

# An investigation into the use of commercial computer-based learning materials to support the teaching and learning of anatomy and physiology in the Adult Nursing curriculum

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## Background

Anatomy and physiology are important subjects, providing scientific underpinning for nursing practice (Akinsanya, 1987, Casey, 1986) and it has been demonstrated that good biological knowledge will lead to good patient care (Clarke, 1995, Jordan and Read, 1997, Jordan and Potter, 1999). However, many nursing students experience difficulties learning and understanding these subjects (Wharrad et al, 1994, Jordan et al, 1999). Some of these difficulties have been attributed to poor levels of previous academic achievement, the teaching and learning strategies employed and the limited amount of time available to teach students due to curriculum overload (McKee, 2002). At CCCU there has been a persistent problem of small numbers of Adult Nursing students who find this subject difficult.

For these reasons, among others, there has been a growing interest in the use of computer-based learning (CBL) in nurse education (Lewis et al, 2001). In recent years there has been an increase in the number and availability of commercial CBL packages and online resources from publishers of anatomy and physiology textbooks, but there is a lack of evidence in the literature to demonstrate the effectiveness of these resources.

The aim of the project was to evaluate the effectiveness of using a commercial CBL package in the teaching of anatomy and physiology to Adult Nursing students on an interprofessional learning programme within one university.

## Approach/methodology

Before the study began the researchers reviewed three commercial CBL packages and visited two HEIs to see how these packages were used in practice. The selection of the package used in the study was based on the user friendliness of the materials, the extent to which the materials matched the course learning outcomes and the degree of interactivity offered.

A convenience sample of 15 students was selected from the February 2008 cohort of Adult Nursing students, who began their taught anatomy and physiology module in September 2008. These students (22% of the cohort) were chosen because they were being taught by one of the researchers and were based at a different campus, thus separate from the rest of the group. The remaining students in the cohort were used as controls. The nature and aims of the study were explained to the students and they were given the option not to participate. The Faculty of Health and Social Care Research Committee gave ethical approval for the study.

Before the taught course began, each student in the study group was given access to the CBL material and a copy of the companion textbook. The students were briefed on how to log on to and use the web-based materials. They were asked to complete a short pre-study questionnaire designed to elicit biographical data and a VARK (visual, aural, read/write, kinaesthetic) learning style analysis in order to help determine whether CBL is more beneficial to students with a particular learning style. The students in both the study and control groups followed the same course of lectures during the module and were assessed against the same learning outcomes. In addition the study group was given a plan of CBL activities, tests and relevant reading from the companion textbook, selected by the researchers to supplement the taught lecture content of the course. They also had free access to the CBL materials which they could use as and when they wished to support their own learning. The students' use of the website was automatically monitored by a tracking function within the software.

At the end of the taught course the examination results of the study group were collated and analysed using a two-tail test to assess what difference, if any, the use of CBL materials had made to their knowledge and understanding of anatomy and physiology. The study group was also asked to complete a post-course questionnaire to elicit their views about using the CBL materials. The exam results were analysed to identify any relationship between learning style preference and achievement.

## Outcomes

Fourteen of the 15 students in the study group reported that they enjoyed using the CBL materials. In addition the majority also felt that the CBL materials helped their understanding of anatomy and physiology as indicated below.

Not at all	1
To a small extent	2
Moderately	7
To a large extent	5

In spite of this, the examination results did not appear to show any benefit in terms of increased knowledge and understanding of anatomy and physiology compared with the control group. The mean exam score  $\pm$  standard deviation (SD) for the study group was 31.8%  $\pm$  14.9 (range 15-58) compared to 50.6%  $\pm$  17.2 (range 12-93) for the control group. The SDs and breadth of marks illustrate the wide ability range within the student Adult Nursing population. The difference between the means was 18.8, which is highly significant ( $p < 0.001$ ). Multivariate analysis demonstrated that the only significant difference between students in the study group and the controls was that the study group had lower exam scores in previous modules.

The results of the VARK learning style analysis showed that the range of learning styles amongst the study group encompassed multimodal, mild aural, mild visual, mild kinaesthetic and strong kinaesthetic. The relationship between the different learning styles and average exam scores of the study group is shown in the table below.

Learning style	Average exam score
Multimodal	35.1%
Mild aural	18.2%
Mild visual	58%
Strong kinaesthetic	18%
Mild kinaesthetic	31%

The numbers are small but the findings seem to suggest that CBL suits students who have a visual learning style, as would be expected.

The funding provided for this study enabled the researchers to demonstrate that the use of commercial CBL learning packages within the Adult Nursing curriculum at CCCU requires further investigation, eg whether bespoke software would be more appropriate than generic material.

## Enhancing RIT

The research demonstrates that it was not the teaching and learning strategies but the students' academic ability that caused the high failure rate. As the addition of the CBL materials had no impact on exam results it is necessary to examine other factors that might be affecting the results, such as curriculum design and entry qualifications of the students.

The students were exposed to alternative methods of teaching and learning and the majority enjoyed using computer based materials.

The study reinforced the importance of face to face, small group teaching methods in this subject and the fact that additional technologies should be used selectively.

## Advice for others

It should not be assumed that computer based technologies are more effective than traditional pedagogic approaches. Commercial CBL packages should be used with care as they may not meet the needs of individual courses or students.

## Reflections and any future plans

As a result of this study it has been decided not to incorporate commercial CBL packages into the current curriculum. However, these materials may be of benefit in future when nursing becomes an all graduate profession and students have higher entry level qualifications.

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