TEACHER ED

Are you a knowledge maker?

A knowledge maker is one who makes or creates knowledge. A knowledge user, on the other hand, is one who does not question but simply employs or puts the knowledge into practice. As a teacher, which would you rather be? Read on to find out how you can become a knowledge maker through action research.

Article highlights

•   How action research benefits teachers

•   How to start an action research

•   How to deal with problems that arise

Tan Wah Kiat is a knowledge maker. A former teacher and now pursuing his doctoral degree in Queensland, he is a firm believer of teachers doing research. Wah Kiat has had his fair share of ups and downs with action research projects during his years as a teacher.

Based on his experience, Wah Kiat shares with us his motivation for conducting action research and his advice for teachers who are considering embarking on such research.

What is educational action research?

Educational action research is a form of self-reflective inquiry undertaken by teachers and/or students within social situations.

What is the purpose of action research?

There are three main purposes:
1.   To improve the rationality and justice of the teacher's own practices
2.   To improve the teacher's understanding of these practices
3.   To improve the situations in which the practices are carried out

Educational research is *not* merely a tool to prove the efficiency or effectiveness of particular pedagogy or intervention. It is not about being "right".

It is essentially a framework to think about learning that embodies all the elements of competent practice (Cochran-Smith & Lytle, 1999). These elements include subject matter knowledge, knowledge about the disciplinary foundations of education, human development, classroom organization, pedagogy, assessment, the social and cultural contexts of teaching and learning, and knowledge of teaching as a profession.

Why should teachers embark on such research? What are the benefits both professionally and personally?

If we hold fast to the stated objectives above, action research allows the teacher-researchers to explore and question their own and others' interpretations, practice, and ideologies.

This is advantageous to teachers who want to develop their practice by analyzing existing contexts and identifying elements for change. The rigorous process enhances teachers' professional development through the fostering of their capability as professional knowledge makers, rather than simply as professional knowledge users.

All participants involved in the research could also benefit on a personal level because the emancipatory process gives the opportunity for individuals to make genuine change and improvements.

What issues should they consider researching?

Presently, the majority of action research projects conducted by teachers in Singapore are focused on improving academic outcomes (Tan et al., in press). I propose a broader understanding of action research with greater focus on issues of equity and social justice.

For example, teachers may consider researching on how they use gendered language in their classrooms. For the triangulation of data, they may audiotape

and analyze their own lessons, coupled with personal journal entries of their reflections on the lessons and interviews with the students in the class.

How should teachers initiate or design a quality action research?

Identify a problem or issue that is close to the heart. Never create a problem to solve or work backwards with a solution in mind.

Read relevant literature. It is always good to start with some background knowledge of existing research done in the field.

Start small by designing a pilot study and take it as the first cycle of action research. The pilot study may help decide the feasibility of data collection methods and refine the research questions.

It is also important to have a critical friend to always question without offering too much advice. The rationale is really for the teacher-researcher to reflexively verbalize and organize the design of their action research.

What are some potential problems teachers might encounter? What can they do in such situations?

Time management is often a major problem for teachers with ever-increasing workloads. It is typical of teachers to complete action research projects with minimum fuss and attention when they view it as an additional burden. Schools should recognize teachers who are engaging in action research and their workload should be negotiated.

Perhaps one of the biggest problems that teachers may face is the fear of telling "unwelcome truths" (Kemmis, 2006). The Ministry and school leaders can help alleviate that fear and allow, or even encourage, and support teacher-researchers to critically examine and question policies and strategies that may seem oppressive.

Tell us about one of your action research projects.

I conducted an action research on the gendered practices of PE teachers in my school.

I created a "book of moments" for the PE teachers to record incidents where they felt represented either positive or negative experiences. This was followed by interviews and lesson observations with them.

I embarked on this project because I realized through the literature and reflexivity that my personal practices are gendered, even though I always thought that I was impartial.

What advice do you have for teachers embarking on action research?

From my personal experience, don't be upset by failures or lack of cooperation from participants. These are usually wonderful data that helps shape your next cycle of action research.

Also, we have to start believing that "to find bad news is good news" for action research!

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LANGUAGE ED

Don't just test comprehension, teach it!

All teachers hope to have students who are proficient and independent readers, and who will become lifelong learners. How do we ensure that students really understand what they're reading? Researchers are helping teachers understand just what they can do about it and why it's so important.

Article highlights

- Why are reading and comprehension so important?

- How can teachers help students read better?

- What does research tell us about reading intervention?

Many parents seem to think that when it comes to reading, it is the quantity of books read that matters. This emphasis is seen in schools as well. Our children thus try to read as many books as possible.

