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Redesigning Pedagogy 2017

Educating Learners Today for Tomorrow

The seventh Redesigning Pedagogy International Conference this year focuses on the theme "Education for the Future: Creativity, Innovation, Values". We speak to the Conference Chairperson and Deputy Chairperson to understand why it is important to prepare our youths today for the future.

Topping the Programme for International Student Assessment (PISA) 2015 rankings, the Singapore education system has been widely recognized as one of the world's top-performing systems. These rankings are testament to our efforts to deliver high quality education over the years, but it will not do to rest on our laurels. In an era marked by rapid changes, education must evolve to prepare youths *today* to overcome the challenges that *tomorrow* may bring.

Education Minister Ng Chee Meng, during his first major speech that sets out his vision for Singapore schools in December 2015, emphasized the importance of creating learning environments where students can become innovators who are able and motivated to create value for society (Teng, 2015).

This emphasis subsequently inspired the theme of the 3-day international education conference held at the National Institute of Education (NIE), Singapore, from 31 May to 2 June 2017.

Being Future Ready

"The current world, as we now know, has been described as volatile, uncertain, complex and ambiguous (VUCA)," says Conference Chairperson, Associate

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>
> - Associate Professor Kenneth Poon,
> *Conference Chairperson*
> *Office of Education Research, NIE*

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Professor Kenneth Poon from the Office of Education Research (OER), at NIE. "We can only expect the future world to be increasingly so and very different from today."

According to a report by McKinsey Global Institute in 2017, about 60 per cent of all occupations today have a 30 per cent chance of being automated, which may affect future employment rates.

"There will be new jobs in the market—jobs that we might have never heard of before," adds Dr Wong Hwei Ming, Conference Deputy Chairperson also from OER. "Our students therefore also need to develop certain skillsets that are transferable for the future."

The conference thus sought to prepare learners today for the VUCA world of tomorrow by engaging teacher and researcher participants through various keynotes, symposia, workshops and paper sessions that focused on three elements of education for the future—*creativity*, *innovation* and *values*.

Creativity and Innovation

"The companies today with the largest market capitalization are not those with natural resources," Director of NIE Professor Tan Oon Seng shared during the conference opening address. In fact, tech companies such as *Apple*, *Facebook* and *Alibaba* make up those with the largest market value. "We live in the age of tremendous innovation, so education today also has to deal with how we can create a generation that is truly creative," he added.

It has become more important to nurture creative and innovative students because these factors are critical for their future success. To nurture creativity and innovativeness in students, change has to first begin with our educators, from within the classroom.

To provide teacher participants with a greater insight into fostering creativity in students, Professor Robert Root-Bernstein in his keynote address explained how "thinking *inside* the box" could potentially benefit students more than the traditional adage of "thinking *outside* the box" (read "Creativity and Being Creative" in this issue).

"Prof Root-Bernstein is an expert in the field of creativity," Kenneth shares. "I hope that his keynote address will help seed ideas on creativity for us to further explore."

Nurturing Values

Kenneth acknowledges that while being creative and innovative are the key ingredients for success, it is also necessary for teachers to teach values because values "ground us in who we are as individuals".

The rapid technological, socio-economic and structural changes our society is experiencing today bring about ripple effects in individuals' attitudes and actions.

For instance, the Internet and World Wide Web allow users to receive information almost immediately with just a few clicks of the mouse. Hwei Ming feels that such instant gratification has inadvertently resulted in people becoming less patient.

"It is therefore important to nurture in our students good moral values such as resilience, honesty and ethics," says Hwei Ming. "The right guiding values can deeply influence our behaviours, attitudes and decision-making." In his keynote address, Professor David Carr from The University of Edinburgh, UK, explored the importance of moral character in education (read "Developing Moral Character and Virtue" in this issue).

Values such as commitment, compassion, fairness, helpfulness, honesty, integrity, patience, respect, responsibility, self-reliance and others are important and *can* be fostered in students.

Hwei Ming emphasizes: "The values we instil in our students today will have a major impact on society tomorrow. These will help prepare students to seize opportunities and face the unknowns of a VUCA world."

Kenneth Poon is Associate Professor and Associate Dean (Research Quality), and **Wong Hwei Ming** is a Research Scientist. Both of them are with the Office of Education Research at NIE.

