

Possible way of learning using posters in Physiology

Ross G. Cooper

School of Health and Social Care, Birmingham City University, UK

Abstract: This study discussed the use of posters in Physiology pedagogy. Students may be sub-divided into buzz groups say of four. Students may initiate instructions in the design of posters, e.g. the use of hypolipidemic drugs. Reflection, may contribute 35% of the final overall mark involving communication skills, and peer reflection of content and support. Physiological detail with nutritional and pharmacological associations may be graded according to a mark scheme and awarded a total of 65% of the final mark. During reflection, the poster presentation may evaluate how students explained the cause of the disease, compared particular types of treatment and analysed the most effective treatment. Students may rely upon their peers to understand articles and possibly read through articles more carefully. Marks for individual pieces of work may be awarded for content, design and clarity (e.g. 70% of the marks). Marks may be awarded for posters discussing the action of hypolipidemic drugs, illustrations of the transport of cholesterol between the liver, gut and extra-hepatic tissues, lifestyle and health, associations of cholesterol, atherosclerosis and coronary heart disease, and the action of named hypolipidemic drugs. Each member in small group work may participate in the use of posters. In poster design, if students work cooperatively, they may engage in an exceptionally good discussion of inherent principles with a simple, but effective focus on relevant Physiological drivers. Essays may form part of the Physiology assessment. In some cultures, individualism, as opposed to group work, is encouraged via competitive grading. Small group work was effective in helping students appreciate pharmacological-physiological inter-relationships from the cellular level. Poster assessment provided one useful way of re-enforcing knowledge of a challenging subject.

Key words: assessment, drugs, exam, Physiology, pedagogy, poster, undergraduate

INTRODUCTION

Introduction: Physiology is usually a requirement in the vast majority of undergraduate health, dentistry, medical, nursing and veterinary courses. Students studying this subject have widely differing preferences for learning style, and a study has shown that there are gender differences in which males prefer multimodal instruction, whereas females are more comfortable with single-mode deliveries [1]. Another study focusing specifically on neuroscience courses found that a comparison of examination scores, essay responses, engagement levels and student reflections, showed that a project as part of their assessment enhances their learning experience [2]. Concept maps stimulate meaningful learning within a problem-based learning course [3]. A study of nursing students' preferences for method of delivery in a pathophysiology course showed that students who achieved higher marks in their final examination expressed stronger preferences for the traditional method of information delivery and preferential teacher-based instruction [4].

The use of posters in health facilities is widespread, e.g. lowering blood pressure [5]. A poster may assist students with a link in their understanding of Physiology and relevant cellular processes. This could enable a link to be formed between students' feelings and their understanding of Physiological processes. A multi-method approach in the study

of Physiological posters using questionnaires and observation is advantageous as it facilitates the appreciation of results of investigations and their relevance to Physiological states of health. Peer assessment via observation allows triangulation of data from the questionnaires (mixed methodological approach). The reliability of results assumed that the aims in the questionnaires could be replicated in tasks [6] and the research process controlled [7]. A logical framework in a poster, referenced with pertinent papers, would enable one to determine and reflect on a patient's journeys. Considering one example of a poster presentation – the heart, the evaluation was principally positive with an appreciation of the diagrammatic representation, the mechanics of circulation, Physiological equations for cardiac output, and disease. The peer assessment process was supported by observing the poster presentation based on knowledge of the cardiovascular system taught in a formal lecture. This approach helped refresh their knowledge. Posters should probably be increasingly used in undergraduate classes as a means of group work, application and focused learning. Physiology pedagogy cannot just include PowerPoint presentations [8]. Group activities using Physiology posters are useful. Small group work helps students appreciate cellular processes. Students enhance their skills by reading scientific literature, developing their oral and written communication, and establishing collaboration amongst peers. This article is a suggested approach through poster assessment to assist the learning progress of undergraduate students studying Physiology in an Institute of Higher Learning/University. Posters are one way of assessing student performance.

Corresponding author: Dr. Ross G. Cooper, School of Health and Social Care, Birmingham City University, 030 Bevan House, Westbourne Road, Edgbaston, Birmingham, UK
E-mail: ross.cooper@bcu.ac.uk

Received: 7 October 2010; accepted: 29 December 2010

METHODS

Students may be sub-divided into buzz groups of four. Students may initiate instructions on the design of posters, e.g. the use of hypolipidemic drugs. Reflection – contributing 35% of the final mark, may involve data/article collection, communication skills, and questionnaire based peer reflection of content and support. As a case study, students may be required, in terms of poster design and content, to: identify a specific disease associated with quality of life, suggest a diagnoses for the disease, evaluate the appropriateness of prescribing hypolipidemic medication, discuss available preventative medicine, and evaluate the effectiveness of treatment. Assessment may be criterion-referenced [9]. The percentage scored the relevance of physiological-pharmacological information, the structure and layout, the presentation skills employed, the content, evidence of teamwork, follow-up, and suggestions for improvement. Physiological detail with nutritional and pharmacological associations may be graded according to a mark scheme, and awarded a total of 65% of the final mark. The suggestions in this study formed part of an MA study and ethics was granted by the Faculty of Education.