But more important than the number of books read is how much of the text has been understood. Children may be able to decode words and pick out their meanings but they may not have comprehended the text in its entirety.

In fact, data gathered from the School-based Reading Innovation Project shows that it is not uncommon to see students attaining high scores for decoding in reading assessments, but score poorly for comprehension.

There is also the tendency for schools to *test* rather than to *teach* comprehension.

Testing comprehension involves asking a series of questions in order to ascertain students' understanding of the text. On the other hand, teaching comprehension focuses on equipping students with a set of comprehension skills to assist them in understanding texts thoroughly.

The importance of comprehension

Research has shown that reading and comprehension correlate with academic achievement in the long run. Students who truly comprehend texts gain an in-depth understanding of the text. This enables them to relate the knowledge to what they have previously learned as well as to what they may learn in the future.

A good reader, one who is able to comprehend what is read, should be able to do the following:
1. **respond** creatively and critically to the text;
2. have a "global" **understanding** of text, that is, be able to comprehend texts as a whole, and not just individual sentences and paragraphs; and
3. **connect** the text with oneself (the reader), with other texts, with the world and life in general.

Facilitating students' comprehension

Comprehension is a complicated process that involves the interaction of two factors—the text and the reader.

Text factors have to do with how a text is put together. It includes aspects such as text structure (the way a text is organized), paragraph structure, different strategies that writers use in constructing the text. These are things that teachers can examine together with their student.

Reader factors refer to a set of behaviour that a good reader brings to undertake the comprehension task. Teachers can help students to develop some of these behaviours:
1. Activating prior knowledge while reading
2. Making predictions
3. Previewing text features such as book blurb and title
4. Using organizational strategies in organizing knowledge
5. Using metacognitive strategies such as inferring and summarizing
6. Connecting text to personal experience

Teachers can systematically and explicitly instruct students on these strategies during reading comprehension lessons. They can demonstrate and model the use of the strategies to help students translate them into practice.

Teaching the teachers

In Singapore, reading instruction at schools may be further enhanced to develop students into proficient and critical readers—readers who can not only decode the meaning of individual words but also be able to comprehend the meaning of whole text at different levels.

A study undertaken by the Centre for Research in Pedagogy and Practice at NIE investigated the reading instruction in a primary school. Several areas of the programme were chosen for enhancement, one of which was in the teaching of comprehension. Teachers attempted to modify their reading instruction to include the instruction of comprehension strategies.

Reading with comprehension is one of the components essential for developing proficient and independent readers. To facilitate text comprehension, students should be equipped with comprehension strategies first. This will give them an advantage in text comprehension and in turn enable them to perform better in their comprehension task.

Investigating literacy instruction

SingTeach speaks to Assistant Professor Chitra Shegar, who tells us more about the School-based Reading Innovation Project.

How did this project investigate the nature of literacy instruction?

This project was carried out with teachers in Primary 1 and 2 of a neighbourhood school, with the aim of enhancing reading instruction in the school. To get an overview of the nature of reading instruction in the school, I observed the teachers over an entire unit of lessons.

Following that, I mapped out the school's reading instruction programme and asked the teachers if it was a true representation of the school's programme. They then compared their programme with internationally recognized, comprehensive reading programmes. This helped them identify gaps in their school's reading instruction programme and revealed areas that need improvement.

A comprehensive reading programme develops readers into proficient critical readers. In such a programme, children will be systematically instructed on phonics and comprehension strategies. They will also be shown the connection between reading and writing. In addition, it should also include a programme to foster the love of reading in children.

How were these components incorporated into the project school's curriculum?

Those areas identified for enhancement were addressed through professional development workshop. Through these the teachers were provided with specific knowledge and techniques for use during their reading instruction. Following the workshops teachers designed new lessons plans to institute changes. Feedback was given on the lesson plans as well actual conduct of lessons.

Resources
Look out for the book *Techniques for Developing Readers and Writers* (edited by Dr Chitra Shegar and published by Cengage Asia), due out in early 2010, which will showcase a variety of techniques used by the teachers to develop students as readers and writers.

Visit the project's webpage <http://www.crpp.nie.edu.sg/ course/view.php?id=407> or contact the project's principal investigator, Dr Chitra Shegar <http://www.ell.nie.edu.sg/ innerPages/STAFF/staff_CSA.htm>, to learn more about this project.

MATH ED

Stop drawing models in secondary math?

