TEACHER ED

Creativity as a learning outcome

Creativity is gaining importance in today's classroom. What's more, it is a learnable and teachable skill. But to teach creativity, we must understand what it is. What exactly does creativity mean in the Singapore classroom? Professor Erica McWilliam, who has written extensively on creativity in education, tells us more.

Article highlights

- What is creativity?

- Why is it important in today's classroom?

- How do we cultivate an environment that nurtures creativity?

What comes to your mind when you hear the word "creative"? Is it, perhaps, a mad artist like Van Gogh, or a musical genius like Mozart?

If any of these images come to mind, they spring from an outdated conception of the word *creativity*, according to Professor Erica McWilliam. "Creativity was associated with artistic ability. It wasn't teachable or learnable. You were either born that way and had this marvelous gift, or you weren't."

Of course, there are still brilliant musicians, but creativity is far from just "artsy-ness". It is the capacity to work across domains of knowledge that are normally held separately. Creativity, then, can add value to economic productivity and aids in design improvement and sustainability.

Why has creativity become such a crucial issue today? And what does it mean for the Singapore classroom?

The need for creativity

"My generation has solved all the easy tasks," says Erica.

And in the wake of the baby boomers, today's generation is left in the lurch. "We're leaving all the difficult tasks for the next generation," she explains.

"And I feel sorry for young people, because baby boomers are saying, 'We'll leave you trying to find a cure for cancer, we'll leave you trying to find a cure for climate change, we'll leave you with all those things, and we'll wave you goodbye.'"

Grooming the next generation to tackle these thorny issues begins in the classroom. Thus, creative thinking is crucial as a learning outcome. This changes the notion of the role we, as teachers, play in preparing our youth for the future.

Low threat, high challenge

The best environments for building creativity are what Erica calls "low threat, high challenge" environments.

"We minimize the threat of failing exams, and that the teacher's going to be angry with them. And we need high challenge, so that even our best performers experience what it's like not to know things. That's what we need, kids who know what to do when they don't know what to do."

And that's a quality teachers should develop, too—knowing what to do when you are in a zone of discomfort. By being a leading learner in the classroom, rather than a knower, you welcome error openly. Erica calls this approach "meddling in the middle".

The Sage, the Guide and the Meddler

Erica outlines three main pedagogical approaches, and discusses their role in the context of learning the Shakespearian text, *Macbeth*.

1. *Sage on the Stage*

   A Sage is someone whose word is so sacred that their authority goes unquestioned. The Sage positions him or herself as an all-knower whose job is to instruct, and students take on a passive role in the classroom.

To teach *Macbeth*, the Sage would simply read and explain the play to the students. The students tend to lose interest in the lesson.

2. *Guide on the Side*

A Guide tries to deviate from the rigidity of the Sage and instead focuses on the students' interest. Their good intention is to "guide" students, helping them understand the tasks at hand. The teacher takes a passive role, and students get bored and become passive, too.

To teach *Macbeth*, a Guide may show the class a modern film version of the play, thinking the students might access the ideas best this way.

3. *Meddler in the Middle*

The Meddler can be thought of an "assembler, editor, or designer". He or she is literally in the middle of the students, interacting with them and engaging them in dialogue. The Meddler is a knower in terms of understanding, but models the curiosity of a learner.

To teach *Macbeth*, the Meddler would ask questions like, "If no man of woman born can harm Macbeth, how can he die?" Or, "If Macbeth will never be overcome after the forest moves, what does that mean?"

Where does the Singaporean teacher stand?

"There's a time to instruct, a time to guide, and a time to be a meddler," says Erica. Teachers must exercise their professional judgment in knowing when to take on which of the three roles.

"Whether you're a Sage, Meddler, or Guide, you have to engage your students." But this new disposition may be hard to model, given our strength in teaching for exams.

"In Singapore, assessment drives everything," Erica concedes. "But Singapore might have gone as far as it can go with that traditional instruction, traditional exams, and traditional success."

Now that Singapore already has basic literacy and numeracy, and the bilingual policy boosts mental agility, what next?

