Chapter 31
Learning about the Different Dimensions of Sustainability by Applying the Product Test Method in Science Classes

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ABSTRACT

This chapter reflects upon the development of a new pedagogy for secondary level science education: the product test method. This method mimics the authentic societal evaluation practice performed by professional product-testing agencies. The design of this particular pedagogy is tied directly to the three most prominent dimensions occurring in contemporary sustainability models: ecological, economic and societal sustainability. Application of this method focuses on learning about the evaluation of competing industrial products with regard to sustainability criteria. This chapter reflects upon the underlying theoretical framework of the consumer test method. It also illustrates its application in the classroom based on a lesson plan for the evaluation of different sorts of plastics. Experiences and feedback from teachers and students are discussed, based on the cyclical development process by Participatory Action Research. They reveal that the lesson plan has great potential for contributing to higher levels of student motivation and learner perception regarding issues of sustainable development.

INTRODUCTION

Application of science and technology is essential for the contemporary development of every modern society (Bradley, 2005). This is why all modern concepts of scientific literacy include the idea that students must acquire skills which prepare them for active participation in societal debates and decision-making processes concerning scientific and technological issues (Hofstein, Eilks & Bybee,

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2011; Holbrook & Rannikmae, 2009). Science education in this sense must therefore contribute to Education for Sustainable Development (ESD) by promoting skills which make younger generations able to act responsibly and help shaping both our future society and the entire world in a more sustainable fashion (Burmeister, Rauch & Eilks, 2012; De Haan, 2006).

From an ESD and scientific literacy point-of-view, it is absolutely essential supporting students to become responsible citizens and in the means of authentic pedagogy to acquire proper skills in order to be able to participate in societal decision-making in the future (Holbrook & Rannikmae, 2007). These skills include not just communication and evaluation abilities *in* science and technology, but also a competency to debate and decide *about* science and technology in a societal context (Eilks, Nielsen & Hofstein, 2014).

One specific skill set belonging to responsible citizenry is critical media literacy, especially the ability to critically review and deal with information presented in the news media (Hobbs, 1998). Among other things, this area concerns information related to both the domains of science and technology (Rundgren, Chang-Rundgren, Tseng, Lin & Chang, 2012). However, this aspect touches upon far more than an ability to critically examine and accordingly react to science and technology related news in the media, as discussed by McClune and Jarman (2012). Information related to science and technology also appears frequently in the form of advertisements, product test reports and everyday life communications (Bauer, 2009).

This paper describes how product testing for media purposes is normally conducted and focuses on how to use the idea of product testings in science classes. It therefore presents a method to help pupils specifically learn about this issue. Using the example of evaluating different sorts of plastics along sustainability criteria, this method will be evaluated according to its potential for contributing to an understanding of issues and aspects of sustainable development.

SETTING THE STAGE

A Theoretical Framework for the Product Test Method

In all probability, the majority of high school students will never embark upon careers in which they become scientists or engineers (Hofstein et al., 2011). Even if some of them do, these students will generally become experts in one very specific area of science or engineering, effectively making them non-experts in all other domains of science. Therefore, only a small minority of all high school students will ever encounter future situations in which they are called upon to deal with authentic, scientific information in a specific domain. The authentic science in that domain can only be found in the respective research institutes, scientific publications or conferences associated with that area (Eilks et al., 2014). Access to such information is regularly limited to scientists in the specific area of interest due to both reasons of limited access and to the use of formal scientific language, technical terms, and symbols among experts.

Nevertheless, there is also another kind of 'scientific' information. The science-related information with which the vast majority of our students eventually come into contact comes only indirectly from the core of the authentic, scientific endeavor (see Bauer, 2009). As soon as we leave the world of the scientists, we are no longer dealing with original scientific information. Starting from the field of popular science magazines or school textbooks, the information available to readers has already become "filtered information" (Hofstein et al., 2011) in numerous steps by many persons along the chain of information transfer (Eilks et al., 2014). Almost all of our everyday communication, debates in society, and media reports are based on information which no longer comes directly from the field of science. Relevant information is presented by journalists, politicians or pressure groups. Their information regularly has been derived from the areas of mass media