INTRODUCING THE CONCEPTS OF SCIENCE THROUGH STORIES: AN INNOVATIVE APPROACH TO COMBINE LANGUAGE LEARNING, SCIENCE CONCEPTS AND ICT

By

Chin Teoi Peng
Institut Perguruan Batu Lintang, Kuching
email: teoipeng@yahoo.com

1.0   Introduction

When the policy to change the medium of instruction in the teaching of Mathematics and Science from Bahasa Melayu to English in 2002 was introduced, it posed special challenges not only for teachers who have been trained in the Malay medium but also for those trained in English, whose professional experience has largely involved the use of Bahasa Melayu as the medium of instruction. I was one of the initial science lecturers asked to assist the English Language Teaching Centre to train school teachers for English in Teaching Mathematics and Science (ETeMS). When we were asked to monitor the progress of school teachers who have undergone the ETeMS training, we saw the host of challenges faced by school teachers especially in the primary schools.

First and foremost, the teachers themselves have English language proficiency problems especially for those under the age of 40. A number of them could not give simple instructions. Therefore, the pupils did not understand what the teacher actually wanted. That inevitably led to poor class control. On top of that, the teachers who were asked to teach Science lack content knowledge as they were never trained in the teaching and learning (t&l) of science.

Back at the college, the same sets of problems beset our trainee teachers during their practicum in rural schools. It was very frustrating for them to see blank faces not comprehending what they were trying to say let alone the science concepts. At least in the rural areas, they have less class control problem but the interest factor was of influence.

Seeing all these challenges that the teachers faced in terms of English language, class control and interest in science, the idea to introduce the concepts of science through stories was born.

2.0   Why introduce the concept of science through stories?

Science has always been considered a "difficult" subject in schools not to mention boring. The way science was taught in schools was very academic

and abstract. Only the top 10 percent of the school population can "learn" science. Unfortunately this fallacy had been ingrained in the school system until now. Content areas of science should be learnt through concepts and understanding of scientific concepts helps to explain a host of phenomena which is the essence of science. Scientific concepts are statements made in a nutshell which only require the learners to comprehend and to see the relationships. The following statements best describe this.

> Scientific concept building is thus a two-way street. Highly abstract concepts are rarely developed spontaneously; such development requires instruction. Nor can in-depth understanding be gained without a knowledge of concrete examples to fill out the skeleton of an abstract concept (Best Teaching Practices, Maryland Department of Education).

Story telling has been used since time immemorial to pass information or to clarify certain concepts or ideas. In Luke 15:11-32**,** Jesus used a parable**,** The Prodigal Son, to illustrate God's love for mankind. The fables of Aesop are well known. Moral values, so intangible, are so easily concretized by simple stories.

In "What is *Storytelling*?", a definition discussed by members of the National Storytelling Association mentioned that "most dictionaries define a story as *a* narrative account of a real or imagined event or events. Stories are the building blocks of knowledge, the foundation of memory and learning."

What better way for young learners to learn a new language and science concepts if not from stories? In the Handbook for Storytellers, "Why Tell Stories?" listed the aims of storytelling. Among the aims gathered from various sources are that stories can:
(1) introduce the child to oral language patterns;
(2) develop a child's listening skills;
(3) introduce classic tales which all well-informed people should know;
(4) aid in vocabulary development;
(5) entertain and amuse the child; and
(6) enrich the various areas of the curriculum, as English, history or science.

3.0   An ICT Approach
The introduction of ETeMS also saw the introduction of Information Communication Technology (ICT) tools in the classroom. To assist teachers in the t&l of Mathematics, Science and English, teachers of these subjects were supplied with laptops and LCDs. These have brought upon a new t&l media in the classroom that is so different from the traditional blackboard or the whiteboard. Classroom t&l has reached the digital multimedia stage.

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T&l with multimedia is seen as a great leap forward in the classroom. It holds endless potentials for teacher to explore t&l strategies and for learners to better grapple with concepts and abstract ideas with multimedia presentations.

