

Physiological measurement and health education

Elizabeth Angel
& Nicola Mathews

School of Education, University of Exeter

Micros have become a part of school furniture; the problem facing staff may be in finding effective uses for them. Any software offering potential for classroom use has a good chance of acceptance. Packages for making physiological measurements on individuals are beginning to appear; what implications do these have for strengthening health-education initiatives in schools?

The Editorial in the previous issue of *Education and Health* posed the question: *Will measurement in health education raise its status?* It was suggested that the diffuse and qualitative nature which is the essence of much health education, and its "non-examinable" nature, gives it a low status which does not match its perceived priority in the eyes of many teachers and those seeking to develop a core curriculum.

Perhaps it is for this reason that the "bodily health" aspect of health education – the hard facts – finds easier support for inclusion. Facts are easier to teach and more readily testable; they fit into discrete areas of the curriculum; and, being traditional, they can readily be accepted as valid learning. Clearly, any development which can help to bridge the gap between the areas of self-awareness and biological function has exciting implications for the nature and status of health education. The imminent introduction, on a wide scale, of personal physiological measurement (PPM), may be such a development.

A package for personal physiological measurement

Recently, here at the HEC Schools Health Education Unit, we were privileged to see a PPM package, designed for use with a BBC computer, in an advanced state of development. It has already been used in pilot schools, and is expected to be on the market later this year. The package includes:

1. Reaction-time tester, using visual and audible stimuli.
2. "Driving" a point around a maze.
3. Recording heartbeat (pulse form and rate).
4. Recording body temperature.
5. Recording the rate of respiration.
6. Recording oxygen consumption.

Items 1 and 2 allow any improvement or evidence of "learning" to be monitored. Items 3 to 6 can be stored, monitored over a long period, and inter-related; the results for two or more subjects may be directly compared on the screen. The use of an exercise bicycle permits the effects of high exertion to be observed.

The computer display is extremely attractive, and the data is expressed both numerically and graphically. Previously-recorded data (either for the same subject or a different one) is readily recovered. Therefore there is potential for monitoring long-term changes, and building up an archive of pupils' personal data.

There may well be other monitoring systems being developed, either commercially or within school science departments. The comments in this article probably apply to all, at least in some respects.

What use is it?

To involve the pupils in the subject being taught is widely accepted as good practice. The use of this equipment could result in the following benefits:

1. Development of skills in analysing data.
 2. Better understanding of human physiology.
 3. Insights into departures within a group of individuals from the norm.
 4. Consideration of factors related to physiological function; for example age, gender, body morphology, exercise, diet, and smoking.
- Almost certainly, item (4) will lead to
5. Concern about personal physical fitness.

A group of eight 3rd-year B.Ed. students in the University of Exeter's School of Education (St. Luke's) recently underwent a session with the equipment, and this article reflects the experiences both of themselves and the onlookers. They were put in almost the same position as the children in a class might be; they did not know what to expect, and different members of the group reacted in different ways to the prospect of being put "on show" in front of their peers.

A "classroom" session

The very attractive and exciting visual display inspired confidence. Therefore there was much personal as well as group enthusiasm. This led to an underlying element of competition, which could be of benefit in the process of motivation

and learning. If the equipment were accessible on a permanent basis outside regular lessons, individuals could tailor their use of it to areas of personal interest or concern, and monitor themselves over the course of a fitness programme, building up a personal archive.

The equipment, obviously, is valuable not only in "science", but could be incorporated in other areas of the curriculum, particularly PE. In this way, links could be forged or strengthened between various departments in the school.

Apart from some initial apprehensions about using a computer keyboard, most of the pointers did seem to be favourable. However, it was only after the group had been exposed to the power of the machine that some of the unsuspected and possibly damaging effects could be appreciated. An immediate comment is: how does the teacher lessen the public ordeal for the shy individual who feels obliged to "have a go", or handle the conflict that could be caused by refusal to co-operate?

Due to the impact of the display, and the status we normally afford information from computers, potentially damaging data cannot easily be "anaesthetised", even if it is judged that it should be. The equipment does show very nicely that we are all different, and that is a virtue; but in doing this it will also highlight variations from the norm. Worries and anxieties out of all proportion to the medical seriousness of the condition could result. What will be motivation to improve for some will be loss of self-esteem for others.

An event occurring during the trial highlighted the teacher's dilemma when faced with obvious anomaly. The heart-beat of one of the students appeared to stop for a time, in full view of the group. Reaction ranged from "see a doctor" (or even "call a doctor"!) to "something's wrong with the machine". The teacher faced with such a situation may find it hard not to conceal his concern for the individual or the group, but the temptation will be to minimise its significance. The ultimate recourse is to blame the machine, at the risk of discrediting all that has gone before. It may not be

practical to draw up guidelines for such an occurrence, since so much will depend upon the circumstances; but the teacher undertaking any work in PPM must be prepared for minor and major eventualities of this kind. Serious medical disorders could be revealed, imposing responsibility for further action.

Questions to consider

The group felt that the following points needed to be considered, and decisions made, before embarking on the classroom use of equipment for personal physiological measurement:

1. Should live or stored data (obtained previously from anonymous volunteers) be used, at least to start with?
2. Should guinea-pigs be selected by arrangement beforehand, bearing in mind that many more will wish to use the equipment than lesson time will allow?
3. Throughout the work, the teacher must be very careful to avoid making value judgments when comparing results, and to be sensitive to the implications of class discussion.
4. Is the equipment to fit into a course, or the course to be built around the equipment?
5. Will facilities be made available for further monitoring, as part of a fitness course?
6. Is the better tactic to introduce the equipment into the classroom as a "big bang", or to let it become familiar to the pupils as a school resource first, so that they are not overawed?

7. If the screen display is sophisticated (graphs, means, etc.), should there be liaison with the maths. department to ensure that the level of display is appropriate?
8. Has the teacher sufficient knowledge to support the range of findings that such equipment can reveal?
9. To what extent should the PE and biology departments, for example, share the use of the equipment and the data archive?
10. *The implications of storing personal data, perhaps over several years if pupils are to be monitored throughout their time at school, need to be carefully considered.*

Conclusion

Members of the group, having experienced the use of a PPM package in "classroom" conditions, found the event stimulating but disturbing. Some felt that the extremely personal, in fact fundamental, nature of the data being displayed could so easily lead to distress that they would be reluctant to bring it into the classroom. However, the march of events may override the option. Schools with computers are anxious to use them, and attractive software which can be worked into the curriculum will attract ready customers, particularly when aggressively marketed, as this is certain to be. It is more than likely that teachers will find themselves expected to use it, and having to plan an approach. We hope that this article will attract comment from readers wishing to pass on their own experiences.