Redesigning Pedagogy International Conference 2017

The biennial *Redesigning Pedagogy International Conference* (RPIC) attracted a record of over 1,400 participants from 22 countries including Finland, Norway, Australia, Indonesia and Japan.

RPIC provides opportunities for teachers and researchers to share and exchange classroom ideas and research findings.

"This conference seeks to facilitate the bridging of the research and practice gap," shares Conference Chairperson Associate Professor Kenneth Poon. "I hope that participation from teachers

can help researchers to further understand priorities on the ground and subsequently allow for better teacher-researcher collaborations."

The Co-Chairperson of RPIC's Programme and Abstract Selection sub-committee Dr Dennis Kwek also notes that the conference saw abstract submissions of impressive quality from schools this year.

"Abstracts submitted by schools have been particularly encouraging as we saw more practitioners drawing from rigorous research methodologies to understand practice," Dennis,

who is also an Assistant Dean of the Office of Education Research at NIE, shares. "We also saw increasing numbers of NIE-school co-authored submissions, which is a positive trend in university-school partnerships."

At the opening ceremony on 31 May 2017, Director-General of Education from the Ministry of Education (MOE) launched the Singapore Teaching Practice (STP). STP is a collaboration between MOE and NIE. An online portal and resource page, STP aims to bring together shareable lesson strategies for teachers.

Research

Building Character Through Digital Storytelling and Drama

We tell stories to share our beliefs and values with others. This oral tradition is a social practice that has been around for as long as the human language. While many might be familiar with traditional storytelling, what then is digital storytelling and how does it, along with the use of drama, impact the teaching and learning of Character and Citizenship Education in the classroom today?

Written or spoken storytelling is often seen as a fundamental form of entertainment or a way of sharing knowledge with others. However, the employment and engagement of a palette of technological tools to this old-age tradition creates a different version of narration—digital storytelling.

Dr Phillip Towndrow, a Senior Research Scientist from the Office of Education Research (OER) at NIE, and his team wonder how such digital stories and new media narratives

Phillip Towndrow (right) and Galyna Kogut, a Research Associate at OER, who was also one of the presenters. Another presenter not mentioned in the article is Prudence Wales, Assistant Deputy Director of Hong Kong Academy for Performing Arts.

complemented with some drama can impact learning in the classroom. Particularly, he is interested to explore the effects of this multimodal learning platform within the context of Character and Citizenship Education (CCE).

To investigate this, he led his team as Principal Investigator on a digital storytelling (DST) project that involved two teachers and their respective CCE classes to understand how digital stories can be used in classrooms and the kinds of learning outcomes that both students and teachers experience.

Active Learning Through Digital Storytelling and Drama

Providing students with the platform to collaborate, work together and create drama was all part of a CCE classroom activity in one secondary school.

The activity engaged students through "freeze frame" or tableau, where they watched a segment of a digital comic strip before creating a live still image to capture and communicate the meaning and concept of the next possible scene.

"I did this activity in class and students watched one story that runs in sequence in the form of comic strips," explains Mr Rethinavel Shanmugam, a lecturer at NIE and also Co-Principal Investigator of the project. "At one point, I stopped the sequence and I asked them 'what do you think happens next?'"

Encouraging students to participate in such activities promotes positive collaboration and discussion as they explore and deliberate on what could happen next.

"We want the students to be able to personalize their storytelling," Phillip adds. "For them to do that, we created a drama-space where students felt comfortable and confident enough to share their personal stories." For both Phillip and Rethinavel, opening the floor to drama in the classroom can create that needed space.

Traditional Versus Drama Classroom

In a traditional classroom setting, the teacher tends to provide one-way instruction to the students, leaving them with few opportunities to engage in meaningful dialogues that aid their learning. A drama classroom, on the other hand, calls for mutual dialogue and two-way conversation between students and the teacher.

Rethinavel further explains the difference between a traditional classroom and a drama classroom: "What happens in a drama classroom is a very dialogic process because we are co-creating the work. The teacher is no longer just a person who gives knowledge. He or she is actually a co-constructor of knowledge with the students."

He feels that the incorporation of drama in the classroom is aligned with the concept of DST as students need a voice to be able to construct a story.

"It is their voice that has to come through in the stories, and I think a drama classroom setting helps to facilitate that process by opening up a space," he says. But more than just being a safe environment for students to be active participants, drama also creates authentic learning experiences for them.