According to Wood (1998), attending, concentrating and memorizing are activities. Simply asking a child to pay attention will not work. The material to be remembered and learned must make sense to the child. Teachers faced extra challenges then to engage children attention in the classroom more so with children that have been exposed to media such as television and interactive computer games.

Carla and Jennifer Paschke (2005) in their research "Flashing into a child's mind: The educational impact of children's multimedia on learners satisfaction" stated that at such a critical time in their development, children need to be stimulated and motivated to learn in both the present and the future. Computer technology may be the needed link to put back the enjoyment in learning, thereby securing higher levels of achievement.

Marianthi Papadimitriou (2000) in her writing, "The impact images have on children's learning in a hypermedia environment" stated that visual elements in a hypermedia environment might make the educational procedure meaningful and contribute to the solution of some learning problems that arise from the use of conventional pictures in print. In particular, an analysis of how static as well as animated and dynamic pictures in a hypermedia environment may constitute an auxiliary and supportive agent to children's memory, comprehension, attention and motivation was attempted.

Pouwels (1992) who did a related study of vocabulary acquisition in combination with memory research and perceptual learning styles addressed the impact of multimedia in vocabulary acquisition. He specifically studied auditory and visual modalities and his results showed a positive correlation between the visual modality and items combined with pictorial-verbal aids.

Khalid Al-Seghayer (2001) in his study on the effect of multimedia annotation modes on L2 vocabulary acquisition put forward several pedagogical implications for language learning. According to him, exposing learners to multiple modalities of presentation (that is, printed text, sound, picture, or video) produces a language-learning environment which can have a real impact on learning. Chun and Plass (1998) also found out that "organizing information in working memory seems to be aided by learners making connections between the verbal and visual system, and this helps in linking information to components of the mental model in long-term memory" (p. 193).

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The generative theory of multimedia learning (Mayer, 1997) suggests that presenting explanation in words and corresponding illustrations is effective because it helps guide learners' cognitive processes. In vocabulary learning, learners tend to build visual and verbal cues for retrieving stored information from memory. Storing information in memory is not supposed to be a difficult task, but retrieving it is expected to be difficult. In order to make the task easy for learners, we can provide multiple retrieval cues by integrating two different forms of mental representations.

In order to create effective multimedia instructional materials, two principles need to be considered. The first principle is that instructional materials designed to accommodate individual differences should combine the use of integrated media. Pusack and Otto (1997) contend that it is important to consider that students may have personal modes or combinations of modes that work best for them as individuals. Thus, we must never assume that specific media will be put to the same use or have the same effect on all students. The second principle that needs to be taken into consideration is that, as indicated by Chun and Plass (1997), the selection of the mode of presentation should be based on how it best supports a particular cognitive process. Cognitive processes are said to be supported by the characteristics of the particular mode. Therefore, an instructional designer should make a sound judgment regarding which mode of presentation is more suitable to a given learning situation.

3.0 Putting It All Together

In the design of introducing the concepts of science through stories via ICT, the curriculum areas of science have to be the main focus. The challenge is to look at the curriculum areas, identify the main concepts and build a story around the main concept. For example, in the curriculum areas Year 1 Science, learning objective 1.2 is about the five senses and the part of the body linked with each sense and the learning outcome is pupils are able to say that they use their: eyes to see; ears to hear; noses to smell; tongues to taste; and skin to touch and feel.

The science concept here is clear. The accompanied language acquisition is also clearly stated. The most appropriate story that can bring out the concept and at the same time emphasizes on the language acquisition would be the story about *Little Red Riding Hood* which is a classic children's literature.