"The issue is: Can Singapore jump to the next level in terms of developing creative capacity for employability as global workers?" asks Erica. "Because people who do routine tasks and do routine transactions will be a dime a dozen worldwide. And exams basically are routines."

"High-end employment calls for creativity, not just credentials," she stresses. "How creative is Singapore going to be?"

Further reading

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McWilliam, E. (2009). Teaching for creativity: From sage to guide to meddler. *Asia Pacific Journal of Education, 29*(3), 281–193.

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LANGUAGE ED

Putting words in their mouths

Our students can talk for hours on end with their friends in school or on the phone. But when asked to describe a picture or to identify connectors in a passage, many students are often at a loss for words. How can we get our students to talk more in class?

Article highlights

- How can group work be effectively incorporated into the language classroom?
- What are information gap activities?
- How can information gap activities be used to enhance language learning?

When asked to describe a picture or to identify connectors in a passage, many students are often at a loss for words. They struggle with articulating their thoughts and expressing themselves clearly.

But speech is a crucial part of learning a language. And come 2010, changes in the English Language syllabus will focus on developing oral confidence and grammar knowledge.

How can we get our students to speak well and confidently? A series of research projects led by Dr. Rita Silver explores how the power of group work can be harnessed to help students learn the English language.

The power of group work

It is only when students start talking in order to be understood that they learn the language well, says Rita.

She recommends the use of group work in the language classroom to achieve this end.

"The real power of group work in learning language is getting the students to discuss in depth until they understand each other," Rita explains.

Sometimes, our students need that extra push to get them to actively communicate with each other. They need to learn both to speak and to listen to what the other person is saying. Such activities are not used enough in the classroom, contends Rita.

Creating an information gap

In a series of four projects, Rita and her team explored how teachers can get students talking more in class—by providing them with less information.

Using what are called *information gap activities*, students have to work in groups to piece together bits of information. The activity requires them to obtain the missing bits of information from other students.

For example, in a picture differences activity, two students are given the same picture, save for some crucial differences. They sit so they cannot see the other's picture and then try to find out how the pictures differ—by discussion alone. While trying to find the differences, the students invariably describe parts of their picture.

To complete the task, students are pushed to articulate themselves well enough to be understood. They also need to understand what the other student, who has the required information, is saying. This calls for deeper discussion among students, facilitating a dynamic language learning process.

Such an information gap activity elicits richer and more detailed descriptions from students, says Rita. It is also easily done by turning a picture description activity into a picture differences activity.

Picture Differences

Rita suggests using spot-the-difference cartoons in the classroom. These are readily available on the Internet or in the local newspapers and magazines.

1. You could clip them out and enlarge them. Coloured-in pictures will get the students to talk more.

2. Students could then be split up into pairs or fours. One person gets picture A, and the second person gets picture B. Then, they have to try and find out what's different. In this process, the students have to describe their picture. For example, one student says "I have a picture of a flower", and the other student says, "I don't have a flower, what flower?" And so on.

3. At the end, the students should have figured out about 5–7 differences. By then, students would have a lot more to say, and you get a much better composition.

This activity can be repeated with new materials, and can be tailored to suit your time constraints. As the oral discussion may take about half an hour, the activity can be made less time-consuming by integrating it with other activities.

Such an information gap may be introduced in a grammar activity, or reading or writing activity.

Focus on language, not procedure

In information gap activities, the focus is on the language used, rather than how students do the activity. For teachers, this means placing an emphasis on language rather than procedure when guiding the students in doing group work.

For example, Rita describes an activity where students are asked to re-order pieces of a newspaper article. Each student in a group is given a different passage of the article. They then try to guess what the article might be about, and what part (middle, beginning, or conclusion) their passage is about.

Rather than asking students what they think the main idea is, or what the key words of the text are, teachers tend to take a procedural orientation and tell students things like, "remember to take turns" or "remember to read the headline". As a result, students just do what is required of them, without learning much about language.

"You have to be able to pick out the language items, like key words, and repeating words, that provide coherence in the article," says Rita. "When you point out linking devices, key words, synonyms, students learn the language better."

