Using videoclips to improve theoretical anatomy teaching

J.A. Pereira, A. Merí, C. Masdeu, M.C. Molina-Tomás and A. Martínez-Carrió

Department of Experimental and Health Sciences, Faculty of Health and Life Sciences, Universitat Pompeu Fabra, Barcelona, Spain

SUMMARY

The introduction of multimedia technology into teaching has brought important changes in university teaching. This study seeks to evaluate whether the use of videoclips as an aid in theoretical lessons, improves students' performance.

This study compares the results obtained in the scores of Locomotive System Anatomy for two consecutive groups of students that took the First Course of Descriptive Anatomy in the degree in Biology at the Faculty of Health and Life Sciences at the "Universitat Pompeu Fabra" of Barcelona.

In the first group (G1 n=72) theoretical teaching was performed through conventional lectures supported with Power Point slides. In the second group (G2 n=70), during the same period of time, teaching was done by a combination of theoretical explanations, slides and multimedia anatomy videos, which were used in order to reinforce the key issues of all lectures. The evaluation of theoretical knowledge was achieved through a multiple-choice test of 30 questions (70% of final mark), completing with a test of 15 short questions (30% of the final mark). Evaluation was performed done selectively based on the same items in 2 examinations using different questions.

Comparison of the results revealed that students receiving video input performed significantly better (G1:76 % vs. G2: 93 %). Results of students opinion performed between two groups find out to be similar in each group (G1: 5.7 vs. G2: 5.9). The adequacy of the teaching material was (G1: 7.9 vs. G2: 7.5) and general satisfaction with the teaching methods was (G1: 6.8 vs. G2: 6.8).

In conclusion, it was found that using videoclips for teaching Human Anatomy significantly improves students' comprehension of theoretical contents.

Key words: Teaching – Human Anatomy – Video – Undergraduate Education

INTRODUCTION

The application of new information technologies to university teaching (Greenhalgh, 2001) has revolutionised traditional methods of teaching Human Anatomy (Paalmman, 2000), enabling us to employ relatively simple teaching methods that would have been impossible some years ago (Reidenberg et al., 2002; McNulty et al., 2004; Pereira et al., 2003).

Application of the techniques of computer image processing to theoretical Human Anatomy classes has led to significant changes (Carmichael et al., 2002; Paalman, 2000; Reidenberg et al., 2002; Trelease et al., 2000). As a result, today there can be little justification for maintaining the traditional Anatomy class format (i.e., lecture with sketches and drawings on the blackboard) and both students and teachers have quickly become accustomed to using this

Submitted: March 29, 2004
Accepted: June 10, 2004

Correspondence to:
José A. Pereira. Facultat de Ciències de la Salut i de la Vida, Universitat Pompeu Fabra, C/ Dr. Aiguader, 80, 08003 Barcelona, Spain. Phone: +34 93 542 28 77;
Fax: +34 93 542 28 02 E-mail: jose.pereira@upf.edu

technology (Levine et al., 1999; Nieder et al., 2002; Trelease, 2002), especially in the area of animated images (Guttman, 2000, Trelease et al., 2000).

Film or video has been in use for many years now as a method of supplementing the teaching of Anatomy and other disciplines, especially in seminars and occasionally in place of practical classes in cases of overcrowding or due to a lack of human anatomy teaching aids. The arrival of multimedia technology in the 1980s led to additional material being made available to students on CD-Rom or via the Internet (Bacro et al., 2000; Carmichael et al., 2000; Guttman, 2000; Seidel, 2000).

Among the potential advantages of video are step-by-step demonstration of processes, attracting and holding class attention, the presentation of scenarios and physical settings, the representation of real cases and complex situations, and the analysis of movement.

The recent introduction of reasonably priced easy-to-use digital video cameras and software enabling processing of the images filmed allows teachers themselves to design, film and assemble their own class material for various teaching purposes.

Lower academic performance and a relative lack of student interest in comparison with other first-year subjects was detected by teachers of General Embryology and Descriptive Anatomy I at the Universitat Pompeu Fabra, Barcelona. This subject is a first-year component of the Degree in Biology (Human Biology) and focuses on General Embryology and Locomotive System Anatomy. It was decided to design strategies to make the subject more attractive and thus improve the students' academic performance.

This paper aims to analyse the impact of the use of videoclips as a supplementary aid for theory classes on academic performance and student satisfaction.

Materials and Methods

Subjects

The subjects were first-year students of the Degree in Biology at Universitat Pompeu Fabra. Two full complements of students were studied over two consecutive years. The student characteristics were similar in terms of age, distribution by sex, and previous academic performance (Table 1).

Table 1.- Characteristics of both groups of students.

	GROUP 1 N=72	GROUP 2 n=70	p
SEX (M/F)	15/17	19/51	
AVERAGE MARK PAAU	8.31	8.22	n.s.
MIN. ENTRY GRADE PAAU	7.76	7.53	n.s.

