A micro in the canteen

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This article describes an experiment in an Oldham comprehensive school. A microcomputer was used to reinforce nutrition education by monitoring the intake of protein, vitamin C, and calories in sample lunches. These figures were evaluated in relation to DHSS recommendations.

The author comes to some conclusions about the protein and calorie intake of different sets of pupils, compared with recommended amounts, and also examines the overall effect of the experiment. It is emphasised, however, that generalisations cannot be drawn from a small-scale survey of this kind.

This project was set up because of teachers' concern over the effect of cafeteria-type meals on the nutrition of their pupils. It was made possible through the help of the local health education and dietetics departments, together with assistance from the regional statistical unit.

Four objectives were identified at the start of the project:

1. To provide relevant nutritional information, and insight into how best to achieve this through form tutor time;
2. To give an incentive to those having school lunches to "eat well" by using a micro-computer to analyse and comment on their choices;
3. To use the data stored by the computer to measure any change in nutritional levels during the project;
4. To assess the nutrition of teenagers having school lunches in relation to DHSS recommended intakes of protein, calories and vitamin C, particularly those having no breakfast and those having free meals.

Preparation

During the preparatory phase the dietician carried out an analysis of all the items on the menu in terms of protein, calories and vitamin C. These were fed into the computer by the computer studies teacher, who also devised a program to print out 12 possible comments. These comments depended on the combination of inadequate/adequate/excessive calories, compared with one-third of the daily recommended intake for each age/sex group. For example, if your lunch gave you over 90% of recommended protein intake, between 80 and 120% of recommended calories, and less than 90% of recommended vitamin C, the comment you would receive on your printout together with the analysis of your meal would read *Not a bad choice – but try more fruit and vegetables to get more vitamins.*

Since girls' needs do not increase greatly from 11-18, but boys' do, calculations were for three age-sex groups: boys 11-14+, boys of 15 and over, and girls. During the preparatory phase a meeting was held with the dietician, a Health Education Officer, and staff at the school. This was to ensure that everyone knew about the project, and to give form tutors some material they could use in sessions on nutrition. These included a *Check your meal is balanced* score sheet, with illustrations of possible meals, a fact sheet, and a true/false quiz. The score sheet is illustrated.

Sampling the meals

In order to get a baseline for the subsequent analysis, observation of meal choices on the three mid-week days was carried out. Lunches were served at about 7 every minute, giving time to examine only a sample of about 1 in 8. Since the lunch queue was organised by forms, the sample had a representative cross-section of ages, bearing in mind that far more of the 11-14+ age group, compared with the 15-18 age group, had school lunches. About 40 lunches were sampled each lunch hour.

The next week the computer was introduced to the canteen and, as well as age, sex and meal choice, information on whether the person had had breakfast and was having a free lunch was collected. The following week form tutors were asked to do some work on nutrition and meal choices. The computer was then in the canteen for the three mid-week days as before, for four weeks. This involved a team of three to make it flow smoothly: one person to select the 'sample' and ask them to take part, one to go through the questions, and one to punch the information into the computer.

"Just another task"?

Looking at the four objectives in turn, the first one (to provide relevant nutritional information in form tutor time) was not specifically monitored. However, unofficial feedback was that it was done patchily through the school because some teachers felt it was just another task, and

Checking your meal is balanced
score sheet

How to use this sheet:-

1. Underline food items you have eaten - you should have something from each group.
2. Add the number of points you have in each section up to a maximum of 3: if you have more than 3 points count it as 3. Peas and baked beans appear twice but can only be counted once.
3. Total your scores and add a bonus point if you have had something from the bonus section.
4. If you scored 8-10 you had an excellent meal; 5 - 7 was o.k. but could be better: less than 5 try something different next time.

	Score 3 points for any of these	Score 2 points for any of these	Score 1 point for any of these	Max. Score	Your Score
meat - fish - cheese egg pulses group	beefburger, battered fish, ham, tongue, chicken, cheese, steak & kidney pudding, meat pie pizza	sausage, baked beans mushy peas, pork pie cheese & onion pie, cornish pasty, egg	fish finger	3	
fruit-vegetable group	any fresh fruit, salad tinned tomatoes, green beans cauliflower, mixed veg.	tinned fruit, apple pie	mushy peas baked beans	3	
cereal-potato group	brown bread, jacket potato	bread, chips, muffin sally lun, mincemeat pie, sponge, scone	rice, jelly	3	
BONUS POINTS	Add a bonus point for any of these: yoghurt, milk, flavoured milk, cheese cake, instant whip, cheese.			1	
			TOTAL SCORE	10	

The Check your meal is balanced *scoresheet*

that, in any case, education was inappropriate when it was the cafeteria system which was wrong.

For the second objective, the computer certainly aroused a lot of interest and enthusiasm among pupils. However, the necessity for sampling, and problems with slow printout (which meant that many people did not claim their 'results'), reduced its effectiveness.

