Comparison of the Use of Stand-alone Video and QTVideo Clips in HyperCard

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Abstract

Video has been used to reduce or obviate the need to use live animals in my teaching in physiology practical laboratories at Massey University for many years, but its effectiveness as a stand-alone learning aid is questionable. This paper presents the results of an attempt to assess the effectiveness of video compared with computer-based learning (CBL) using QuickTime video (QTv) clips sourced from the same video. A group of 48 third-semester veterinary science students viewed a 30 minute section of video and later worked through a HyperCard stack which incorporated QTv clips from the same video. Students were randomly assigned to either view the video before the CBL or vice versa. Then the students were required to fill out an anonymous questionnaire to determine their experience with computers, prior expectations and opinions of ease of use, information level, likes and dislikes. Analysis revealed that computer experience was limited; some expected the CBL would be difficult. CBL users liked the video clips, the colour pictures, the interactive quizzes and the ease of use. Video was ranked as being too passive and boring and could not allow interactivity in a group-viewing situation. Overall, 64% of students preferred CBL to the video but some students (23% of respondents) preferred use of both methods. A smaller proportion (13%) preferred video to CBL.

Pairing the results from the same video viewed separately and also incorporated CBL, removed the largest obstacle to such a comparison in that the source material was the same.

The main conclusion was that most students preferred CBL, but retaining use of some quality video might be desirable if used with small groups to allow pause and playback if required.

Keywords

video CBL, assessment, veterinary-education, animal-ethics

1. Introduction

(The statements included in this section are the opinions of the author and may not represent the views of other teachers in the Veterinary School at Massey University)

1.1 Background

Traditionally, the teaching of neurophysiology in medical and veterinary schools has comprised formal didactic lectures and practical benchtop laboratory classes. The laboratories invariably involved the use of animals, often mammals such as rabbits or cats, and extensive surgery was necessary to prepare these animals for student use. Euphemisms such as the ‘preparation’ or the ‘model’ are used to describe these surgically-modified animals. One of the original and most controversial animal models was the decerebrate cat. This animal model was developed by Sherrington at the beginning of

this century and was used extensively to teach the principles of spinal reflexes. Decerebration is a surgical procedure involving transection of the brainstem at the level of the mid brain so that the higher brain is removed. The advantage of this is that the areas of pain perception are removed whilst the hind brain respiratory and cardiovascular control systems remain intact to maintain basic life support. Students could study this animal preparation without any fear that the animal would feel pain. Students remembered such practical sessions for the rest of their lives, either because they found the experience a very interesting and effective method of consolidating their theoretical knowledge or they were so upset at the perceived cruelty of submitting a cat to this kind of surgery that their disgust would etch a permanent memory engram in their brains!

1.2 The use of modified animals for clinical teaching.

The author holds strong views on animal welfare and appropriateness of animal use in teaching physiology (Tarttelin, 1993). In fairness, it must be emphasised that Massey University has an effective Animal Ethics Committee which judges all manipulations as to their ethical worth and would not approve any procedure which involved any element of cruelty. However, it is my opinion that the effect of manipulations, involving the use of animals, on the students must also be taken into account since a student's reactions to a distressing experiment might well affect the learning process. There is a perception amongst physiology teachers that laboratory exercises should include acquisition of skills in the use of complex instrumentation such as stimulators, transducers, oscilloscopes and chart recorders, as well as the surgical skills derived during the animal preparation. However, I also hold the view that the main purpose of practical sessions is to reinforce the often imperfectly understood complex concepts laid down during formal lecture periods. If the nature of the practical exercise has a good learning outcome and the students gain some manual skills then that is a bonus. But effective practical sessions should contain an element of problem solving and they should make as much use of the students' cognitive and interpretative brain as their hands.

The surgical preparation in live animal laboratory classes can be distracting and extremely time-consuming. Purposeful conceptual physiology teaching may commence several hours later, near the end of the scheduled laboratory period when students are tired, often frustrated if the preparation is in an advanced state of anaesthetic overdose or surgical shock or dead and therefore cannot yield useful data. This leads to further frustration when results are often at variance with the standard text-book dogma and deemed worthless. The final tutorial might need to use slides or video from a successful laboratory and students often comment, "why did we endure the last three hours and sacrifice numerous animals in order to be told that our results are suspect?"