Development of materials and classes

The subject programme was identical in both cases, and the students received a total of 30 hours theoretical instruction in each group. (Pereira et al., 2003).

The first group (G1) received classes in the form of lectures with support through Power Point presentations (Microsoft Power Point 2000, Microsoft Corp). The second group were shown explanatory videoclips instead of the lecture component, although the rest of the teaching was identical to that of group 1.

The videoclips employed were obtained from different sources: material filmed by the teachers using human models and anatomical dummies, and extracts from commercially produced Anatomy videos (Acland, R. Video Atlas of Human Anatomy. Lippincott, Williams and Wilkins, 2000).

The material was filmed by teachers using a miniDV Sony DCPC6E digital videocamera. Image capture was performed with a Pinnacle E/S analog/digital video capture card (Pinnacle Systems Inc.) installed on a PC using Windows 2000 as an operating system. Post-filming manipulation and edition used the Pinnacle Studio 8 program (Pinnacle Systems Inc.).

Evaluation of academic performance and student satisfaction

Evaluation was carried out by means of two similar tests in each group: a multiple-choice test (PEM) comprising 25 items (accounting for 70% of final mark) and a test made up of 15 short questions (30% of the final mark). The same items were evaluated selectively using different questions. The results were compared with those of another similar subject (in terms of number of credits) taught at the same time, and also with the overall pass-rates for first exam sittings.

Student satisfaction was measured by means of the University's standard questionnaire which is given to students at the end of all subjects and before the examinations. Specific scores were recorded for (a) subject interest; (b) the appropriateness of teaching materials and (c) the overall student satisfaction with teaching received.

Statistics

Statistical comparisons were carried out by means of the Statview 5.0 program (SAS Institute Inc.), using the Student t-test for paired data and contingency tables for the qualitative data.

Results

The total number of students registered in the first year of our study was initially 72 (G1) and 70 in the second year (G2). Both groups were similar in terms of academic performance prior to entry to the University (Table 1). A number of students dropped out over the course of the term (G1 = 8.3%; G2 = 8.6%), and these, along with students deciding not to take the first exam sitting (G1= 11%; G2 = 8.6%), brought the total number of students tested down to 58 (G1) and 56 (G2) respectively.

Table 2 sets out the results of the student evaluations. Although higher for the group receiving video input, the difference in the average grade was not statistically significant according to the Student t-test (G1= 5.85 vs G2= 6.46). The table also shows that there were no significant differences between each group's performance and that of students in another similar subject, with the same number of credits, (Physiology) taught at the same time (G1 =87% vs G2 = 89%). Nor were there any significant differences observed in comparison with the overall percentage of credits passed in first exam sittings by each group (G1 = 94.5% vs G2= 92.9%). In contrast, significant differences were observed in the percentages passing the subject of Human Anatomy (G1 = 76% vs G2 = 93% p< 0.01).

In the subject second exam sitting, the percentages of overall success (excluding the students who dropped out) were similar in each group (G1= 97% vs G2= 94%) and no significant differences were recorded.

Table 2.- Comparison of results obtained in evaluations.

	GROUP 1 n = 58	GROUP 2 n = 56	p
PHYSIOLOGY	87%	89%	n.s.
ANATOMY	76%	93%	<0.01
CREDITS PASSED	94.5%	92.9%	n.s.

Table 3.- Comparison of scores obtained in satisfaction questionnaires.

	GROUP 1 n = 41	GROUP 2 n = 36	p
INTEREST	5.8 (2.6)	5.7 (2.2)	n.s.
MATERIALS	7.9 (1.5)	7.5 (1.7)	n.s.
OVERALL SATISF	6.8 (1.6)	6.8 (1.9)	n.s.

The student satisfaction questionnaires administered to both groups recorded similar participation rates (G1 = 62%; G2= 56%). Comparison of scores (Table 3) revealed no significant difference in any of the three items evaluated (interest, appropriateness of materials, and overall satisfaction).

Discussion

The transformations brought about by new information technology have given rise to significant changes in teaching methods (McMillan, 2001; Friel d et al., 2002). Human Anatomy as a subject is no exception to this, and recent years have seen introduction of new methods for theoretical, practical and distance teaching of this discipline (Bacro et al., 2000; McNulty et al., 2004; Carmichael et al., 2000; Guttman, 2000; Trelease et al., 2000; Van Sint et al., 2003; Hallgren et al., 2002; Trelease, 2002).

At the same time, the new focus of university teaching in the aftermath of the Declaration of Bologna means that university teachers need to reassess all aspects of their teaching methods. One of these methods, as our results suggest, may be the use of videoclip extracts to supplement theoretical subject lectures.

The work done to date is not sufficient to clearly demonstrate the superiority of this method (Benbaun-Fich, 2002; Sultana et al., 2001) over traditional methods. Nor has there been any clear-cut proof of additional learning benefits (Smith et al., 1999) due to video input in fields in which it plays a more central teaching role (distance learning, for example).

