively.

Useful Resources

Download Prof Mercer's presentation slides from his keynote address, "[Educating the Social Brain: Linking Language, Thinking and Educational Attainment](#)" from the [Redesigning Pedagogy Conference 2013](#) website.

More information about interthinking can be found on Prof Mercer's [Thinking Together Project](#) website.

Neil Mercer is Professor of Education at the [University of Cambridge](#). His interests are in the development of children's language and reasoning, classroom talk, and the application of digital technology in schools.

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Getting Creative about Teaching

The world has changed tremendously, but has our school curriculum kept up with the changes? Professor Bonnie Cramond calls for the infusion of creativity into the curriculum, which will help our children thrive in the new world. This article is based on her keynote address at the conference.

Do We Really Need Creativity?

Much has changed in the last 100 years, but has the curriculum? Not really. We've changed the names in the US, but it's the same division of knowledge into the same categories.



We're teaching our children content that will be changing. Some of it will be obsolete, some different, but most of it they won't remember.

The emphasis we should be placing on our students is how to learn and what to do with the information, not just to acquire it. What we can do for our students is to teach them to be resourceful and creative so that they can deal with the world as it changes.

So, creativity is necessary for our society. As recent reports warn us that a nation cannot retain its economic and scientific edge in the competitive world with a workforce that has mastered only the minimum competencies.

Creativity maximizes human abilities. Everybody thinks of Albert Einstein as an intelligent person, which he was, but he saw his creativity and curiosity as much more important than his intelligence and knowledge.

And a lot of people don't think of creativity in, let's say, Math. But people can be creative in any human endeavour; you can choose to do it in a more creative way. The famous psychologist Abraham Maslov said, "Good soup is more creative than a bad poem."

What Does Creativity Look Like?

In fact, people misunderstand what creativity looks like. If you've taught highly creative kids, you'll know they're not the easiest kids to teach. The very qualities that enable someone to be creative are also seen as negative.

You've got to ask if your students are being original or bizarre? Independent or stubborn? Have high amounts of energy or just hyperactive? Spontaneous or impulsive? Emotionally sensitive or emotionally unstable? Lost in thought or simply daydreaming?

Here are some creative dispositions I think creative people possess: They are curious, able to take intellectual risk, persistent, tolerant to failing, playful, and open to all experiences.

So How Can We Nurture Creativity?

Creativity is in all children

Years ago, psychologists thought that intelligence was an in-born quality that you had from birth and you kept all your life. We now know that intelligence is very interactive with our experiences.

You might be born with a certain propensity, for a certain intelligence, but how that is nurtured will determine if you reach your maximum potential. The same is true of creativity. We can nurture our creativity or we can stifle it.

I've done research on drop-out kids and found out that many of them are not kids who can't master the basics. They are kids who cannot stand the curriculum in our schools.

All of us are creative in little ways every day, and we use our creativity all the time. You've got to recognize and nurture creativity in all students.

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And it's not enough to say that the kids have arts lessons so they're being creative. What if that child is a creative writer, scientist, mathematician or electrician?

Creativity is not confined to the arts. People who operate at the highest levels in all realms of human endeavour need creativity. We have to infuse it into all subjects and all levels.

Creative teaching and teaching creativity

I want to make a point that there's a difference between teaching creatively and teaching for creativity.

There are a lot of teachers who are pretty creative and might think of a creative lesson, but who's being creative? The teacher is. Teachers can be creative in their lessons but we also want to pull out the children's creativity.

And I'm not saying we shouldn't teach any content. You have to know something and the more complex the field, the more you have to know. But we have to maintain a balance that when we're learning content, we're also inquiring and thinking innovatively and creatively.

One way to do this is to use real-world methods and data, where students think about things but still learn some basic content. They should also work toward solutions of authentic problems that they care about, with the opportunity to either work individually or in teams.

It's also important for us to make learning interdisciplinary. After all these years, we still have our separate segments of knowledge, which, in reality, is not segmented. When you use a problem-based or project-based curriculum, students are more likely to integrate what they know.

Assessing creativity as a priority

In the US, we have three states that have declared that schools must assess if they're teaching kids to be creative. I'm so upset because I looked at one of their criteria, it said, "How many debate classes and art classes do you have?" That's not what we mean!

Also, student success is measured by tests of what was learned. Problem-solving questions typically consist of set methods and set answers. So the students know this is the problem and this is how they have to solve it.

But those methods do not promote critical or creative thinking. They don't teach problem solving or problem finding, which is even more important, and they don't engage students.

Such evaluation should not be more of the same kinds of tests. Instead, we should be looking at assessing the 4Ps of creativity:

- Person: Students and educators
- Process: Curriculum, units, lessons
- Product: Student products
- Place: School system, school, and classroom environments

Those are things we really need to look at if we really want to value creativity.

In the US, a lot of people have been shaken up about education and what we need to do. So my question to you is: Is Singapore awake?

Useful Resource

Download the presentation slides from Prof Cramond's keynote address, "[Why Should We Nurture Creativity? And, How Can We Do So?](#)" at the 2013 [Redesigning Pedagogy Conference website](#).

Bonnie Cramond is Professor of Education and Director of the [Torrance Center for Creativity and Talent Development, University of Georgia](#). Her research interests include the assessment and development of creativity.

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