

References

- Freedman J and Haber R N (1974). *One reason why we rarely forget a face*. Bulletin of the Psychonomic Society 3: 107-109.
- Levie W H and Lentz R (1982). *Effects of text illustrations: a review of Research*. Educational Communication and Technology Journal, 30: 195-232.
- Paivio A, Rogers T B and Smythe P C (1968). *Why are pictures easier to recall than words?* Psychonomic Science 11: 137-8.

UniServe Science narrows the field

Anne Fernandez, Ian Johnston, Mary Peat and Mark Nearhos
UniServe Science, The University of Sydney
PhySciCH@mail.usyd.edu.au

The value of computer-based images in teaching and learning

With the increased use of computers in education it is essential that educators use this technology to enhance student learning. To do this effectively the technology must cater for different learning styles and support the processes students use when they learn. In order to assimilate the new information correctly and gain a broad understanding of it the student needs repeated exposure to variations of the concept and must be actively involved in the learning process. Computer-based images, both still and moving, can be used to provide an environment in which this can occur. For example, interfacing equipment in the laboratory allows the students to conduct 'what if' scenarios with lab exercises; plotting software allows students to plot several variations of a function; and science microworlds (or simulations) enable students to explore a particular problem area by inventing their own activities and experimenting, testing and revising hypotheses.

Need for caution

Computer-based images can expose students to variations of a concept and they can stimulate students to become actively involved in their learning. However, this is not always the case. Some pictures aid learning. Some do not aid learning but do no harm. Others do not aid learning and are distracting or even misleading. Many multimedia programs are still based on behavioural models of learning that emphasise only individual learning and feedback. Morgan (1996) reminds us that we must always evaluate whether our use of technology in education really does support student learning.

Ring (1996) notes that although interactive multimedia has provided richer human-computer interaction much of it is quite complex and difficult to use. Care must be taken to avoid student confusion or information overload through complex or poorly designed images. It is also becoming apparent how easily designers can distort reality using new video and imaging technologies. This is particularly dangerous in an educational setting as the student is left with incorrect knowledge.

In addition, the added emphasis on the use of graphics and the availability of tools which make adding graphics to software applications very easy, increases the likelihood that instructional designers will lose sight of their original goals. Rieber (1994) reminds us that, with graphics in particular, there is a strong tendency to let technology, rather than teaching and learning objectives, dictate decision making. Often designers and consumers of educational software unconsciously fall into this trap. They encourage the use of all special features, instead of questioning whether such

features are relevant to the lesson goals and hold the learner's attention. Often a combination of text and graphics is most effective. Levin (1989) pointed out that "pictures interact with text to produce levels of comprehension and memory that can exceed what is produced by text alone". This was borne out by Bernard (1990) who found that when text captions were used to support pictures the illustrations were more effective than when the illustration alone was used. It is always important to consider the learning objective of illustrations.

UniServe Science reviews

While multimedia has the potential to enhance education, there has been little opportunity for educators to gain experience in how to effectively use and critically evaluate this new media. With the huge volume of products on the market today there is no way educators have the time to seek out and compare different offerings. One of UniServe Science's key activities is to acquire currently available software packages for use in teaching tertiary science, commission independent reviews of this software by teachers in the field and make the findings available to all interested academics. Reviewers are provided with guidelines and an evaluation checklist to ensure they consider all relevant aspects and are encouraged to trial the product with students to judge its effectiveness. Reviews are entered in an online searchable database, emailed to discipline specific mailing lists and may be published in the UniServe Science newsletter.

These reviews highlight important educational aspects of the products and help narrow the field for busy teachers. For example, two recent reviews included the following statements.

1. *The animations are the most disappointing part of this teaching resource. There are serious misrepresentations of the molecular world, examples being ... at best a poor quality teaching/learning resource, at worst a potential generator of serious misconceptions ...*
2. *...cleverly constructed piece of software which is easy and fun to use and very instructive ...*

The UniServe Science reviews are a valuable resource for science academics who wish to integrate the use of computers into their teaching but do not have the time to carry out evaluations on the possible alternatives. The reviews are available in the searchable database at <http://science.uniserve.edu.au/>

References

- Bernard, R.M. (1990). Using extended captions to improve learning from instructional text. *British Journal of Educational Technology*, 21(3), 215-225.
- Levin, J.R. (1989). A transfer of appropriate processing perspective of pictures in prose. In: Knowledge acquisition from text and prose. Eds Mandl, H. and Levin, J.R. Elsevier Science Publishers, Amsterdam.
- Morgan, T. (1996). Using technology to enhance learning: Changing the chunks. *Learning and Leading with Technology*, 23(5), 49-51.
- Rieber, L.P. (1994). *Computers, graphics & learning*. Brown & Benchmark, Madison, Wisconsin.
- Ring, G. (1996). The role of graphics in user interfaces. *Australian Educational Computing*, 11(1), 4-7.
- Weller, H.G. (1996). Assessing the impact of computer-based learning in science. *Journal of Research on Computing in Education*, 28(4), 461-485.
- Wiburg, K. (1995). Becoming critical users of multimedia. *The Computing Teacher*, 22(7), 59-61.
- Williams, J. (1994). *The use and capture of images for computer-based learning*. Educational Technology Service, University of Bristol.