The advantages of the use of videoclips to supplement theoretical teaching are that it attracts the students' attention; it facilitates their understanding of complex anatomical relationships and actions, and it enables us to incorporate other media (texts, graphs, audio) as teaching supports.

The arguments against the use of video are that it may lead to a lack of attention due to environmental features (dimmed classroom lights, viewing difficulties, language problems); it requires video equipment in classrooms, and that it is not good for the expression of abstract concepts and static objects.

In our study we found a clear increase in academic performance among students receiving videoclip input during theoretical teaching instead of part of the traditional lecture. However, this increase was only clear in the first exam sitting, and no significant differences were observed between the groups for the second sitting. This could be due to the fact that both groups prepared for the second sitting using the same learning aids.

Nevertheless, our initial aim of increasing student satisfaction with the subject was not achieved. In our view, this particular parameter may be more related to the subjective importance that students attach to the subject, as reflected in student questionnaires over the last five years, than to the benefits in terms of academic performance brought about by changes in teaching methodology and the incorporation of new teaching materials.

Acknowledgements

This work has been supported by grants from Universitat Pompeu Fabra, Barcelona, and from the Department of Universities, Research and the Information Society of the Generalitat (Government) of Catalonia (135 MDQ 2002).

References

Bacro T, Gilbertson B and Coultas J (2000). Web-delivery of anatomy video clips using a CD-ROM. *Anat Rec*, 261: 78-82.

Benbunan-Fich R (2002). Improving Education and training with it. *Communications of the ACM*, 6: 94-99.

Carmichael SW and Pawlina W (2000). Animated powerpoint as a tool to teach anatomy. *Anat Rec (New Anat)*, 261: 83-88.

Carmichael SW, Haines DE and Drake RL (2002). Education in the Anatomical Sciences: The common goals of societies. *Anat Rec (New Anat)*, 269: 67.

Friedl R, Preisack MB, Klas W, Rose T, Stracke S, Quast KJ, Hannekum A and Godje O (2002). Virtual reality and 3D visualizations in heart surgery education. *Heart Surg Forum*, 5: E17-21.

Greenhalgh T (2001). Computer-assisted learning in undergraduate medical education. *BMJ,* 322: 40-44.

Guttmann GD (2000). Animating functional anatomy for the web. *Anat Rec,* 261: 57-63.

Hallgren RC, Parkhurst PE, Monson CL and Crewe NM (2002). An interactive, web-based tool for learning anatomic landmarks. *Acad Med*, 77: 263-265.

Levine M, Stempak J, Conyers G and Walters J (1999). Implementing and integrating computer-based activities into a problem-based gross Anatomy curriculum. *Clin Anat*, 12: 191-198.

Mc Millan PJ (2001). Exhibits facilitate histology laboratory instruction: student evaluation of learning resources. *Anat Rec*, 265: 222-227.

McNulty J, Halama J and Espiritu B (2004). Evaluation of computer-aided instruction in the Medical Gross Anatomy Curriculum. *Clin Anat*, 17: 73-78.

Nieder G and Hagy F (2002). Analysis of medical students' use of web-based resources for a gross Anatomy and Embryology Course. *Clin Anat*, 15: 409-418.

Paalman M (2000). New Frontiers in Anatomy Education. *Anat Rec (New Anat.)*, 261: 47.

Pereira JA, Merí A, Molina-Ros A and Molina O (2003). Web-based course for teaching Human Anatomy. Results of the UPF experience. *Eur J Anat*, 7: 19-22.

Reindenberg JS and Laitman JT (2002). The new face of gross Anatomy. *Anat Rec (New Anat.)*, 269: 81-88.

Seidel Ch, Wheeler D and Boyd F (2000). Use of streaming viedo in preclinical lectures. *Acad Med*, 75: 517-518.

Smith TL, Ruocco A and Jansen BJ (1999). Digital video in education. Proceedings of the ACM Computer Science Education Conference, New Orleans, pp 122-126.

Sultana CJ, Levt J and Rogers R Jr (2001). Video vs. CD-ROM for teaching pelvic anatomy to third year medial students. A comparison. *J Reprod Med*, 46: 675-677.

Trelease R, Nieder G, Dorup J and Schacht Hansen M (2000). Going virtual with quicktime VR: New methods and standardized tools for interactive dynamic visualization of anatomical structures. *Anat Rec (New Anat)*, 261: 64-77.

Trelease R (2002). Anatomical informatics: Millennial perspectives on a newer frontier. *Anat Rec (New Anat)*, 269: 224-235.

Van Sint Jan S, Crudele M, Gashegu J, Feipel V, Poulet P, Salvia Pa, Hilal I, Sholukha V, Louryan S and Rooze M (2003). Development of multimedia learning modules for teaching human anatomy: Application to Osteology and Functional Anatomy. *Anat Rec (New Anat),* 272B: 98-106.