Authentic Learning of Character and Citizenship Values

"In a traditional classroom, the teacher tends to do most of the talking," Rethinavel says. When that happens, he notes, the discourse is less heartfelt and genuine. The traditional classroom, although suitable for certain subjects like Mathematics, is less pedagogically

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> *on the difference between a traditional classroom and a drama classroom*

suitable for subjects like CCE, which requires the teacher to tap into his or her own values when teaching.

For instance, in a traditional CCE classroom where a teacher is covering the topic on "telling lies", the lack of teacher-student dialogue may result in the teacher simply telling the students that "lying is wrong" and "you do not lie".

"The students can give you a controversial answer or comment which they feel is right. But knowing that you (as a teacher) might disagree, they give you the 'right' answer and that's when teaching and learning becomes inauthentic in a traditional classroom," Rethinavel explains.

As such, Phillip and Rethinavel believe strongly in incorporating drama in the classroom through the use of DST to evoke deeper learning, understanding and discovery of character and citizenship values in students. "To combine DST with drama for CCE, it's got to be something that is innovative, nurturing, personalized and authentic," concludes Phillip.

Phillip Towndrow is a Senior Research Scientist with the Office of Education Research and **Rethinavel Shanmugam** is a Lecturer at the Visual and Performing Arts Academic Group at NIE. This article is based on their presentation "Visualising and Performing Character and Citizenship through Digital Storytelling" at the *Redesigning Pedagogy International Conference* 2017.

Classroom

Learning Science Through Inquiry

To promote deeper learning and nurture self-directed learners in the classroom, Teck Ghee Primary School found it necessary to redesign their approach to science. They share the process undertaken as they shifted towards inquiry-based learning where pupils are empowered to take greater ownership of their learning.

In inquiry-based learning, pupils are given questions and work individually or collaboratively to explain scientific concepts, using evidence to support their thoughts and claims. The process of inquiry is facilitated by teachers who help pupils make connections and build their understanding of concepts.

"When we ask ourselves, 'What are we learning?' this is done in the spirit of inquiry," says Science teacher Ms Alia Alkaff. As curiosity and exploration are at the heart of inquiry, the school hopes to ignite the curiosity of pupils and motivate them to discover for themselves.
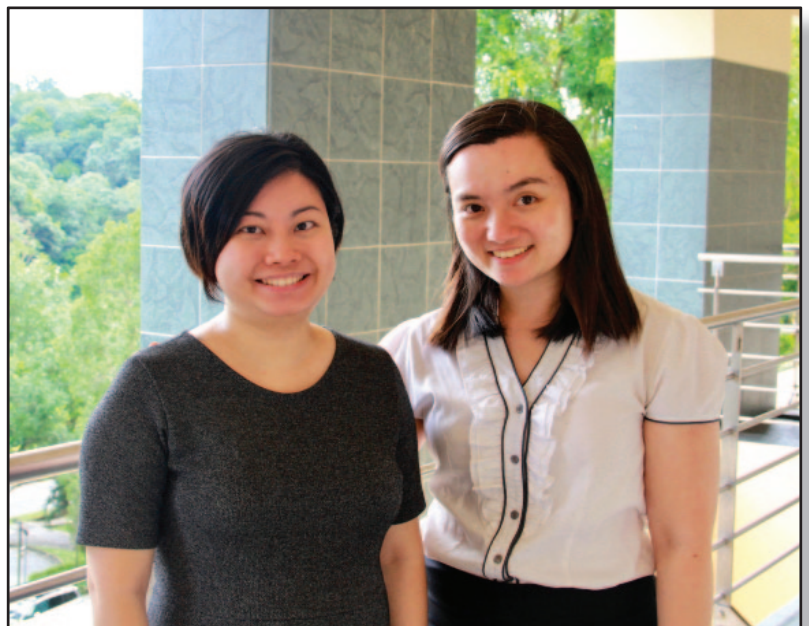
To inculcate a spirit of inquiry in learners, it employs two conceptual models—*experiential learning* and *culture of thinking*.

Experiential Learning

Experiential learning inspires curiosity and empowers pupils to take charge of their learning by showing them how science relates to real life. By designing lessons to be authentic, student learning can extend beyond the classroom.

Science teachers Chaw Tee and Alia find that inquiry is effective in getting students to ask questions and develop an interest in science beyond examinations.