A new frame of mind

Information gap activities proved effective in Rita's projects on group work. The research also showed that these activities can be easily integrated into English Language lessons in Singapore primary classes, and are effective in engaging the students' attention.

The greatest challenge appears to be teachers' procedural frame of mind, which may come in the way of a language-oriented way of teaching, so that students can learn the language better.

Further reading

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Silver, R. E. (2008). *Peer work, peer talk and language acquisition in Singapore primary classrooms* <http://www.crpp.nie.edu.sg/~pubs/CRP8_04RES_FinalResRpt.pdf> (Final Research Rep. for Project No. CRP 8/04 RES). Singapore: National Institute of Education, Centre for Research in Pedagogy and Practice.

Online resources

- http://kidsfront.com/find-differences.html

- http://puzzles.about.com/od/opticalillusions/ig/SpotTheDifferencePuzzles/

- http://www.eslprintables.com/buscador/buscar.asp?nivel=any&age=0&tipo=activity-card&contents=spot+the+differences&B1=Search

Read more about this project:

The *Peer Work, Peer Talk and Language Acquisition in Singapore Primary Classrooms* <http://www.crpp.nie.edu.sg/course/view.php?id=272> project investigates the use of pair and groupwork in lower primary English language and content courses, focusing on the language use and language learning within pair/groupwork.

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MATH ED

Teaching students to ask questions

After spending 10 minutes explaining a math concept to the class, the teacher stops and asks, "Are there any questions?" The class turns absolutely silent and many students cast their eyes downward. The teacher coaxes before a brave student gingerly asks, "We do not understand—could you please explain everything again?"

Article highlights

- Why is student questioning important?

- What types of questions may students ask in a math lesson?

- How can teachers encourage students to ask appropriate questions?

Why is student questioning important?

One of the aims of Curriculum 2015[1] is to prepare students to become self-regulated learners so that they can think and learn independently. Such learners must have the mindset to ask questions in order to deepen their understanding and the ability to frame appropriate questions for this purpose.

Some students are fearful or shy to ask questions in front of their classmates, thinking that their questions are "stupid". Others may not know how to ask appropriate math questions because they have not been trained to do so.

Why is it important for students to ask questions about their math work? Let us consider two psychological reasons.

1. They will learn better and understand more when they can clarify their doubts through asking questions.

2. They can learn from feedback to their queries, whether the feedback is given by the teachers or classmates. By asking questions, the students engage in elaborating on and integrating what is being learnt in an active rather than passive way.

Although many studies have been conducted on the impacts of different types of math questions *teachers* ask in lessons, there has been limited discussion about how to encourage *students* to ask their own questions and how this might influence learning.

The *Enhancing Mathematics Performance* (EMP) study[2] included a small pilot to investigate this technique among some primary and secondary students.

Types of questions students may ask

Math learning often deals with four aspects: *Meaning, Method, Reasoning*, and *Application*. A variety of questions may be asked about each of these aspects.

Some sample questions that the students can ask are shown in Figure 1. The questions are printed on laminated cards with an aspect labelled on one side and the sample questions on the reverse side. These are called Student Question Cards or SQCs.

The students can fill in the ellipses (…) with words related to the lessons. Each set of questions also includes an option for "Your own question", for students to ask their own questions.

Meaning	**Method**
M1: What do you mean by	Md1: Can you show us how to do this problem in another way?
M2: What is the difference between .... and	Md2: Can you explain/show us this step (....) again?
M3: Can you use a diagram to show	Md3: What will you do next?
M4: (Your own question)	Md4: (Your own question)
Reasoning	**Application**
R1: Why do you do that ....?	A1: Why do we study this topic (....)?
R2: What happens if you change .... to ....?	A2: How do we use this (....) in everyday life?
R3: (Your own question)	A3: (Your own question)

Figure 1. Student Question Cards

How can teachers encourage students to ask appropriate questions?

Teachers can design their lessons to include specific question times (QT) for students to ask questions. During these QTs, encourage students to refer to the SQCs to find a question to ask about that part of the lesson.

It has been said "I hear and I forget. I see and I remember. I do and I understand." We wish to add to this saying, "I question and I learn".