RESULTS

Reflection. During reflection, the poster presentation may be supported by an oral description, was effective and achieved relational qualitative abilities [10] whereby the students explain the cause of the disease, compared particular types of treatment and analysed the most effective treatment. A good poster may compare the efficacy of two prescribed medications. Student-assessment of their peers may be useful, and constructive feedback provided from a colleague sitting in on the lecture may give further insight to group dynamics and lecturer-student interactions. Students may indicate that they rely heavily on their peers to understand articles (68%), and that they read through articles more carefully (83%). **Poster design and content.** Marks for individual pieces of work may be awarded for content, design and clarity (70% of the marks). The poster must be referenced correctly (20 % of marks). The overall appearance of the poster may have a 10% mark allocation. Posters showing the action of hypolipidemic drugs may use a flow chart with important information sequestered in boxes. Illustrations of the transport of cholesterol between the liver, gut and extra-hepatic tissues may discuss synthesis, transport and excretion. A background to lifestyle and health, followed by the association of cholesterol, atherosclerosis and coronary heart disease, and finally the action of named hypolipidemic drugs may be included. Information eschewed within the poster content may be given in a mark scheme and detailed thereafter. Reference to diet and stress combined with an unhealthy lifestyle may be elucidated in the better posters with reference to physiological stress in institutions of higher education [11], and questionnaire-gauged responses to healthy living in adolescents [12] was essential. Additionally, details of local meat consumption may have also been included [13]. The most thorough group may discuss additional factors contributing to coronary heart disease, including high blood pressure, smoking, obesity, sedentariness, and drinking soft water. Elevated free fatty acids (FFA) may be associated with emotional stress, nicotine, coffee and the consumption of large,

infrequent meals. A discussion of cholesterol may be assessed in terms of details of its synthesis, effects of elevated serum cholesterol levels, and associated incidence of coronary heart diseases. A discussion of low-density lipoproteins (LDL), high-density lipoproteins (HDL), cholesterol ratio may be included, and a background of how atherosclerosis arises according to classic textbook detail [14], may be awarded one-third of the content marks. Students may be expected to show how hypolipidemic drugs block the formation of cholesterol at various stages in the biosynthetic pathway. Named drugs and their effects may be emulated. E.g. compactin and Mevinolin may act to reduce LDL cholesterol levels with few adverse effects, and Ezetimibe attenuates blood cholesterol levels by inhibiting the absorption of cholesterol from the intestine.

DISCUSSION

In the use of posters in small group work, each member must effectively participate. Physiological aspects of consideration in a poster may include the cell, organelle inclusions (nucleus, mitochondria, ribosomes, lysosomes and the membrane), cell division, cell functions, transport across a cell membrane, cell division and cancer. Although students may be rather reticent at first – with prompting and the use of illustrations combined with sheets of paper for discussing processes like diffusion and osmosis – they are usually interested in participating. In poster design, if students work cooperatively [15], they may use notepad software to enable them to draw simple and understandable processes. Students may engage in an exceptionally good discussion of inherent principles with a simple, but effective focus on relevant Physiological drivers. Essays may form part of Physiology assessment. Individualism as opposed to group work may be encouraged via competitive grading [8]. Indeed, one's independence at going away and putting together an essay answer cannot be ignored. Some students may find it challenging to adapt to self-directed learning styles due to family needs and pressures [16]. In poster design, students may be given analogies to assist their understanding, e.g. the sinoatrial node being similar to a battery or generator, and the conduction system of the heart akin to electrical wires conducting electricity. Poster education is one way of teaching. Exam review and practices of multiple choice questions may provide useful revision discussions. Some students may raise more queries from questions uploaded electronically [8]. An exam may be tackled with enthusiasm as the students were aware that they may have to sit and pass a number of components to be granted an award. This may motivate them to work very intensively for an exam. Motivation is exceptionally important, both in terms of reading the assigned material and in developing a style for answering exam questions. Parfitt [17] argues that a good motivational attitude is required to allow factual learning, problem identification and planning for nursing intervention, tackling exams, and the efficient completion of practical assessments.

