Assessment of the use of CAL to replace remedial biochemical calculation tutorials.

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Introduction

A number of students at the early stages of our courses have problems with the correct use of units and basic concentration calculations. These problems are easily addressed by remedial tutorials.

A PCCAL computer package from Bath University on basic calculations in Pharmacy was loaded onto the Erasmus Darwin network. The programmes were used initially with a small group of second year P/T B.Sc. Biomedical students (11 students) to assess if the packages could replace previously used remedial tutorial time.

The P/T students received one introductory tutorial on how to access the programmes and their content. In addition, they also under took a short pre-programme test. For the following three weeks the students used the PCCAL programme in the Erasmus Darwin computer resource room (ED290) in place of the remedial tutorial.

At the end of the tutorial sessions the students were again subjected to a short post-programme test and a verbal feedback session. All the students showed an improved score on the test taken after using the computer programmes. In the verbal feed back

session the students enjoyed the fact that they could work at their own pace on the packages and that the material got progressively harder.

It was decided to test the programmes effectiveness the packages with a larger group of students and to link the assessment of the packages to a pre and post computer session multiple choice test (MCQ).

The Computer Programmes

PCCAL Basic Calculations in Pharmacy (SI units, Moles and Molarity).

These programmes are authorware-based programmes that lead the students through progressively difficult problems. There is very little self-assessment associated with these programmes.

To complement the PCCAL programmes, a series of self-assessment tests using “Question Mark” were constructed. These self-assessment tests were installed on Erasmus Darwin network and the students were directed to use the Qmark tests to assess their progress. If they achieved low scores they were to continue with the PCCAL programmes and then evaluate their progress using the Qmark tests.

The Qmark tests constructed were

(a) "Units"; randomly accessed 20 questions from a bank of 300 questions.

(b) "Easy conc."; randomly accessed 20 questions from a bank of 1,000 questions.

(c) "Hard conc."; randomly accessed 20 questions from a bank of 300 questions.

Methodology

A group of 48 1st year HND students at the first tutorial were given a 15 question MCQ test comprising questions on units and concentration calculations that could be found in the Qmark tests.

After the test they were also informed of their score and that they would be again tested in four weeks with the same format of questions. This second test comprised 20% of the module mark. The students were also given information on how to access the PCCAL and Qmark programmes.

Results

		MCQ score	MCQ score
		Prior to computer use	After computer use
Miss	B	46	29
Miss	B	54	86
Mr.	B	31	86
Mr.	C	38	36
Miss	C	31	86
Mr.	C	31	100
Miss	C	31	100
Miss	C	62	36
Mr.	C	31	79
Mr.	C	38	79
Miss	D	54	50
Mr.	D	54	79
Miss	D	38	93
Mr.	E	38	57
Mr.	F	77	100
Mr.	G	54	64
Mr.	G	23	93
Mr.	G	38	79
Miss	H	31	86
Mr.	H	31	64
Mr.	H	54	50
Miss	H	46	79
Mr.	H	23	36
Mr.	L	54	79
Mr.	M	69	86
Mr.	M	54	36
Miss	M	38	86
Miss	M	31	100
Miss	O	62	57
Mr.	O	62	64
Mr.	P	38	79
Miss	P	62	79
Mr.	P	38	79
Miss	P	46	100
Mr.	R	54	100
Miss	R	38	86
Mr.	R	46	79
Mr.	S	46	79
Mr.	S	77	57
Mr.	S	31	57
Miss	S	69	50
Miss	S	38	43
Mr.	S	23	71
Mr.	T	38	43
Ms	U	46	100
Ms	W	54	93
Miss	B	46	29
Miss	B	54	86
Mean	(± Stdev)	45 (±14)	73 (± 21)

There were 16 students who improved between 10-100%, in this group eleven students scored 70% or better in the final test. Twenty-one students improved 100% or more and 9 students did not show any improvement in their score.

Conclusions

The results show that computer aided learning can in this instance replace traditional teaching practices. The method of pretesting to demonstrate to the students their deficiencies and post testing with the reward of module marks, produced a significant improvement (paired T-test = $p \ll 0.001$) in the MCQ score for the test after the students had used the computer-based programmes.

Further work is currently under progress to improve the method of delivery and assessment of basic calculations tests.