Chapter 4
Using Multimedia Learning Aids from the Internet for Teaching Chemistry:
Not as Easy as it Seems?

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ABSTRACT

Large advances in technology in the last few years have made computers cheap and presentation technologies easily available in most secondary schools, at least in industrialised countries. Due to recent developments in software technology nearly anyone can create animations and visualisations. The Internet has helped to make the distribution of such graphic tools both wide and fast. Thus, using multimedia in science teaching is becoming more and more common. Today, integrating visualisations and animations from the Internet into the science classroom seems an obvious choice for enhancing science lessons. But are all of the animations offered on the Internet really helpful for promoting understanding? This chapter discusses what might occur while working with animations taken from the Internet and how these multimedia illustrations can potentially interact to reinforce rather than resolve students' misconceptions about chemical principles. Daniell's voltaic cell serves as a good example to illustrate the ways in which visual aids can be interpreted differently by experts and novices. The following discussion takes place in the form of an exaggerated example. It is meant to appear as a critical interjection making readers more aware of the myriad, often invisible, potential drawbacks which exist when first selecting promising-looking animated illustrations for classroom use.

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INTRODUCTION

The development of ICT was and remains a very fast phenomenon. It was only a little over a generation ago when computers were exclusively adopted for special industrial applications and research purposes. At that time, computers were prohibitively expensive and therefore generally not available to private users. Additionally, the handling of computers was a very demanding challenge, one only performed by experts. Nowadays computers are available everywhere. Working with them and their wide range of gainful applications no longer requires specialised competencies, *e.g.* skills in understanding computer-programming languages. Computers are used everywhere in our life for business or private purposes. The use of computer applications, like cognitive tools, became easier step by step in recent years, consequently those developing learning environments can no longer ignore this progress (Falvo, 2008).

One of the major steps in making computers easy and comfortable to use was the development of graphic desktops and WYSIWYG technology ("What you see is what you get"). Until the shift towards WYSIWYG occurred some 15 years ago, cognitive tools like text editors and graphic tools were unable to accurately depict materials on a computer monitor while simultaneously working with and altering them. Also, the picture quality of the representations was highly inferior to that which we take for granted today when working with electronic media. Frequently, this led to various surprises when printing out a hard copy of the material. Today, displaying correct fonts, page layouts or graphical elements on the computer screen while simultaneously editing the respective documents is no longer a problem. It has become possible to create texts, pictures, and animations in nearly any form, combination or context we prefer. Modern computer games beautifully demonstrate the current, cutting-edge breakthroughs in developing illustrations and animated programmes, up to and including artificial, "virtual" realities.

The creation of pictorial, animated materials no longer demands the professional expertise of specialised programmers. Cognitive tools like Macromedia Flash are quite cheap to purchase and have become easier to use. This has also had wide-reaching consequences in the educational domain. Curriculum developers and teachers are now able to create animated classroom aids using these tools, and actively do so. This leads to a constantly-increasing number of animated visual aids. The Internet has helped to make these visual aids on a variety of science topics available for everyone at very nearly no cost to the user.

Perhaps because of this rapid development of hard- and software, it seemed obvious and logical to enhance science lessons by integrating animated visualisations from the Internet into the science classroom. This was done because of the promising perspectives hoped for by the inclusion of multimedia applications (e.g. Pavio, 1986). It was also undertaken in order to keep pace with students' positive computer-based multimedia experiences in their private lives (Falvo, 2008). A lot of promises were made and educational research supported expectations that the integration of visualisation and animation via the use of computers could potentially support learning. One example is the thoughtful embedding of computer technology into teaching by binding it to other learning activities (e.g. Mayer, 2001; Falvo, 2008).

But the use of multimedia visualisations in science classes might seem to be easier than it truly is. We can derive such a conclusion from the dangers seen when working with potentially misleading illustrations in textbooks (e.g. Hill, 1988; Eilks, 2003). The question should be allowed, as to whether all animations used for illustrating scientific concepts are genuinely useful in supporting learning. In particular, we must reflect on whether any specific illustrations taken from the Internet actually provide us with