"Why can't I use the model method to solve this problem? I can still get the answer!" This is a common complaint received by secondary school Math teachers. Some have even resorted to banning the use of the model method in class because they believe it prevents students from learning to use letter-symbolic algebra. But is this belief valid?

Article highlights:

•   Should we discourage students from using the model method in secondary school?

•   How can teachers use the model method to teach letter-symbolic algebra?

To solve word problems, it is important for students to represent the information presented in the word problems. Students as young as Primary 2 are taught to construct model drawings to help them visualize the word problems.

Because of the familiarity with the model method, many students continue to use it even at the secondary school level, where they are taught to use the more abstract letter-symbolic algebra.[1] (Ng, 2003)

However, many secondary school teachers are concerned that continued use of the model method may prevent students from learning letter-symbolic algebra, which is the preferred tool.

Letter-symbolic algebra is also the language of higher mathematics, making it the gateway for students who want to further their mathematical study. Letter-symbolic algebra can be used to solve all types of algebra word problems, while the model method is limited in its applications.

When efforts to discourage the use of the model method fail, some teachers resort to desperate measures such as banning the use of the model method in their classrooms.

But does the model method really hinder students from learning symbolic algebra?

Model method versus letter-symbolic algebra
The model method and letter-symbolic algebra are methods that can be used to solve algebraic word problems. The main differences are in the manner in which the unknowns are represented and how the value of the unknown is evaluated.[2]

The following, taken from a Secondary 1 Math textbook, is an example of a question that can solved using both the model method and symbolic algebra.

From model to algebra
Suppose Peter has some marbles. He gave 10 to Jane and he had 12 marbles left. How many marbles did he have at first?

left	given
12	10

?
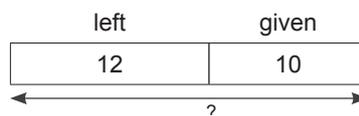
Using models, we find out that Peter had 22 marbles at first.

Now let us use algebra to solve the problem.

Let the number of marbles Peter had at first be x.

left	given
$x - 10$	10

12

x
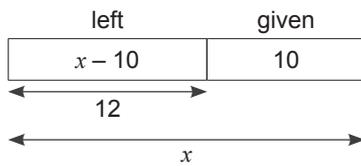
He gave 10 marbles to Jane. Thus, he had (x – 10) marbles left. This is given as 12 marbles.

$x - 10 = 12$
Can you guess the value of x?[3]

(Source: Sin, Chip, & Ng, 2006, p. 111)

Using the model method as a bridge
When the model method was introduced to the curriculum, it was not intended as a tool to help students learn symbolic algebra. However, continuous use of the model method by lower secondary school students demands that teachers take another look at how students' knowledge of the model method can be used to help students learn letter-symbolic algebra.

In a study by Associate Professor Ng Swee Fong, teachers found that the model method and letter-symbolic algebra are related (Ng, 2003). A word problem captured in a model diagram may be converted to algebraic equations and vice versa.

For students to make the transition to letter-symbolic algebra, teachers can help them by asking a series of appropriately targeted questions such as:
• In the model method what do rectangles represent?
• Instead of rectangles, can other objects be used to take over the role of the rectangles?
• Can letters of the alphabet be used instead?

So, instead of banning the use of the model method, secondary school teachers can activate students' prior knowledge of the model method and use it as a bridge to teach letter-symbolic algebra.

What can be done?
Although the connection between the two models was taught to all pre-service teachers, the significance of this knowledge may not be appreciated at that point as pre-service teachers lack actual classroom experience.

Dr Ng and her colleagues (2006) suggest that it may be more useful to target this knowledge at lower secondary school math teachers, who are currently facing the model method-symbolic algebra dilemma.

The important thing is not to stop students from using any method to solve a problem. With understanding comes appreciation. Once students understand what they are learning, they can better appreciate the usefulness and importance of letter-symbolic algebra. Then, they can choose the most effective method to solve problems.

Notes
1. In the current curriculum, students learn the model method first in primary school, before being introduced to abstract letter-symbolic algebra in secondary school.
2. In the model method, rectangles are used to represent unknowns and the arithmetic method is used to evaluate the unknown. In letter-symbolic algebra, letters represent unknowns and the value of the unknown is evaluated using transformational procedures, which maintain the equivalence of an equation.
3. Using letter-symbolic algebra, the answer to this question, expressed as an algebraic equation, looks like this:
   $x - 10 + 10 = 12 + 10 = 22$

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Read more about the Teaching and Learning Mathematical Word Problems: A Comparison of the Model and Symbolic Method *project <http://www.crpp.nie.edu.sg/course/view.php?id=300> by the Centre for Research in Pedagogy and Practice (CRPP). The project is led by Associate Professors Kerry Lee and Ng Swee Fong, from CRPP and the Mathematics and Mathematics Education Academic Group, respectively.*

SCIENCE ED

Cartoons in the classroom

Capturing the attention of and engaging pupils during lessons is at times challenging and frustrating. Yet this is important if pupils are to benefit from the lessons taught. One teacher used cartoons during a Science lesson and found that her pupils not only enjoyed themselves but also gained a better understanding of the concepts. So what is the appeal of cartoons?