The learning objective 1.3 is to link good health with good habits and the learning outcome is about practicing good daily habits and to give reasons for practising the habits. There are no children classics that deal with this theme. The challenge then is to write a story to deal with the theme. In story telling, there are principles to be followed or else the story falls flat and it

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becomes a descriptive essay. In all stories there has to be a hero and a nemesis. There has to be a conflict and the hero will be the person who resolved the conflict. The story must have elements of suspense as what is going to happen next and the ending satisfying. The following writing is an example of a descriptive essay than a story.

Mary's Family

This is Mary's family. She lives in a single story house. The living room is big and beautiful. There have sofa and chair. Sometimes you can see some cockroaches and lizards under the sofa.

This is Mary's parents and her younger brothers. When Mary's parents read the newspaper, Mary's younger brother likes to sit beside them. Mary's mother likes to plant some flowers and green plant and place them in the living room. Mary likes to play with her dolls. Mary has two pets, a dog and a cat. Mary likes her pets very much. Her brother keeps a tortoise and fish in his room.

Mary's family is a loving family. They love each other very much.

Unfortunately, one day a heavy rain came. This caused Mary's house to be flooded. All the things in the house got washed away. Now, can you help Mary find the things that she has lost?

In this essay, Mary is supposed to be the hero and the conflict is the flood. However, it lacked the elements of suspense and the ending is not satisfying.

In the following story, the hero is Chang Er, the conflict is the evil king and the people sufferings. The suspense is what is Chang Er going to do with the magic portion?

The Story of Lady in The Moon

Once upon a time there lived a very cruel king in China named Huang Ti. The people were very scared of him and they lived in fear. Huang Ti wanted to live forever. He found a magic portion that could give made him live forever. His wife, Chang Er, was very sad when she heard the news. If her husband was to live forever, the people would suffer. So she decided to get rid of the magic portion.

When her husband was asleep, she stole the magic portion from his pocket. Suddenly, her husband woke up and found his magic portion gone. He saw Chang Er holding the magic portion. He wanted to take it back from her. To prevent him, Chang Er quickly drank the magic portion. She felt herself growing lighter and lighter until she

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could float. She floated out of the window and found herself floating towards the moon.

Do you think Chang Er can live on the moon?
How are we going to find out more about the moon?

In introducing the concepts of science through stories, the stories need not be long but the content of the stories must cover the learning outcomes. In the following writing to introduce the concept of size (Science Year One, Theme: Learning about the World around us, Learning Area: 1.0 Using our Senses; Learning Objective 1.3: Different sizes, Learning Outcomes: Differentiate sizes: big and small), the writing managed to introduce the concept of size and at the same time, the elements of a good story (hero, conflict, suspense, ending).

> *One day, a group of animals were playing inside a big cave. They were a hippopotamus, a tiger, a bear, a rabbit, an ant, a tortoise, a mouse and a frog.*
> *Suddenly, a <u>big</u> rock dropped and covered the mouth of the cave. They all were trapped inside the cave. If they could not get out of the cave all of them would be die.*
> *The only way they could go out from the cave was through a <u>small</u> hole. But not all of them would be able to get through the small hole.*
> *Only the <u>small</u> animals can get out from the cave. Once out of the cave they quickly went to see the king of the jungle, a <u>big</u> lion to seek for help.*
> *The king thought for a while. "Hmm.., there are so many animals in this jungle. Some are <u>big</u> and some are <u>small</u>. But who can remove the <u>big</u> rock?Monkey? Mousedeer? Buffalo? Rhinocheros? Wild boar? Elephant?"*
> *They all agreed to choose the elephant because he was the <u>biggest</u> animal.*
> *The king called the big elephant to remove the <u>big</u> rock. The elephant tried very hard but he still could not remove the <u>big</u> rock. He needed the helped of the other animals. The animals have to line up from the <u>biggest</u> to the <u>smallest</u> behind the elephant to help him to pull the rock.*
> *At last the rock was removed. All the animals that were trapped inside the cave were saved. They all were very happy and thanked everyone for their help.*

In the writing above, besides the science concept, the language acquisition was also emphasized. In language acquisition, especially for young L2 learners, word repetition is essential. Words repetition in the form of stories

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takes away the drudgery of language learning. It will also reinforce and concretized vocabularies learnt that will helped in long term memory.