Proponents of the traditional laboratory claim that students are learning that we live in a real and imperfect world and not all data are perfect. Others claim that the principles of surgery are laid down in physiology laboratories and will be of benefit in later clinical years. However, I believe that students are not unmindful of these realities and may consider that their time is far more profitable spent in practical sessions with a high probability of an effective teaching outcome relevant to the present course. Finally it is my view that the physiology laboratory, with its inappropriate surgical environment, is not a good model for learning surgery to the standard required in a modern veterinary clinic.

1.3 The solution?

The initial solution was to perform a decerebration on a cat (in 1983) and edit a video of the whole production from surgical preparation, and include a discussion of brain anatomy, a description of the neurological procedures in assessment of the loss of brain functions, and the demonstration of the retention of all spinal function. This video included demonstration of neurological assessment of motor and sensory function in normal cats of various ages, and was a true stand-alone learning aid.

1.4 A problem?

The Decerebrate Cat video was used to replace a 3-4 hour practical laboratory. Students viewed the video then completed an assignment with clearly laid out learning objectives and problem-solving exercises associated with neurological testing and discussion of the retention of a functional CNS. After a period of personal study a tutorial was given to draw attention to the objectives and attempt to stimulate a question and answer session. A general assessment of the success of this exercise usually produced statements such as, "I was still horrified at what the video portrayed." Students still did not like being reminded that a cat was used in this video production. Even 13 years later, students have said that they thought the surgery was horrifying. Students rarely commented on the traditional criticism of video being largely a passive learning exercise which reduces its effectiveness as a learning aid. However, the graphic and exciting nature of the video sometimes stimulated effective learning by appealing to the senses and the emotive part of the learning process.

1.5 Another solution?

In 1993, during a period of sabbatical leave in the Interactive Multimedia Learning Unit at Melbourne University, parts of the video were digitised and incorporated into a HyperCard stack (HC) entitled, 'The Decerebrate Cat: a model of neurological examination'. This stack has 6 modules and covers the basic surgical preparation with a section incorporating QTv clips of the neurological examination of the decerebrate cat and a further 4 modules on basic brainstem anatomy, functional anatomy of cranial nerves and then a more elaborate neurophysiological explanation of the nature of spinal reflex control leading up to an explanation of the muscle spindle and its involvement in control of movement.

In 1995, eight PowerMac 6100 computers were purchased by the physiology department and this CBL application was used for the first time. It was decided to canvass student opinions on the learning value of video versus CBL incorporating a selection of QTv.

2. Methods

2.1 How was the study set up?

Forty-eight students were involved in this study which was conducted over a 3 week period. Each week, from a group of 16 students, 8 were randomly assigned to view the video and 8 to work through two modules of the HC stack. The video lasted 30 minutes and then the students were asked to complete a written assignment for a further 30 minutes; 60 minutes was allowed for the HC study. Then the groups were reversed. After both groups had completed the video and HC study, a tutorial was conducted by the author to review the learning objectives, answer questions and attempt to stimulate some student interactivity to assist in understanding why spinal reflexes are still functional in a decerebrated animal and what is the cause of the muscular rigidity.

Students were asked to complete a separate assessment for the video and the CBL.

2.2 Design of the assessment

The lay-out of the assessment is illustrated in figure 2. It was designed to be completed in 5 minutes.

Answer the following questions by ticking the boxes.

1. How would you rate your previous experience with computers? ☐ HIGH ☐ MED ☐ LOW

2. Give examples of your previous use of computers ☐ CAL ☐ WP ☐ OTHER

With specific reference to CBL, DC Cat, please can you answer the following questions:

3. Expectations before you studied this CBL ☐ HIGH ☐ NONE ☐ LOW

4. If you answered high or low, did you change your opinion? ☐ YES ☐ NO

5. Give some details.

_____

_____

_____

6. Ease of use ☐ YES ☐ NO

7. Information level in the program ☐ HIGH ☐ OK ☐ LOW

8. List three "likes" about the program, ranked in descending order

_____

_____

_____

9. List three "dislikes" about the program, ranked in descending order

_____

_____

_____

10. Have you any further comments to make regarding this program as a learning aid?

_____

Fig 2.