Article highlights

- What are concept cartoons?

- What are the benefits of using concept cartoons?

- How can cartoons be used to clear misconceptions in Science?

Concept cartoons as a teaching strategy
Science concepts are often abstract and difficult to grasp, especially for children. And when teachers try to explain them in as simple a manner as possible, they run the danger of oversimplifying these concepts.

It is also common for pupils to develop misconceptions about these concepts. How then can we help our pupils to fully comprehend complex science topics?

One teacher decided to use cartoons to help her Primary 4 class learn about Matter. Ms Farah Aida Rahmat, who was then teaching at Pasir Ris Primary School, also tried to observe and document its effectiveness through action research.

What are concept cartoons?
Ms Farah made use of "concept cartoons" in her lesson. Concept cartoons are "cartoon-style drawings presenting characters with different viewpoints around a particular situation" (Roesky & Kennepohl, 2008, p. 1355).

According to researchers Brenda Keogh and Stuart Naylor (1999), concept cartoons are extremely versatile as a teaching strategy. They may be employed across subjects, such as the development of reading skills in English, or the teaching of problem solving in Math.

Concept cartoons may be also used at different stages of a lesson—as a trigger to get students to tune in, as an activity to elicit pupils' responses and generate discussion, or as a means of summarizing the topic at the end.

Ms Farah found such cartoons particularly useful for clearing up her pupils' misconceptions about the Science topic, Matter.

A teacher's reflections
"[This action research] made me think critically about how my pupils make connections between what they know and what is being taught to them."

This was what Ms Farah noted as she reflected on her action research. She carried out her research at Pasir Ris Primary with the support of the Science and Health Education Department.

The purpose of this action research project was to observe the impact of concept cartoons as a teaching strategy. In particular, she was interested in its effectiveness in addressing misconceptions that would arise in the learning of a new topic.

Ms Farah worked with a Primary 4 class of 40 high-ability pupils. She taught two lessons on the topic of Matter and the pupils made a presentation during the third lesson. The lessons were modelled on the 5E-inquiry model of teaching and learning. Concept cartoons were used at different stages of the learning—the *Engagement*, *Exploration*, *Explanation*, *Elaboration* and *Evaluation* stages.

At the end of the study, she observed that her pupils benefitted from the use of concept cartoons in her teaching. The pupils managed to clear up misunderstandings about the topic. And, most importantly, they thoroughly enjoyed themselves!

"When my pupils enjoy themselves while learning, they seem to learn more," noted Ms Farah. "Their engagement throughout the learning journey is essential to the success of their own learning."

Why use concept cartoons?

Clearly, there are many benefits of using concept cartoons.

1. Grabs attention
Kids and adults alike like cartoons. They usually associate cartoons with fun and humour. Concept cartoons thus provide an appealing and non-threatening way to represent ideas. Pupils are more likely to be enthusiastic towards the activity to come and will then be more focused and receptive to learning.

2. Generates participation
In cartoons, the ideas have to be presented succinctly. These ideas can be so thought-provoking that pupils are drawn into "participating" in the dialogue by "becoming" one of the characters, giving rise to vibrant class discussions. The lesson thus becomes more interactive and student-centred as pupils are actively involved in their learning.

3. Develops skills

During discussion of the concept cartoons, pupils have to verbalize their ideas and thoughts. They are motivated to take a stand on the different ideas presented. If they disagree, they may present and defend their points of view. This process allows teachers to gain important insights into their pupils' understanding. Participating in such discussion also lets pupils hone their communication skills.

