

*Research article***An Evaluation of Factors Affecting Computer-Based Learning in Haemostasis: A Cultural Experience.**JOYCE A OVERFIELD¹ AND LESLEY BRYAN-LLUKA²

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Abstract

Computer based learning (CBL) is increasingly used to enhance the learning experience. Cultural differences and attitudes in learning and teaching are an important consideration for tutors engaged in the choice and provision of CBL materials.

We have compared the attitudes of Pharmacy/Dentistry students in a combined class (n =106) at the University of Queensland (UQ) with BSc Biological /Biomedical students at the Manchester Metropolitan University (MMU) (n =33) after using a Haemostasis CBL package. Results show that MMU students enjoyed the learning process more than UQ students. Both groups agree that moving graphics made CBL interesting and understandable. Students' autonomy of study pattern is seen to be important by both groups. Students' perception of the tutor's role during CBL sessions shows that both groups consider this to be a necessary support. Major differences in student opinion at UQ and MMU can be seen regarding the relevance and content of the material to their curriculum. This is a necessary factor in facilitating learning.

CBL is a valuable learning and teaching resource providing consideration is given to the nature of the student group. Availability and accessibility of computers is essential; students are unhappy with CBL if support is lacking.

Keywords: computer-based learning; haemostasis; cultural

Introduction

Learning resources accessed via computer and web-based learning modes are now commonly used in developed countries and numerous software packages are easily available from a variety of sources. However, reports suggest that more educational research should be performed to find out how effective computer-based learning (CBL) really is. It has been viewed by some as a fashion based primarily on social influences, in contrast to approaches based on established educational principles, critically evaluated experiences, or the results of valid research (Campbell and Johnson, 1999). Cultural differences and attitudes in learning and teaching are an important consideration for tutors engaged in the choice and provision of computer based learning materials. This study attempts to evaluate students' learning experience in two different environments using a selected CBL package to teach haemostasis.

The 'Haemostasis' package has been written as part of a suite of Pharmacology packages. The package is quite extensive, comprising of four sections: Overview, Platelets, Coagulation and Fibrinolysis. It includes text, mobile images and multiple choice questions and other interactive exercises to aid learning. The objectives are to:

- Provide the student with an understanding of the processes involved in haemostasis;
- Illustrate the relationships between coagulation, anticoagulation, fibrinolysis and fibrinolytic therapy;
- Show how drugs act to modify haemostasis;
- Exemplify the clinical effects of drug treatment;
- Illustrate defects in haemostasis and show how they may be corrected.

The Haemostasis package is supported by a Teaching and Learning Resource Package (TLRP) which provides a paper-based handout to reinforce learning at the students' convenience as well as tutors' notes for assessment purposes (Hollingsworth *et al*, 1999).

Here we describe the results of a questionnaire-based study to assess attitudes in computer based learning using this package, in Bachelor of Pharmacy and Bachelor of Dentistry students in Brisbane, Australia and Bachelor of Science (BSc) students in Manchester, England.

Method

Pharmacy and Dentistry students in a combined class (n =106) at the University of Queensland (UQ) were compared with BSc Biological /Biomedical students at the Manchester Metropolitan University (MMU) (n =33). All students (aged 17-21years) were in the third year of study. Both groups of students completed the Haemostasis CBL package in conjunction with a TLRP provided by the pharmaCALogy consortium of the British Pharmacological Society (BPS). Details of this range of software packages and suggestions for their use are described by Hughes, 2002. The TLRP was specifically designed to assist students when working with CBL packages from the BPS.

Comparisons were made of the following aspects of the students' experience in using the material:

- rating of the computing facilities
- previous computer skills
- current use and perceptions of CBL
- time spent using package
- learning style and motivation

Results

The questionnaires were analysed according to a five scale rating from 'strongly disagree' to 'strongly agree'. Percentages of students rating an item 'strongly agree/agree' were tabulated. Table 1 shows the overall student experience in terms of previous experience of computer assisted learning, computer access and availability and the average time spent in general computer usage. Time spent using the Haemostasis package was rated as 0-5 hours or greater, and results in Table 1 show % students completing the package in less than 5 hours.

Table 1. Initial experience of information technology and facilities

	UQ	MMU
Previous use of CAL packages	95%	89%
Rating of computer facilities	Excellent (50%)	Good (46%)
Daily use of computers	44%	62%
Time spent using package	78% -0-5 h	100%- 0-5 h

Student responses to questions analyzing learning style and motivation are shown in Table 2.

Table 2. Post use of Haemostasis package: student attitudes to CBL (figures show % agreed/strongly agreed)

<i>Learning style and motivation</i>	UQ	MMU
1. Learning with the CBL/TLRP was enjoyable	20	77
2. Graphical features made subject more interesting/understandable	63	69
3. Could work at own pace	61	100
4. Allowed flexibility of place/time	44	92
5. Missed having tutor around	36	39
6. CBL/TLRP was relevant to my course	28	92
7. Challenged my understanding	15	23
8. Content pitched at the right level	18	92

Students at MMU clearly enjoyed the learning process more than those at UQ. This is further reflected in their comments (see listed). The Haemostasis CBL has a high content of graphical images to portray various cellular concepts and results from both groups of students (63% UQ and 69% MMU) agree that these made the CBL interesting and understandable. Students' autonomy of study pattern is seen to be important by both groups. Students' perception of the role of the tutor during CBL sessions is noted. Both UQ (36%) and MMU (39%) students consider this to be a necessary support. Major differences in student opinion at UQ and MMU can be seen in responses to questions 6-8.