3. Results

Data were entered into an Excel spreadsheet and analysed by working out the percentage of responses to each of the questions which allowed a mathematical description. These data are also illustrated graphically in figure 3.

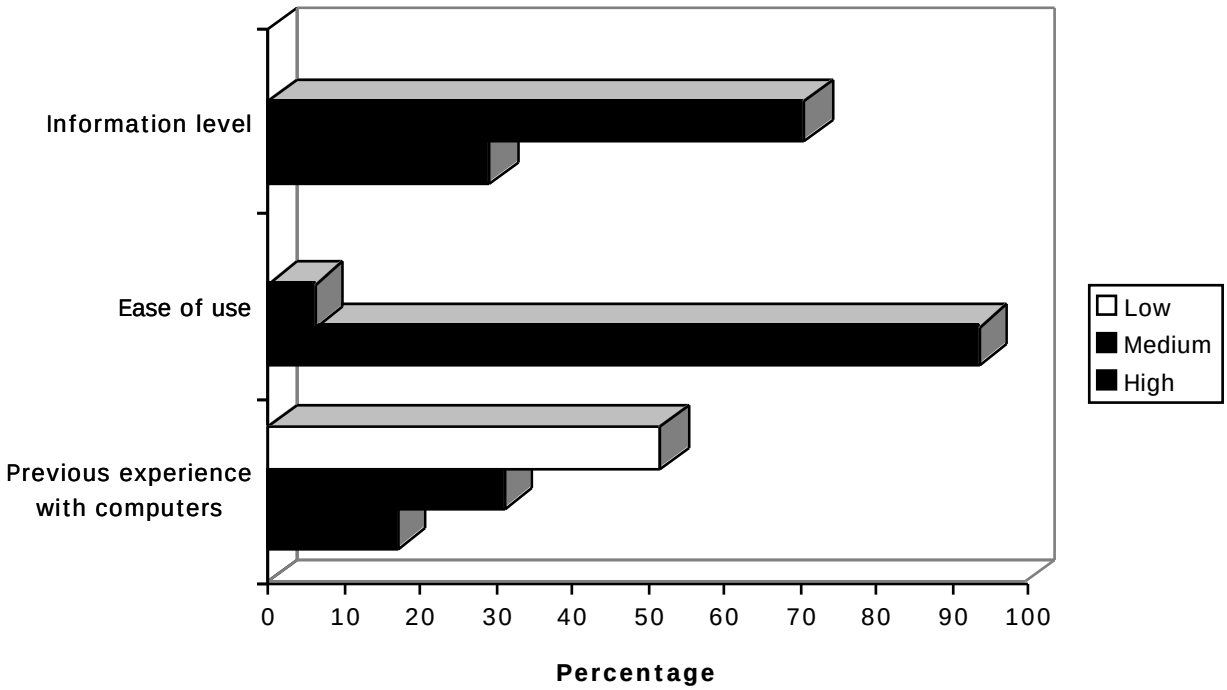

Figure 3

CBL:

3.1 Previous experience

The previous experience of students was:

52% low, 31% Medium, 17% high.

3.2 Expectations

79% had none. Of those that had expectations, most said they thought it would be difficult or boring. All reported that they did not find this to be true.

3.3 Ease of use

94% expressed total satisfaction as to the interface and ease of use.

3.4 Information level

71% thought that the information level was about right, 29% thought it was too high.

3.5 Likes, in order of prevalence

The most common ‘like’ was the QTv clips. Next they ranked the colour graphics and the quizzes. Some also commented specifically on the ease of use of the program.

3.6 Dislikes, in order of prevalence

Most students did not like the element of program control in that some pop-up menus were timed to disappear automatically in a few seconds. They also did not like any pop-up graphic which occluded a text field even though there was no interrelation with the text field. Some commented that they thought there was too much text on some of the cards. Some students commented that they found computer use was tiring and inhibited them taking notes.