Using concept cartoons
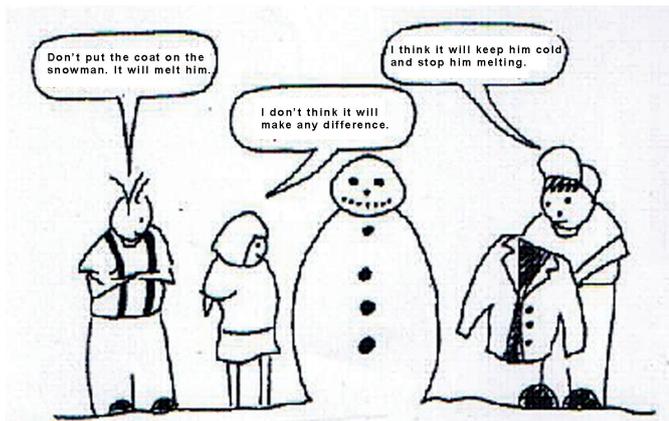
(Source: Keogh & Naylor, 1999, p. 433)

The concept cartoon above was developed to address the misconception that "some materials have the property of making things warm" (from http://www.conceptcartoons.com/). Each character in the cartoon conveys a particular idea "spoken" in the speech bubble.

The cartoon is useful as a teaching tool to invite pupils to voice out their opinions and provide reasons for their ideas. The informal nature of concept cartoons encourages pupils to present their views without fear of being judged. This opens up an opportunity for teachers to probe and clarify their pupils' thoughts on the topic.

Here are some tips for developing your own concept cartoons:

• Base cartoon characters on people or icons that pupils are familiar with

• Choose a context for the cartoons that is familiar to the pupils

• Minimize text used to present the concept

• Concepts or ideas should relate to one central idea or word (Keogh & Naylor, 1999)

Visit the Concept Cartoons website <http://www.conceptcartoons.com> to learn more about concept cartoons and how you can use them in your classroom.

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HOT TOPIC

Who is driving the future of education?

We live in an increasingly technology-enhanced learning environment where the drivers of the future are the youth of today, noted Professor Roy Pea in his keynote address at the 2009 Redesigning Pedagogy International Conference. But are our schools equipped to deal with this reality? Dr Vicente Reyes grapples with this issue as he reflects on the future of education reforms.

"Prof. Roy Pea's central keynote message was about "the value of re-conceptualizing the nature of learning". His speech highlighted how advances in information technology have dramatically reshaped schooling and education, thus the need to re-conceptualize the nature of learning.

It must be noted that discussion about reform in education is not entirely new.

Frustration about the seemingly endless iteration of apparently hollow education reforms have been raised by prominent scholars (Cuban, 1990; Tyack & Cuban, 1997). Reform driven by networks of schools (Lieberman & Grolnick, 1996) and by the irrepressible waves of globalization have similarly been identified (Gopinathan, 1999; Reyes & Gopinathan, 2008).

In most of the literature on school reform, the drivers have undoubtedly been policy makers, researchers and school practitioners (Luke, Freebody, Lau, & Gopinathan, 2005; Mintrom & Vergari, 1998; Yip, Eng, & Chin, 1990). But an insightful point raised by Prof. Pea about the nature of schools deserves reflection:

Digital natives are consumers and producers; schools are unchanged from their parents' generation and schools are not the best sources of information.

From this assertion, he moved on to declare a truly refreshing and captivating message in relation to the lingering questions of school reform and who drives these. Prof. Pea accurately described that this time around, it is the youth who are driving the future, not educators or researchers.

The very current and relevant examples provided by Prof. Pea of how the youth have taken the initiative and have seized learning and have transformed these into an "expansion of imagined fields of action" are certainly convincing anecdotes of a new wave of "technologically-enhanced learning" that are imminent.

As the 21st century leaps forward, we realize that today's generation of digital natives may not necessarily fit the mould of our conventional schools. (One can argue that our current conventional schools are patterned after the 19th century "assembly-line" factories, where our kids go through a metaphorical conveyor belt and are provided with knowledge and skills as they move along one grade level to another.)

Prof. Pea has argued quite compellingly that the drivers of the future are the youth. A pivotal question related to this would be: What then should the roles of researchers, policy makers and school practitioners be in an increasingly technology-enhanced learning environment?

Prof. Pea's keynote has been a powerful platform to jumpstart a conversation towards resolving this question.

Let the conversations continue.**"**

Roy Pea is Stanford University Professor of the Learning Sciences and Co-Director of the Human Sciences and Technologies Advanced Research Center. More information about his keynote address on "Fostering Learning in the Networked World: Trends, Opportunities and Challenges for Learning Environments and Education" may be found online at: http://conference.nie.edu.sg/2009/info/keynote-speaker.php

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Vicente Reyes < http://www.nie.edu.sg/nieweb/dept/loading. do?id=Academic&cid=10584077&ppid=10616881> is an Assistant Professor with the Policy and Leadership Studies Academic Group at the National Institute of Singapore. He has a keen interest in the politics of schooling and governance, policy implementation, school reform and transformation.