Storytelling is an art. The story teller has to be very skillful if the story is told orally. Voice modulation, gestures and eyes movement are essential to keep the audience captivated. For young L2 learner not proficient yet in English, story told orally would be too mystifying for them to understand the science concepts. Research has shown that a large majority of learners are visual learners. Therefore, if the stories can be put into a visual form, the concepts of science as well as the language acquisition would be better learnt.

Charts and big books are often used for visual presentation. With the advent of laptops and LCD, charts and big books are no more effective. Visual presentation would be best done using software such as PowerPoint. PowerPoint is very versatile for visual presentation. Skilful usage of PowerPoint can put across the concepts of science as well as language acquisition very effectively. When a story is told with the aid of PowerPoint, the learners senses of sight and hearing are stimulated. Animated texts and visuals, inserted sound effect and music will enhanced further the sense of sight and hearing in learners. On top of that, replays can be done, thus keeping the essence of the story telling as intact as possible. A teacher telling the same story several times would find it tiresome. On the other hand, young learners love to hear or see the same story over and over as they bond with the characters in the story.

The power point slides below are an attempt to incorporate concept of science, that is, animals' movements, language acquisition (highlighted words) in a story form.
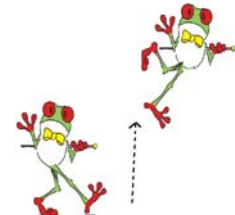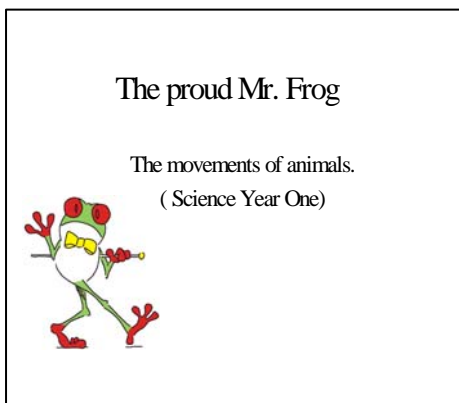
I am the best animal.

3

He said to:

Mr. Craby, the crab,

Mrs. Titi, the tortoise,

Miss Flame, the flamingo

Miss Talipia, the fish

4

"Look I can jump easily with my powerful legs"
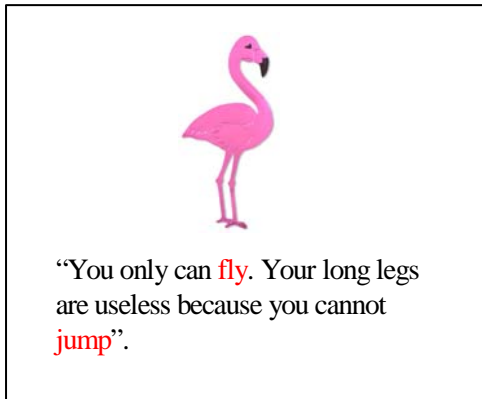
5

He told Mrs. Titi . "You only can crawled slowly".

6

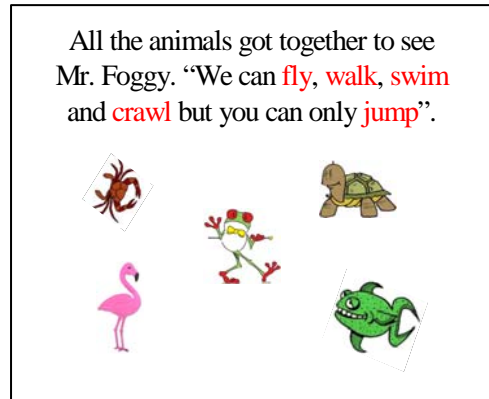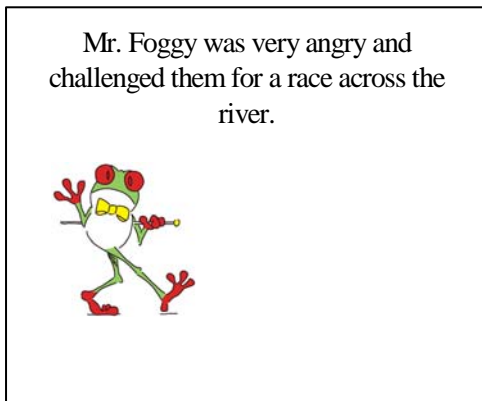" Ha……. You only can walk side ways with your many legs".