Influence on nutrition levels

The third objective was to measure any change in nutrition levels during the project. Two attempts were made to do this. The first was to calculate the average amount per person per day of the project for protein, calories, and vitamin C, as a percentage of recommended requirements. This series of data was then tested for line of best possible fit against 12 possible models. These models were based on the different possible results of the intervention, beginning at the "baseline" and following the pupils' dietary responses to (a) the introduction of the computer, and (b) the health-education input. For example, one of the models had improved dietary intake after (a) but no change after (b); another had deterioration after (a) but improvement after (b), and so on.

However, the picture was confused and somewhat contradictory. Boys of 15 and over increased their protein intake, while girls increased their calories after the health-education input. Boys under 15 increased their protein after the introduction of the computer.

The variation in the figures for vitamin C was so high that they could not be regarded as statistically significant.

A second effort to look for changes in what students were eating during the project was made using the *Check your meal is balanced* score sheet opposite. The average scores throughout the project varied from 4.4 to 4.9 and there was no significant trend. In other words the balance of meals consumed was on average very poor, and remained so throughout the project.

	Boys of up to 15	Boys of 15 and over	All girls
Protein less than recommended	12	6	5
Calories fewer than recommended	0	6	0
Calories more than recommended	2	0	6
Vitamin C less than recommended	0	1	8

Days (out of 12) when nutrition intake was significantly different from the calculated value

DHSS recommendations

The final objective was to examine protein, calories and vitamin C in relation to DHSS recommendations, particularly in the groups having no breakfast or receiving free lunches. The table above shows the number of days when the average level of nutrition was significantly different from the recommendations (See Note).

It immediately stands out that the boys under 15 in the survey were eating significantly less than one-third of their recommended daily protein in 80% of the cases studied. There was also a tendency for the older boys, and all of the girls, to consume less than this proportion of protein. In the case of calories, however, the boys over 15 seemed to be having less than they need, while the girls tended to eat more than they need. The girls, on the whole, were also recording much less vitamin C intake than were all the boys.

In trying to look specifically at the two at-risk groups selected, there was a problem with very small numbers making statistical reliability unlikely: the vast majority of the sample had free lunches; and the vast majority also said that they had had breakfast. However, for what it is worth, there were 12 instances out of 108 possible (for the 3 nutrients in 3 age/sex groups over 12 days) when there was a significant difference between those paying and those having a free lunch. In each

case those with the free lunch had a higher intake than those without, though it was still below the recommended level in 7 of the 12. In only 3 instances out of the 108 were there significant differences between the group who had breakfast and those who did not. In each of these, those without breakfast did eat more at lunch time, though it is doubtful whether this would be enough to compensate.

Some afterthoughts

The success of this project in relation to its objectives was variable. It aroused a great deal of interest both inside the school and outside, but the analysis indicated that the educational input made little significant impact on nutrition levels. While one can only speculate on why this was so, a major possibility seems to be lack of sufficient groundwork with the staff as a whole. The analysis also suggested some ways in which the cafeteria system may be affecting different age/sex groups – certainly a more complex picture than one might initially have thought. Probably if the project were to be repeated it would be interesting to look also at fibre, fat, and sugar in the diet.

Certainly, as a pilot, the project illustrated the potential of the micro as a tool for health education research: the panel gives a checklist of needs for anyone wishing to follow up and develop the idea. While these needs could possibly be met from within one organisation, perhaps another positive feature was the opportunity it provided for co-operation.

[*Note:* Teachers willing to initiate a similar project in their own schools will find this frank account of pitfalls invaluable. Additional points worth noting include: (a) The assumption that the pupils in the survey should have consumed one-third of their daily nourishment at lunchtime makes conclusions about actual rather than relative levels of consumption dangerous; (b) Some estimate of the quantity of breakfast eaten would be helpful; (c) Without a control study, establishment of a dietary "baseline" and examination of any changes in nutrition levels would be difficult to achieve.

The nutritional data on which this exercise was based were obtained from the DHSS Report on Health and Social Subjects No. 15: *Recommended daily amounts of food energy and nutrients for groups of people in the United Kingdom* (HMSO, 1979). It is worth quoting the comment on page 4: "If the nutrient intake of any individual is shown to be less than the recommended amount for that nutrient, this does not necessarily imply under-nutrition in that person. A particular individual may have a small requirement for the nutrient, which can easily be met by an intake less than that recommended." – Ed]

Checklist of Needs

A suitable computer, preferably able to printout at the same time as receiving new information, and space in the canteen to use it. If more than one were available it would also help to speed things up.

2. Three people to "manage" each computer (i.e. input information, keep paper running, select participants, go through items), unless there is plenty of time, which would permit a "self-help" system to be used.
3. A suitable program/programmers. Programming was very time-consuming and led to some teething difficulties.
4. Help from a dietician to check nutrition analysis of menu items.
5. Staff able and willing to do back-up health education so that the fairly simplified "computer messages" are not left in isolation.
6. A co-ordinator, especially if analysis is to be done on the results.