Analysis of student comments

In addition to questionnaire responses a space was provided for any additional comments the students may have. Specific comments, listed below, were supplied by 14% of students at UQ and 16% at MMU. Individual comments are reported *verbatim*, some issues were raised repeatedly, these have been paraphrased and the frequency is shown in parentheses.

Comments from Pharmacy students at UQ (n= 68):

- 'Need more opportunity to write down answers to test understanding'*
- 'Diagrams were not shown up in the computer sometimes'*
- 'Very long – a lot of information to take down'*
- 'I much prefer a lecture as it is very hard to concentrate on a CAL'*
- 'I'd rather have a lecturer – they cover the right amount of material'*
- 'Wasn't specific enough about which parts we had to take notes on'*
- 'Should have given a lecture in addition to the CAL'*
- 'Time consuming'/took too long' (6.5% of students)*
- 'I was not happy with the CBL – it contained more than I needed to know'*

Comments from Dentistry students at UQ (n=39):

- 'CBL is the most useless teaching method I have come across. CBL should never be used because they make scientists dumber'*
- 'CBL is a way for tutors to get out of lecturing. Stop being so lazy'*
- 'CBL is not the way of the future; face to face interaction will always be required'*
- 'Well I shared a computer because there weren't enough'*
- 'it was not easily accessible and should be on the web, not just for selected computers'*
- 'these should be made accessible to our homes' (3% of students)*
- 'CBL sucks –it needs to be available over the net'*

Student comments from MMU:

- 'would like to see more use of CBL, not to replace traditional methods but to supplement them'*
- 'valuable supplement but some degree of teacher contact needed to set the pace of learning'*
- 'flexibility, you can do it in your own time, this is good for part-time students'*
- 'you can see what is going on in blood vessels and what is happening'*
- 'it is not as good as actually listening to someone –the examples stick in your mind better'*
- 'if replacing lectures and misinterpreted it could be disastrous for exams'*

Discussion

Notable differences in the attitudes of the two groups of students can be seen. A variety of factors may have an effect on the implementation of CBL as part of a taught module. The majority of students from each university (95% UQ, 89% MMU) reported previous use of computers and computer assisted learning packages in other areas of study, either at university or at home. Clearly the access and availability of computers is of paramount importance and should be given due consideration by tutors. Student comments from the Queensland group indicated difficulty in accessing computer terminals. It is of note that those who found the computing facilities inadequate often experienced problems with access. The majority of students in Queensland live at home and travel daily to their studies, but this is less prevalent in Manchester where students often live in halls of residence near campus. The expectation at UQ was that CBL should be accessed at home and preferably be web-based. The MMU group were used to attendance at University with access to computing facilities to be made available to them.

Another significant factor in the success of CBL as a teaching aid is the actual and perceived relevance of the CBL content to the curriculum. In this study, the relevance and pitching of the CBL content was found to be discrepant between the groups. This information may be of use to further evaluate these cultural differences and may reflect differences in the focus of study between programs (Pharmacy, Dentistry, Biomedical Science). Biomedical Science students at MMU used the CBL as part of a module in Haematology thus the relevance to the curriculum was clear and the material was used to supplement lectures both as tutorial support and examination revision. Students of Dentistry at Queensland did not appear to use the package in a way that was integrated to their studies as is reflected in their comments. This is likely to be due to the fact that they are at a different campus for most of their studies, and hence may have had greater access difficulties than the Pharmacy students in the same group. Negative attitudes must therefore affect learning outcomes and reflect poorly upon CBL as a concept rather than the specific content of the package. This confirms the views of Devitt and Palmer (1999) that in implementing CBL as a learning resource, provision must be made for the style of teaching of the course and the style of learning of the students attending that course. The fact that integration into the course curriculum is crucial has also been described by Hughes (2002) and it must be stressed that use of CBL as an 'add on' resource is a de-motivating factor in student learning. It also reinforces the student view (comments, UQ) that tutors are 'trying to get out of teaching', an interesting concept in comparison with the current demand for distance learning modules experienced by many UK and Australian universities. Both universities included assessment in use of the CBL, however, pre and post evaluation of knowledge gain was not performed as part of this study.

A positive outcome of the study was the shared enthusiasm for moving graphical images in the package. It is clear that these animations are considered by students to be of importance in facilitating understanding of a wide range of biological processes. This is an area in which CBL materials may excel over traditional teaching methods and tutors would be well advised to consider this when selecting CBL materials. In addition, both groups of students valued the flexibility of CBL, though significantly more so in the UK.

Finally, information regarding attitudes of tutors to CBL has not been assessed in this study and may be valuable for further insight into the barriers against a more integrated use of CBL in higher education.

Conclusions

CBL is a valuable learning and teaching resource providing consideration is given to the nature of the student group.

Availability and accessibility of computers is essential; students are unhappy with CBL if support is lacking.

Student perception of the relevance to their course is a necessary factor in facilitating learning.

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References

Campbell, J.K. and Johnson, C. (1999) Trend spotting: fashions in medical education. *British Medical Journal*, **318** (7193), 1272 – 1275.

Devitt, P. and Palmer, E. (1999) Computer-aided learning: an overvalued educational resource? *Medical Education*, **33** (2), 136 – 139

Hollingsworth, M., Hughes, I.E. and Dewhurst, D.G. (1999) Implementing technology in pharmacology. *British Journal of Pharmacology*, **128**, P 303 (abstract).

Hughes, I.E. (2002) Computer-based learning – an aid to successful teaching of pharmacology. *Naunyn-Schmiedeberg's Archives of Pharmacology*, **366** (1), 77-82.