7

"You only can swim".

8

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"You only can fly. Your long legs are useless because you cannot jump".

9

All the animals got together to see Mr. Foggy. "We can fly, walk, swim and crawl but you can only jump".

10

Mr. Foggy was very angry and challenged them for a race across the river.

11

They all agreed. Mr. Abit the wise rabbit became the judge.

12

"Ready, 1… 2…. 3….". Said Mr Abit. The race started. Mr. Foggy jumped, hoping to win the race.

13

But poor Mr. Foggy landed into the mouth of Mr. Cobra the hungry snake

14

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Mr. Cobra glided away happily. Soon after that, all animals lived peacefully even though they felt sad and pity for the death of Mr. Foggi.
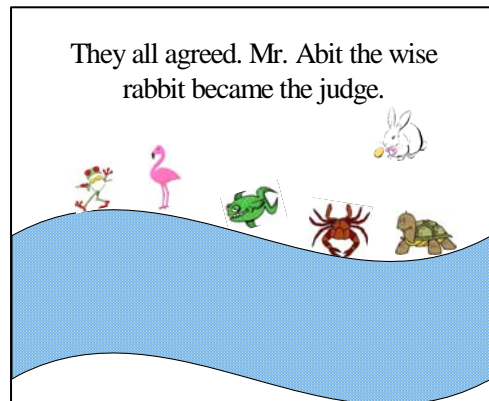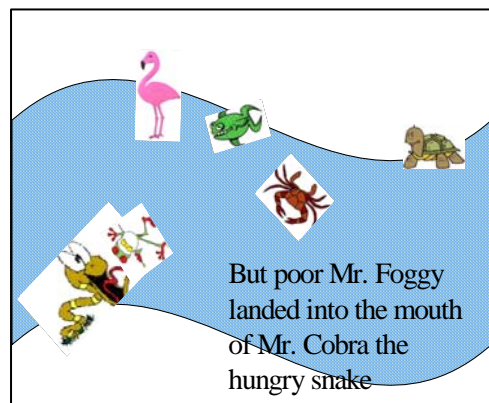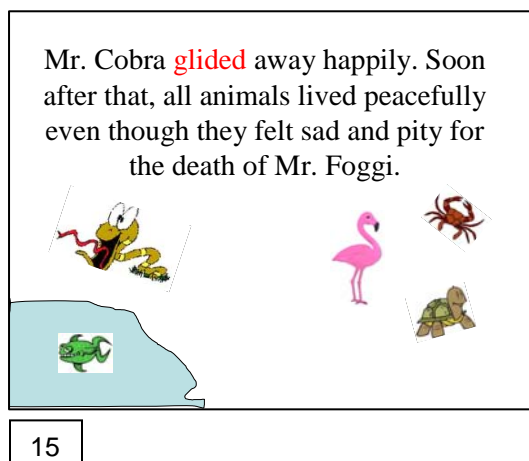
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4.0   In Conclusion

Story is a powerful mean of delivering an idea. In science, the story would be used to introduce the concepts but the actual inquiry discovery hands-on learning has to follow from there. At the end of the lesson, the story can be replay to round up the lesson and also to reemphasize the concepts and the language acquisition. Learning and teaching science in this way has not only fired the imaginations of the learners but also the teachers.

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