

Invited commentary

Information and communication technology in nutrition and dietetic education

Computers have played an increasingly greater role in education since the 1960s (Fletcher-Flinn & Gravatt, 1995). In the past 10 years the availability of powerful personal computers has introduced a new, almost unexplored source of innovation in educational technology (Montague & Knirk, 1993; Bates, 1995). As the Windows™ operating system is gradually elevated to industry standard, a certain uniformity develops. Specifically, in the past 2 years an increase in the processing capacity of PCs (internal memory and processor speed) has unleashed new opportunities for educational applications (Martens, 1998). Thus, next to the increase in pressures of teaching in tertiary education, as pointed out by Wise (1998) in this issue, there may be some different reasons to include information and communication technology (ICT; we prefer to include the communication aspect in this technology as well) in tertiary education.

Wise (1998) incorporates the use of information technology (IT) into direct teaching of second year Nutrition and Dietetics students. From the evaluation the author presents we learn that the aims to include IT were efficiency (timetabled hours, program use outside classes), efficacy (support of understanding the subject), and satisfaction (simplicity of use, students' attitude towards computers). Thus the aims, which, as far as we can guess, were not known to the students *a priori*, were expressed at a relatively general level. The general conclusions also reveal that the evaluation was directed towards students' interest, feeling of confidence, and liking for computers. We fully agree with the conclusion that the students themselves are good judges of whether they feel that programs are beneficial to them, and we appreciate being able to comment and explore collaboratively further issues.

There are three major points which we would like to address. First, we discuss the use of ICT in the context of its possibilities for education. We then suggest evaluations that check whether students have achieved the aims – which are described and known to them – in an efficient, effective and satisfactory way. Third, we illustrate this approach with a different example of ICT in nutrition and dietetic education.

ICT can be used in education as object, aspect and as medium (COMMITT, 1996).

- Use of ICT as object is defined as the study of the computer and its applications as objects of teaching. For example, making use of apparatus and programs in science and research.
- Use of ICT as aspect relates to the computer as a tool, for instance for collecting information, analyses of data,

modelling in Natural Sciences, and for communication using e-mail or computer conferencing. Word for Nutritionists and the research version of Diet5 for Windows, discussed in the article, are examples of ICT as aspect.

- Use of ICT as medium relates to using the computer to mediate learning. Examples given by Wise (1998) are 'Metabolic Pathways', the teaching version of Diet5 for Windows, Sentences Construction, and Minitab. Often, these programs partly replace practical work (Kirschner, 1991).

It is clear that Wise (1998) has made use of ICT as both aspect and medium in an integrated educational environment. This integral embedding of ICT in the educational process is a prerequisite for good practice (Kirschner *et al.* 1997).

ICT cannot replace practical work completely. Obtaining skills such as how to deal practically with glassware, devices, machines (except when the machines are computers), animals and humans is very hard to achieve with ICT. However, ICT can be used to achieve many of the necessary cognitive skills associated with understanding science and scientific research, and to understand the more theoretical questions behind practical work. Moreover, ICT can aid the learning of how to set up an experiment, how to formulate hypotheses, choosing a proper methodology, and obtaining data through simulation. Subsequently the data can be analysed, the results can be presented and discussed (electronically), and conclusions related to the hypothesis can be drawn. An example of this approach, developed in the context of open distance learning, is the computer simulation program Rat Model (Westerterp-Plantenga *et al.* 1994). Aims for using ICT as a medium are: use it, if it contributes considerably to the efficacy, efficiency and satisfaction of studying for the student as well as the teacher. But the road is not the purpose. The aims in terms of knowledge, insight, application, analysis, synthesis, evaluation and practical skills should be determined and described accurately and in great detail with respect to the subject to study. It has appeared to be of advantage that the students are aware of these aims (Kirschner, 1991).

Therefore, we suggest that evaluations should check whether the students have achieved the explicit aims in an efficient, effective and satisfactory way. In the case of Rat Model, the main purpose was to train the students in planning and doing experimental research, not in the laboratory but by simulation. The program made the student familiar with the experimental research of the Department of Animal Physiology at the University of Groningen, The Netherlands, where all the real data were

obtained. Whether the aims had been achieved by the students was evaluated by an examination that had to be taken using the program, and by a short questionnaire that asked for subjective ratings of satisfaction aspects.

A second example illustrates the different possibilities using ICT in nutrition and dietetic education. Developing and running the open distance learning course Food In Europe (Westerterp-Plantenga *et al.* 1997) required the use of ICT in two forms. For its development a SOCRATES grant was obtained, which requires European collaboration. Collaboration was executed using e-mail and computer conferencing, which was, in the given context, the only way for course development (ICT as aspect). The course consists of written material, with embedded support devices to enable independent learning, and of a computer simulation program (ICT as medium). This program, named Body Weight, is based upon a model developed from real data (Westerterp *et al.* 1995). The purpose is 'to understand how body weight is influenced by food intake and physical activity'. The program familiarizes the student with the concepts regarding energy balance of the human body. Cases are given, inviting the student to play the role of investigator, or of a dietician. Also, students have to find publications through Internet access to International Libraries. Running the course, with students from all over Europe, means that studying takes place at home, and tutoring by means of computer conferencing through Internet (ICT as aspect). Discussion groups were formed, discussing relevant culture-related issues. Examination takes place using First Class personal mailboxes. The evaluation of this course revealed that apart from achieving the aims to a considerable extent, the students were positive about the achievement of mutual understanding (Westerterp-Plantenga *et al.* 1998).

Thus, in accordance with one of Wise's (1998) conclusions, we confirm the notion that the students themselves are good judges of whether they feel that programs are beneficial to them, but also to the Lecturers, who felt that this was the only way to deal with the issue efficiently and effectively.

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