Video: The results are summarised in text rather than with percentages as some of the questions relating to computer experience and expectations were not considered relevant to video so were not asked.

Ease of use was highly praised. Students were actually asked to switch on the video themselves and rewind at the end for the next group!

The majority thought the information level was about the same as the CBL, i.e., about right.

On the question of 'likes', they thought video showed the "whole rather than only parts" of a given scene. They appreciated the animal welfare aspects in that one animal was sacrificed and the video could be used for many years of teaching. They also commented on the quality of the commentary and appreciated not having to do the experiment themselves. However, they ranked the video as a learning aid as passive and implied it was less effective than the interactive methods of learning. Some thought watching a video was boring. They also resented not being able to interact with the video and fast forward or wind back.

When students were asked to rank their preferences for either CBL, video or both, 64% clearly stated a preference for CBL, 23% preferred both and 13% stated they would have preferred the video solely.

4. Discussion

The results expressed above did have some clear trends. Half the students had little experience of computer use. 31% thought their computer use was moderate and this would have included previous CBL in the department of physiology and anatomy earlier in the first semester. Most students (79%) stated they had no expectations at the start of the lab. Those who did express an opinion (21%) stated that they expected the CBL module to be difficult or boring. All of these students stated that this expectation was not realised! Most students (94%) found the interface was good and commented on the ease of use. The information level was also considered "about right" for the majority of the class (71%).

The most consistent comment, when asked about their 'likes' was that they liked the QTv clips and the colour images. Colour in HyperCard presents significant delivery problems, even with the latest versions (v2.3), because the window redraw function is very slow and applications only run very satisfactorily on the faster Macintoshes. Students also frequently commented that they liked the quizzes: frequent assessment gives students the best feedback as to the level of comprehension and retention at the time of the study. They often echoed their opinion on the ease of use, even though a separate question was asked about the interface.

Common 'dislikes' about the program listed some program control in which some small pop-up text fields were visible for a few seconds. Students preferred to hide them themselves. Also, some images were displayed on top of text and even though the images contained stand-alone information, the students preferred the text to be always visible. Some students volunteered the opinion that there was too much text, even though this program did not use scrolling text fields. Some students also complained that they found computer use tiring even though they were only asked to work for 1 hour.

Finally, some students complained that they found note taking at the computer difficult and often requested a print-out of the cards. Clearly, some students are not accustomed to CBL and the advantages of IMM.

The assessment of the video was very interesting and reinforced my view that our veterinary students prefer watching than participating, even though they clearly realise that passive learning can be boring and is less effective than alternatives. One interesting comment was that they liked the video as it gave "....an overall picture of the neurological examination." I presumed they were alluding to the fact that the CBL, by the very nature of the design, had short QTv clips, averaging 6-10 seconds in duration. It was interesting that nearly a quarter of the students preferred to see the video and also to work through the CBL. Students were given a section in the questionnaire in which they were asked to freely comment. Several who viewed the video before they worked through the CBL stated that they thought the CBL should have been presented first so that they could have the objectives and relevance of the study clearly in their minds. But conversely the students who worked through the CBL at first thought a video overview prior to the CBL would have helped them put the clips into perspective.

The downside of development of IMM, with its increased sophistication in colour use and extended graphic design, is the need for increased memory and faster processing power in the delivery machines, which limits the widespread use of such CBL. Video, on the other hand, only requires a simple delivery system which is freely available throughout the world and can be used in large groups if necessary. But video still remains a passive teaching aid and like CBL, its success is still dependent on the finest quality of design and production.

5. Conclusion

In conclusion, it would appear that retention of a video as a learning aid in a complex subject such as brain anatomy and neurological examination is desirable and that most students would prefer to study the CBL first and then be allowed to view the video in small groups, or as individuals, so they can fast forward or pause and rewind as required.

6. References

Tarttelin, M.F. (1993). Computer-aided-learning and alternatives to the use of animals in physiology teaching. Paper presented at the *Apple University Consortium Conference*, August, Christchurch, New Zealand.