Teachers may try different approaches to get their students to learn to ask meaningful questions, including the following:

- Ask every student to choose a question from the SQCs and call on a few of them to ask their questions. This forces every student to think about what they are learning.

- Ask students who really have doubts about that part of the lesson to ask a question from the SQCs.

- Focus on a particular aspect, for example, only reasoning questions. Change the focus during the lesson and across several lessons. This will help students to become familiar with all four ways of thinking about math.

- Call on specific students to ask questions from the SQCs. This will encourage participation from as many students as possible, including those who normally keep quiet in class.

- Organize students into groups, allow them to discuss the questions to ask, and pick a few groups to ask their questions.

Once a question has been asked, the teacher has to answer it as carefully as possible. The class should pay attention to the teacher's answers to these questions.

The specific questions on the SQCs serve as scaffolding at the initial stage to promote student questioning. With sufficient practice, this scaffolding using the given question prompts can be steadily decreased so that the students become better at asking their own questions.

What has been learned about using this student questioning technique

Two primary and two secondary Math teachers participated in this part of the EMP study. They designed their lessons to incorporate QTs. Every student was given one set of SQCs to use during the study.

The teachers used different ways of selecting students to ask their questions. This flexibility is important to allow teachers to become comfortable with the new teaching technique and to match it with their teaching objectives.

They mentioned that this technique helped to break the monotony of the lessons. It was also useful in getting the quiet students to become more active, though it was sometimes challenging for the teachers to give good answers on the spot to students' questions.

The students generally found the SQCs easy to use, and the primary students reported enjoying the use of the SQCs more than the secondary students. Some students mentioned that the SQCs helped them to formulate questions and the QT gave them a chance to ask questions, while others did not like to be forced to ask questions or were afraid that the teacher would pick on them to ask questions.

A concern was the extra time for the QT would reduce the time to "cover" the syllabus. Perhaps, when students are competent at asking their own questions and eager to think about the answers, they will become self-regulated learners, making it easier for teachers to teach and to "cover" the scheme of work.

Notes

1. The vision for C2015 is *Strong Fundamentals, Future Learnings*. This means having a clearly defined educational philosophy in school leadership; clear strategic intents and direction to guide the national and school-based curriculum; school autonomy to innovate at school and classroom level; and a comprehensive mechanism to evaluate if students have acquired the strong fundamentals and are prepared for future learnings, to ensure school accountability. (Ministry of Education, 2009)

2. The *Enhancing Mathematics Performance* (EMP) study was developed to understand the characteristics of pupils who were weak in Mathematics.

Reference

Ministry of Education. (2009, February 17). *Recent developments in Singapore's education system: Gearing up for the future.* Retrieved November 12, 2009, from http://www.bic.moe.go.th/fileadmin/BIC_Document/B2/ASEAN/regional09/Singapore.pdf

Read more about this project:

Wong, K. Y., & Quek, K. S. (2009). *Enhancing mathematics performance of mathematically weak pupils: An exploratory study* (Final Research Rpt. for Project No. CRP 47/03 WKY). Singapore: National Institute of Education, Centre for Research in Pedagogy and Practice. Retrieved October 23, 2009, from http://www.crpp.nie.edu.sg/~pubs/CRP47_03WKY_FinalResRpt.pdf

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SCIENCE ED

When common sense isn't good enough

What is "matter"? If your students define matter as anything they can see, touch or feel, they are approaching the question from a commonsensical perspective. So how can we help your students go beyond the commonsensical to the scientific?

Article highlights

- What is the difference between common sense and scientific knowledge?
- What is Progressive Science Building Inquiry?
- What are the benefits of this approach?

From common sense to science

Prior research in Science education shows that young learners tend to define matter based on what they can observe (So, Seah, & Toh-Heng, 2009).

But as students of Science, they must be able to articulate the properties of matter and to identify and differentiate its three stages (i.e., solid, liquid and gas).

Assistant Professor So Hyo-Jeong shows how you can use the *Progressive Science Building Inquiry* cycle to help your students move from this common-sense theory on matter to a scientifically correct one.

