Chapter 9
Fostering Inquiry in Science among Kinaesthetic Learners through Design and Technology

Nazir Amir
Greenview Secondary School, Singapore

R. Subramaniam
Nanyang Technological University, Singapore

EXECUTIVE SUMMARY

This chapter reports on an action research study conducted in a secondary school in Singapore to show how a popular Design and Technology (D&T) activity—the pencil holder project—can be used as a platform to incorporate physics principles into its design via an inquiry mode for kinaesthetic students. By harnessing basic materials processing skills and computer graphics skills that the students pick up in D&T and Computer Applications (CPA), respectively, and linking these two subjects into their learning of science, a platform is offered for the hybridization of D&T and CPA with science.

Results show that the inquiry setting has been useful for students to showcase their creativity in science through designs of pencil holders that function on various physics principles. Extracts from their portfolios and artefacts reveal how a number of these students made use of physics concepts such as turning effects, inclined planes,

DOI: 10.4018/978-1-4666-0068-3.ch009

wheel and axle, pulleys and friction to good effect as part of the functionality of their pencil holders. Their computer drawings from the CPA lessons showed how they were able to exhibit their understanding of science through their designs. The authors noticed that these students also found a sense of purpose in completing the CPA task as it required them to come up with a design that would be fabricated as a 3-D artefact rather than one that is purely based on imagination.

Students in the study developed positive attitudes towards studying science and D&T after the project. The study has opened up a route for linking science and CPA into D&T in a simple way that is within the school D&T and CPA curriculum, and one that places the focus on creativity as an outcome of curricular interaction via an inquiry setting.

INTRODUCTION

In today's fast paced economy, no longer are we to train our less-academically inclined students for jobs that require them to be proficient in just vocational skills (through working with their hands) but to develop them into understanding science and guiding them to be creative thinkers in science. Understanding science becomes a necessity and forms the basis to help them solve many technological problems that they would face when they enter the working world. There is a constant need to get these students to observe and analyse problems that are around them and guide them into coming up with new ideas and ways of solving such problems through reasons that are based on science.

Creative thinking is one of the crucial 21st century skills that need to be fostered among students by science educators (Metz, 2010). Creativity in science is generally perceived as the process of thinking or doing things in new or novel ways with a certain involvement of scientific reasoning. It has been stressed that fostering creativity can breed the best scientists (Fisher, 2004). Fostering creativity in science amongst students sharpens their problem-solving skills, allows them to be more inquisitive about how science is used in their daily lives and, at the same time, builds up their confidence into thinking about how science can value-add to our economy. This can instil the spirit of innovation amongst students and pave a path for them to be young inventors.

School leavers who showcase their creative abilities are often recognized as being valuable for personal, social, technological and economic reasons (Haigh, 2003). In school, creative activities in science lessons can be a motivational tool to stir students' interest in understanding science concepts (Hoang, 2007) and increase students' capacity in the core components of divergent thinking (Mirzaie,