

RESEARCH PROJECT: AN INTEGRATIVE TEACHING APPROACH IN SCIENCE

PROJECT TEAM AND CO-AUTHORS

Dr Tan Kok Siang (National Institute of Education, Singapore), Mr Heng Chong Yong (Bukit View Secondary School), Mr Lin Zikai (Bukit View Secondary School), and Ms Tan Shu Hui (Chung Cheng High School (Main))

Lessons Imparting Values Through Science Lessons

As educators, we know how important it is to teach values and life skills in schools. We also know, however, that it is difficult to convince students of the importance of these skills. Some Science teachers decided to experiment with teaching values through the usual Science lessons.

Article Highlights

- What is the link between values and academics?
- How can values be integrated into Science lessons?
- Will teaching values make students more motivated learners?

It is common to hear teachers say that most students are motivated to learn only because the concepts taught in class are assessed. While there are exceptions, where highly motivated students are willing to learn anything *“out of the syllabus”*; these are few and far between. It becomes more challenging to convince students of the importance of learning skills in the affective domain, particularly with easy access to social media and communication systems today.

With more emphasis being placed on imparting values and soft skills, how should we as educators respond? Can teachers really do something effective in this area of affective learning in school?

An Integrative Teaching Approach

In 2010, three Science teachers in two secondary schools experimented with a pedagogy that integrates learning experiences in the cognitive and affective domains. This was part of a 3-year school-based initiative to design a pedagogy and craft curricular materials for primary and secondary school Science lessons. The aim was to impart values and teach positive soft skills and habits to students through Science lessons. This cognitive-affective pedagogy was initiated in 2009 by Dr Tan Kok Siang, a Science Education lecturer in NIE.

The approach involves teaching Science concepts and process skills as usual, through classroom and laboratory lessons. But the lesson also includes a 5- to 10-minute segment where students are asked to discuss and reflect on a daily life experience that may have some similarities to what they have just learned.

For example, students will learn about chemical reactions as required in the syllabus but they may also discuss how the characteristics of these reactions are comparable to certain life events or their personal habits.



(From left) Mr Lin Zikai, Ms Tan Shu Hui, Dr Tan Kok Siang and Mr Heng Chong Yong

Examples of Affective Teaching

In the first school, 32 Secondary 4 Normal (Technical) students were taught the reaction characteristics of the metal potassium and asked to reflect on their social behaviour when involved in a heated argument with friends. Students reported that they were able to associate the violent reaction characteristics of potassium to the danger of violent social behaviours.

In the same school, a Secondary 3 Express Chemistry class was taught the concept of sedimentation. They were asked to observe the difference in appearance between a sample of stirred muddy water and another in which the sand had settled below a clear layer of water.

They then reflected on how these samples were similar to their states of mind - when they were confused or disturbed, and when they were calm and relaxed. Students were able to point out the importance of making critical decisions with a clear and calm mind.

In another school, 11 Secondary 2 Express students compared the rates of reaction of weak and strong acids with pieces of magnesium. They were then asked to identify which acid had reaction characteristics that best represented the way they spend their monthly allowances.

The teacher found that the students' responses accurately described their spending habits. For example, the self-admitted spendthrifts could relate their quick spending habits to the strong acid reaction characteristics.

Teachers' Reflections on Values Teaching

The teachers reported strong interest among students in this 'less-than-usual' way of surfacing affective messages through the usual Science lessons.

They also noted that these learning activities did not require much curriculum time and the conceptual learning was not diluted.

Through classroom activities, the teachers were able to observe their students' personal habits and learning needs. Ms Tan Shu Hui says that these interactions helped her to sway her students' thoughts towards a positive direction. *"This pedagogy has enabled students to relate Science to values in life. The activities have also helped me to recognize the relation between students' responses and their attitudes towards life."*

If every teacher is equipped with such a value system and can infuse values in every lesson, values-centric education will become integrated in their lives and not as a separate subject.

-Lin Zikai, Bukit View Secondary School

Mr Heng Chong Yong found that because the students could relate the values taught to their daily life, teaching the lesson became easier. *"We used to pause our lessons to scold students for misbehaviour or not paying attention in class. This cognitive-*

affective integrative pedagogy reduces the need for scolding and allows us to insert some 'teachable moments' into the lessons."

"Such an initiative is crucial for the C2015 curriculum, where students need to be equipped with certain values and life skills, such as being a confident and self-directed learner, concerned citizen and active contributor," adds Mr Lin Zikai. While this pedagogy is still experimental, he says, *"if every teacher is equipped with such a value system and can infuse values in every lesson, values-centric education will become integrated in their lives and not as a separate subject."*

ACKNOWLEDGEMENT

The Singapore Teachers' Union (STU) is grateful to the Office of Education Research at NIE for permission to reproduce in STU's THE MENTOR two articles with the relevant pictures from volume 4 (2011) of ReEd (Research in Education) and issue No 33 (2011) of SingTeach (<http://singteach.nie.edu.sg>) respectively for the benefit of its teacher-members. In addition, for the article from SingTeach, we thank especially Dr Tan Kok Siang and his research team for their permission to use the text and their group photo.

Reference

Tan, K. S., Heng, C. Y., Lin, Z., & Tan, S. H. (2010, December). *Teaching school science within the cognitive and affective domains. Paper presented at the Global Chinese Conference on Science Education, Hong Kong SAR, China.*