What is Progressive Science Building Inquiry?

The Progressive Science Building Inquiry cycle is a collaborative approach that "focuses on shifting classrooms from a teacher-directed place with a *task-oriented culture* to a student-centered place with a *collective inquiry culture*" (So et al., 2009).

In other words, teachers become the facilitators of their students' knowledge-building process. They design and provide activities that would encourage their students to learn by "extended questioning and explanation-driven inquiry".

In this instance, Hyo-Jeong and her team worked with Primary 3 Science students to find methods teachers can use to shift students' everyday views to scientific conceptions of matter.

A common pitfall

Research shows that many collaborative learning approaches fail because teachers have the misconception that students already know how to work together.

Teachers must first create a classroom environment where students are comfortable sharing their ideas with each other. For example, Hyo-Jeong used a simple method called Thinking Cards (see box story).

Once the students are ready to work collaboratively, teachers can then incorporate the use of the Progressive Science Building Inquiry cycle in their teaching.

Ways to build an inquiry culture

Hyo-Jeong's team used both traditional pen-and-paper activities as well as ICT-supported methods in this study.

Low-tech: Thinking cards

All you need are coloured cards and a board.

Let's say you have prepared cards in yellow and green, for example. Encourage your students to write their ideas on the yellow cards. And on the green ones, they can jot down what they need to learn in order to improve on their ideas.

Get them to pin all the written cards on a board so that every student can read the cards and make comments on them. Students are also encouraged to reorganize the cards to group similar ideas together.

High-tech: Knowledge Forum

Knowledge Forum is a computer software specially designed to support the knowledge building process by allowing students to post and share ideas with each other. The research team considered this to be a vital tool to

help students improve their understanding by "reading, connecting, questioning, and contributing ideas" (So et al., 2009).

How does the cycle work?

There are four stages to the Progressive Science Building Inquiry cycle. They are: *Idea Generation*, *Idea Connection*, *Idea Improvement*, and *Rise Above*.

Stage 1: Idea Generation

Teachers initiate the process by asking open-ended questions. The students are encouraged to express any thoughts that come to mind in response to these questions.

Stage 2: Idea Connection

Teachers should then encourage them to compare their ideas with those of their peers to find out the differences and connections.

Stage 3: Idea Improvement

Laboratory, classroom or outdoor activities are conducted so that students can expand their knowledge to build on their ideas.

Stage 4: Rise Above

Reflecting on what they have learnt from their peers and the results they get from their test, the students work together to come up with better and more accurate answers to the teachers' initial questions.

Table 1 shows examples of activities that were used in the lessons on Matter.

Good and bad news

Students were able to improve on their initial understanding and correct their misunderstandings by reading, connecting and questioning each other's ideas. They were also able to pick up concepts that they were not aware of initially.

Such an environment was also beneficial for both high- and low-achieving students as the students enjoyed working with their friends and learning from each other.

But Hyo-Jeong admitted that it is hard to foster and sustain an inquiry culture in the classrooms.

The level of participation is highly dependant on the students' literacy abilities. A lack of literacy skills may prevent them from expressing their ideas and hinder them from following instructions and interpreting ideas from their peers accurately.

Researchers and teachers can work on "how students can be equipped with linguistic tools and skills, specifically those relevant to the language of school science that will help them to be a better scientific knowledge builder" (So et al., 2009).

Stage	Description of learning activities
Idea Generation	*Trigger activity:* Each group of students was given a set of different materials and told to classify them into groups. Teachers provided scaffolding for the trigger activity with the following questions: a) what is different/similar about all these items? b) do you see classifications among these items? c) what does one classification have that the other doesn't? *Idea generation:* Students discussed collaboratively and wrote down their classifications and reasons. After this, each group shared their reasons for the classifications made.
Idea Connection	*Concept map:* In classrooms, teachers used concept maps to help students connect ideas. The concept maps were co-constructed with students and focused on the states (solid, liquid, and gas), properties and examples of Matter. *Knowledge Forum:* In computer labs, students used Knowledge Forum to type in their ideas and other information they may have sourced on their own.
Idea Improvement	*Lab activity:* Students conducted the hands-on experiment showing water moving from solid to liquid to gaseous stages. Students write down their observations on worksheets. *Knowledge Forum:* Based on the lab observation, students typed in their new ideas and information into Knowledge Forum.
Rise Above	Students worked together to formulate more inclusive and higher order understanding at both the individual and community levels.