CONCLUSION

The use of posters in learning is growing, including those used effectively by hospitals to teach clinicians about lowering blood pressure [18]. In order for students to effectively collate

their data they may need to appreciate the value of research tools, including experimental design and data analysis, enhancing understanding of course material, searching genomic databases, accessing scientific articles, and writing a paper in scientific format [19]. The use of graded assessment and student evaluation are important for determining student appreciation of the topic. The use of small groups may be effective for assisting students to appreciate pharmacological-physiological inter-relationships from the cellular level. Students may also enhance their skills in reading scientific literature, developed their oral and written communication, and established collaborative development amongst peers. With increasing demands on the undergraduate student to memorise large amounts of Physiological information, applications of alternative methods of learning will help reinforce knowledge of the like and make the course more stimulating and interesting to the student. There needs to be a constant innovative focus and approach towards teaching methodology and its effectiveness, and teaching staff may explore new and novel methods of delivery.

Conflict of interest. None to declare.

REFERENCES

- Wehrwein EA, Lujan HL, DiCarlo SE: Gender differences in learning style preferences among undergraduate physiology students. *Adv Physiol Educ* 2007, **31**(2), 153-157.
- Lynd-Balta E: Using literature and innovative assessments to ignite interest and cultivate critical thinking skills in an undergraduate neuroscience course. *CBE Life Sci Educ* 2006, **5**(2), 167-174.
- Rendas AB, Fonseca M, Pinto PR: Toward meaningful learning in undergraduate medical education using concept maps in a PBL pathophysiology course. *Adv Physiol Educ* 2006, **30**(1), 23-29.
- Salamonson Y, Lantz J: Factors influencing nursing students' preference for a hybrid format delivery in a pathophysiology course. *Nurse Educ Today* 2005, **25**(1), 9-16.
- Anonymous: Poster helps to lower elevated blood pressure. *Perform Improv Adv* 2005, **9**(6), 61, 63-65.
- Silverman D (Ed.): *Qualitative Research: Theory, Method and Practice* (2nd Ed.). Sage, London 2004.
- Saunders M, Lewis P, Thornhill A: *Research methods for business students*. Pitman Publishing, London 1997.
- Cooper RG: Selected Physiology pedagogy for Zimbabwean DipHE nursing students in a West Midlands University. MA dissertation, Birmingham City University 2010.
- Brown S, Rust C, Gibbs G: Mechanising assessment. In: *Strategies for diversifying assessment in higher education*. The Oxford Centre for Staff Development, Oxford 1994, 31-44.
- Biggs J, Collis K: *Evaluating the Quality of Learning: the SOLO Taxonomy*. Academic Press, New York 1982.
- Cooper RG, ALAlami U, Jackson C, Stevens K, Jutla J, Khan S, et al.: Proposed study – a trial and indicative health status determination of participants working in institutions of higher learning in Birmingham and the West Midlands using the NeXus-4 physiological monitoring system. *Proceedings of the 3rd Annual Faculty Research Conference, Sharing Research: a faculty wide perspective*, Perry Barr, Birmingham City University, 23 Nov. 2007: 12.
- ALAlami U, Cooper RG: Promotion of healthy living in the West Midlands. *Proceedings of the 3rd Annual Faculty Research Conference, Sharing Research: a faculty wide perspective*, Perry Barr, Birmingham City University, 23 Nov. 2007: 38.
- Cooper RG: Healthy meat eating? *Proceedings of the 3rd Annual Faculty Research Conference, Sharing Research: a faculty wide perspective*, Perry Barr, Birmingham City University, 23 Nov. 2007, 45.
- Botham KM, Mayes PA: Cholesterol synthesis, transport, & excretion. In: Murray RK, Granner DK and Rodwell VW (Eds.): *Harper's Illustrated Biochemistry* (27th edn.). Appleton & Lange, California 2006: 230-240.
- Petty G: *Teaching Today. A Practical Guide*. Nelson Thornes, London 2003.
- Dyson S: The life history experiences of Zimbabwean students studying pre-registration nursing in a UK university. PhD, De Montford University, 2004.
- Parfitt BA: A practical approach to creative teaching: an experiment. *J Adv Nursing* 2006, **14**(8), 665-677.
- Anonymous: Poster helps to lower elevated blood pressure. *Perform Improv Adv* 2005, **9**(6), 61, 63-65.
- Odom DP, Grossel MJ: Using the two-hybrid screen in the classroom laboratory. *Cell Biol Educ* 2002, **1**(1), 43-62.