

# Chapter XX

## Web 2.0 Technologies and Science Education

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### ABSTRACT

*This chapter discusses the potential uses of Web 2.0 technologies in enhancing scientific literacy and the learning of science in the K-12 sector. Web 2.0 offers services and products that could facilitate the learning of science by harnessing the collective intelligence of individuals connected to the Web through social networking. A framework based on social constructivism for thinking about the potential uses of Web 2.0 technologies in the learning of science is proposed. The use of Web 2.0 technologies could bring about a fundamental shift in pedagogy and assessment towards a participatory learning approach that promotes a deeper and more engaged understanding of science.*

### INTRODUCTION

The aims of science education, in general, are to enable students to acquire sufficient knowledge and understanding of the concepts, values and skills in science to be “become confident citizens in a technological world, able to take or develop an informed interest in matters of scientific import...recognize the usefulness, and limitations, of scientific method and to appreciate its applicability in other disciplines and in everyday

life” (Ministry of Education, 2006, p.1), and to be prepared for further studies in the pure sciences, applied sciences or science-related vocational courses. However, in many countries, students have to sit for high-stakes examinations which are focused mainly on students’ recall, understanding and application of facts and algorithms to solve closed-ended problems (O’Neill & Polman, 2004). Teachers may be under the pressures of parents’ and students’ expectations of good results in the examinations, as well as the publicized league

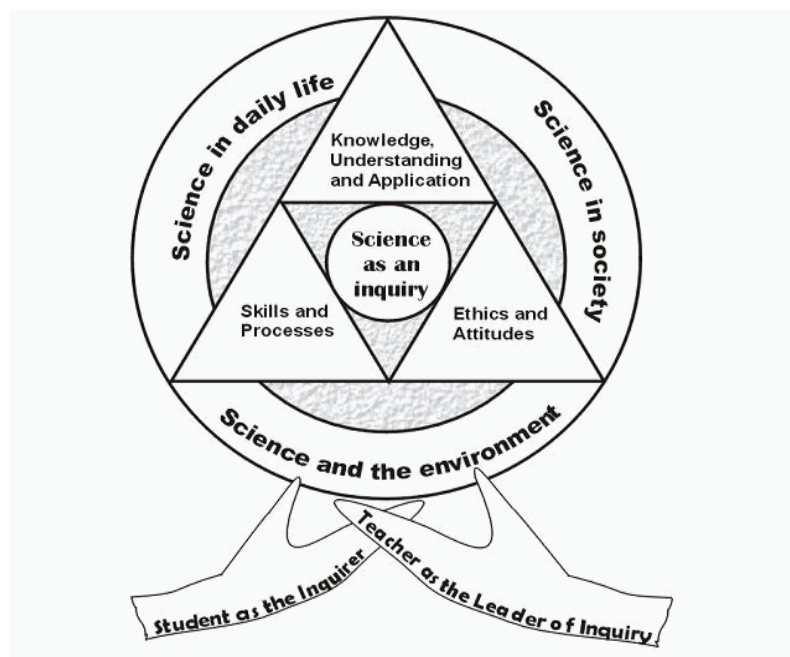
or ranking tables of schools based on students' performance in the high-stakes examinations that are reported in the media in many countries. Such pressures have led many teachers to adopt drill-and-practice instructional strategies to ensure that their students are well prepared for these high stakes examinations. Therefore, it is not surprising that science teaching and learning in many countries have been criticized as being distorted by these high stakes assessment and focused on students' content knowledge which is easily assessed (Osborne & Hennessy, 2003; Rop, 1999). Important considerations such as care for the environment, scientific habits of mind, social and cultural practices of science, and the relevance of the school science to the students' everyday life may not feature as prominently as they should in science lessons.

In Singapore, the Ministry of Education recognizes the shortcomings of an examination-driven science education and has made a deliberate policy decision to design an inquiry-based science curriculum for schools to give students a more bal-

anced science education and to prepare them for the future as informed citizens and for a career in science for those with talent and interest. The Curriculum Planning and Development Division of the Ministry has re-designed the curricula for primary and secondary science based on a 'Science as an Inquiry' framework (as shown in Figure 1) which has three integral domains, namely (a) knowledge, understanding and application, (b) skills and processes, and (c) ethics and attitudes (Curriculum Planning & Development Division, 2007). The primary and secondary science curricula envisage students acquiring science concepts, process and thinking skills, attitudes and values through inquiry activities "grounded in knowledge, issues and questions that relate to the roles played by science in daily life, society and the environment" (Curriculum Planning & Development Division, 2007, p.1).

The Ministry has also launched another initiative, the 'Baseline Information and Communication Technologies (ICT) Standards' (Ministry of Education, 2007) to enable students to acquire

*Figure 1. Framework for Singapore science education<sup>1</sup>*



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