Table 1: Learning activities for the lesson on Matter (from So et al., 2009)

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So, H.-J., Seah, L. H., & Toh-Heng, H. T. (2009). Designing collaborative knowledge building environments accessible to all learners: Impacts and design challenges. *Computers & Education.* Retrieved November 2, 2009, from http://dx.doi.org/10.1016/j.compedu.2009.08.031

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HOT TOPIC

Evidence-based Teaching

How was your year? Did you teach well? How do you know? How much of your teaching was based on experience, and how much on research evidence? What were the main sources of information you used to design your teaching?

Consider this: You need a surgeon to perform a medical procedure on yourself or a loved one. Would you choose the one with more years of experience, or the one with a higher success rate?

Or how about this: You need a tutor for your child, who desperately needs some extra help to pull up his grades. Would you appoint the one who has had more teaching experience, or the one who has managed to produce more A students?

For many people, we want to see quantifiable outcomes or some kind of proof. And while the experience of a surgeon or tutor is not to be dismissed, we would feel reassured if we had evidence of success.

Thus, in almost every profession where consistent outcomes are valued, success is not left to chance.

There are tried-and-tested systems in place to ensure a high chance of success. Practices are formed and informed by research—a systematic and ongoing process of analysing and evaluating what works and what doesn't.

We see this in medicine, finance, aviation, advertising, and increasingly, in education.

Evidence vs experience

For a profession that has the potential to impact many lives, it is interesting that much of what we do in the classroom is still largely based on experience.

In medicine, for example, we understand the importance of abiding by evidence-based practices, as failure to do so could cost lives, literally. Some have suggested that teaching likewise needs to be more informed by research evidence, especially since there are so many young lives at stake.

Evidence-based teaching is teaching that benefits from research into what works best in the classroom (Best & Thomas, 2007, p. 57).

Educational research brings together the experiences of thousands of teachers and expert researchers. By tapping on the collective wisdom and experience of many other teachers, research evidence helps us make more informed decisions about how we teach, and helps us to design the most effective learning experiences.

To what extent is your teaching based on research evidence?

The idea of evidence-based teaching is closely related to the concept of research in education.

> The purpose of educational research is to bring our assumptions and perceptions about the teaching-learning process to a level of consciousness such that we can talk about them and use this knowledge for decision-making. (Brause & Mayher, 1991, p. 61)

In the context of the school, this is often practised as *action research*.

Action research is a form of "self-reflective enquiry" (Carr & Kemmis, cited in Smith, 2007). It provides insights that can enable an improvement in teaching and learning (Best & Thomas, 2007, p. 157).

Research then becomes in essence a process of discovery, of learning, or personal inquiry. And when many teachers come together as researchers, the potential impact in terms of teaching and learning can be considerable.

It doesn't take very much to get started on action research:

- Read more about a specific aspect of learning that interests you.

- Attend a conference that allows you to interact with like-minded educators and leading thinkers in the area.

- Speak to your colleagues about engaging in some action research in your own school.

You may also wish to read "Are you a knowledge maker?" <http://singteach.nie.edu.sg/issue-18-mayjun-2009-/110-are-you-a-knowledge-maker-or-a-knowledge-user.html> for more ideas.

References

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Brause, R. S., & Mayher, J. S. (1991). *Search and re-search: What the inquiring teacher needs to know.* London: Falmer Press.

Smith, M. K. (2007). Action research. In *encyclopedia of informal education* (infed). Retrieved November 5, 2009, from the infed Web site: http://www.infed.org/research/b-actres.htm

Sharing your action research

Do you have an action research project to share? *SingTeach* would like to help you put your research within the reach of fellow teachers in Singapore. Write to us at sgteach@nie.edu.sg