"We create meaningful learning experiences by getting pupils to pull out a sweet potato plant and infer the function of its roots based on observation," Alia shares. Based on pupils' initial observations, Alia then designs her science lessons to build on their understanding and address any misconceptions.

"During lessons, we ask them questions to encourage deeper thinking," she says. "Getting pupils to write down any questions they may have also enhances their learning." Alia's pupils also conduct their own research before the classroom activity so they are able to

> When pupils engage in inquiry from their own lenses, meaning-making becomes dynamic.
>
> - Chaw Tee *on how experience and exploration builds pupils' knowledge*

Alia Alkaff and **Neo Chaw Tee** are Science teachers at Teck Ghee Primary School. They are part of a team involved in the redesign of the Science pedagogy towards inquiry learning for primary school pupils. This article is based on their presentation "Towards Inquiry Learning in Science: Innovation as a Catalyst for Teacher Learning and Change" at the *Redesigning Pedagogy International Conference* 2017.

provide better answers and improve their understanding of different plant parts through the lesson.

Culture of Thinking

To complement experiential learning, Teck Ghee's science classrooms also adopt a culture of thinking where sharing and discussion are encouraged among pupils.

"This culture of thinking is used to develop students' thinking process," Alia explains. The repeated process of having pupils use evidence to support their thoughts and claims instead of merely memorizing keywords and answers immerses them in a "thinking culture" in the classroom.

With practice, pupils eventually acquire the skills to share their thoughts and views in the classroom without the fear of judgement, and monitor their own learning in the process.

"All of this is done in the spirit of inquiry while catering to the pupil's learning needs," Alia says. "We also share our classroom experiences with teachers from different levels to help them understand the intention of this project and think more critically about their own practice."

Facilitating the Active Participation of Pupils

Underpinning these two conceptual models is the belief that to foster learning and discussion in the classroom, pupils need to be active participants during lessons. "Teachers are not the gatekeepers or transmitters of information; they are facilitators in helping pupils make connections and build understanding," shares Ms Neo Chaw Tee, also a Science teacher at Teck Ghee.

To engage her pupils, Chaw Tee created a learning artefact—a setup of four plants consisting of a complete plant, a plant with a damaged stem, a plant without leaves, and a plant with roots wrapped in a plastic bag. The plants were left in the classroom where pupils could observe them for a few days.

"In this teacher-designed task, students have to make sense of their observations and infer the functions of the plant parts," explains Chaw Tee. Individually or in groups, pupils explore what they want to report, research for relevant information and support their claims through self-curated evidence.

"When pupils engage in inquiry from their own lenses, meaning-making becomes dynamic," she says. As they articulate their findings, present their work and receive feedback, pupils are constantly refining their understanding of the subject.

Teachers help to connect, challenge, deepen and extend pupils' thinking by probing or asking more questions. Through active questioning, Chaw Tee finds that pupils can be "led" (rather than simply instructed) to arrive at the answers to their own questions.

Curricular Innovation as a Live Artefact

Teachers have also benefited from the school's emphasis on innovation through inquiry.

"Our teachers have moved beyond being implementers to become designers of lesson experiences," Chaw Tee says. For them to continue developing themselves professionally and transform their teaching practices in the classroom, a culture of experiential learning and thinking supported by school-based curricular innovation must be localized to pupils' needs and teacher readiness.

For instance, when scaling up pedagogical innovations, teachers must consider both the *hardware* (types of tools to use in the classrooms) and *heartware* (pupil readiness and how much the teacher is willing to change the way lessons are delivered).

Chaw Tee describes this process of innovation to promote stronger inquiry and self-directed learning as itself a live artefact—constantly growing and evolving.

"Without the active role of students, teachers and school leaders in contributing to the development of the curriculum and creating a safe and supportive environment for learning, this journey would not have been possible," she says.

Creativity and Being Creative

Professor Robert Root-Bernstein believes that creativity is not an inherent personality trait, but a process that can be taught. In order for educators to help nurture and spark that creativity in students, one first has to understand: What exactly is creativity and how can one truly be creative? This article is based on his keynote address at the Redesigning Pedagogy International Conference 2017.

Problems: The Start of Creativity

Albert Einstein once said that if he were given an hour to solve a problem, he would spend 55 minutes making sure that he understood its ins and outs, and only 5 minutes actually trying to solve it.

Most curricula, however, focus on the opposite—training students to solve the problem rather than understand the intricacies of a problem and its formulation. If we seek to nurture creativity in our students, we have to shift away from fact-based learning that primarily teaches answers and move towards a problem-directed education that centers on equipping students to understand the nature of problems and challenges.

So what is creativity? Creativity is the invention, recognition or reformulation of a problem or challenge in a manner that makes it amenable to resolution in more effective ways.

Thinking Inside, not Outside the Box

Many of us have heard that creativity is about "thinking outside the box", "breaking boundaries" or "blue-sky thinking"—these are actually misconceptions about creativity and miss the point about the nature of a problem.

We know that we can solve mathematical problems only if we use the right methods. Likewise, we have to apply an appropriate solution to any other problem to bring about resolution.

A problem presents a set of constraints that determines what knowledge, skills, methods and practices are required to solve it. Looking at the problem as a box, we have to think *inside*—not outside—the box, working within the constraints of this problem to devise solutions. It is about getting into the box and thinking what you can bring or fit inside this box—creativity from constraints. That is the essence of creating.

Before embarking on the problem-solving process, we must grasp the problem and the better we understand the constraints associated with it, the closer we will be to finding the solution to it or at the very least, the area where the solution lies.

Expanding the Box

Creating is about thinking from inside our boxes yet some individuals are more innovative than others are. This is because they think from larger boxes, which enable them to conceptualize more ideas and possibilities.

We can expand our boxes and thus strengthen our creative capacity through polymathy—the extensive understanding of multiple disciplines.

Being a polymath is not simply about knowing a lot, but about being deeply involved in our interests. An analysis of the profiles of Nobel Laureates reveals that they are three times more likely to have avocations such as art, craft, music and poetry, which they actively pursue outside their respective core professions compared with the general public.

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> - Professor Robert Root-Bernstein,
> *Professor of Physiology at Michigan State University*

Similarly, engineers who have the most number of patents are highly likely to also be artists or craftsmen.

These exemplifications of polymathy show that being actively involved in a mix of interests can help us foster a deep understanding of a range of disciplines. As a result, we would also be equipped to think about problems from multiple angles and identify more constraints. This would then enable us to develop more ideas and possibilities that can present as effective solutions to problems.

Synthesizing: The Basis of Creating

While polymathy is about mastering multiple disciplines to build our creative capacity, synthesis is the start of the actual creative process and involves the integration of knowledge and skills associated with different fields to develop new ideas and possibilities.

American poet-cum-painter E. E. Cummings, who is known for experimenting with poetic form, once remarked in an imaginary interview, "Tell me, doesn't your painting interfere with your writing? / Quite the contrary: They love each other dearly". On close examination of his poetry, many of which are word forms of artworks by Cézanne and Picasso, one would realize that his painting skills indeed complement his poetic prowess.

Just as we can combine our knowledge and skills of similar disciplines such as poetry and painting, we can also connect the dots between seemingly disparate fields.

For instance, Einstein mentioned that the theory of relativity resulted from musical perception. Similarly, Alexis Carrel figured out how to make organ transplants possible by stitching organs and blood vessels together because he had brought the stitching skills that he acquired from his prior training as a lace maker to the operating theatre—this discovery won him the 1912 Nobel Prize in Medicine and Physiology.

Apart from proving that even seemingly unrelated disciplines can complement one another, the discoveries that Einstein and Carrel made also demonstrate that the more knowledge and skills we can bring to the table, the more ideas and possibilities we can generate and the more problems we can solve.

Curiosity: The Key Driver

Efforts to nurture the creative potential of students can only take off if students are filled with curiosity.

Walt Disney once remarked, "We keep moving forward, opening new doors, and doing new things because we're curious and curiosity keeps leading us down new paths". The desire to learn and do new things is thus key to enabling us to develop new ideas and possibilities. After all, as Sir Ken Robinson said, "curiosity is the engine of achievement".

Ultimately, if we can foster curiosity and wonder in our students, we will also be able to nurture them to be effective problem-solvers who will contribute to a culture of creativity and innovation.

Professor Robert Root-Bernstein is a scientist, humanist, and artist. He is currently a Professor of Physiology at Michigan State University where he studies the evolution of metabolic control systems, autoimmune diseases, drug development, and the creative process in the sciences and arts.

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