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Student Perceptions of Problem Topics/Concepts in a Traditional Veterinary Embryology

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SUMMARY

Even though particular attention is paid to the nature and content of anatomy curricula, little has been published about the actual problem topics/concepts experienced by students of anatomy. This information is relevant to modifying existing courses and methods of teaching. The present study thus sought to identify, by means of a questionnaire administered to students of veterinary anatomy, perceived problem topics, the possible reasons for the problems, as well as student suggestions for solving the problems. A wide range of problem topics were identified by this survey, of which the development of heart and cardiovascular system, development of face/head, foetal membrane/placentation particularly 3 D pictures and then the development of body form and urogenital (including external genitalia) recurred most frequently. A major reason given for the problems experienced was an inability to conceptualise 3-dimensional structures. Students requested more time, more lectures and appealed for a reduction in detail of textual information. Many of the problems experienced by this group of students are reflected in other studies of veterinary, medical and dental students, which suggests the existence of 'universal' problem topics in the various fields of anatomy. We believe that these universal problem topics exist in many anatomy courses, despite the application of innovative teaching methods and advanced audio-visual technologies. Only by identifying these topics can suitable strategies (within the constraints of the particular curriculum) be devised to resolve them.

Keywords: Anatomy, Embryology, Histology, Problem Topics/Concepts, Student Perceptions.

INTRODUCTION

The importance of anatomy as an essential component of veterinary and medical curricula has been emphasized in a number of studies (Cotton, 1999; Shively, 1983). In a recent survey of medical residency programmes in the USA, the majority of programmes rated gross anatomy as extremely important or very important. Gross anatomy was also ranked 'first' in order of importance by more programmes more often than any other basic science (Cotton, 1999). Although it is acknowledged that gross anatomy plays a pivotal role in the training of Veterinary and Medical professionals, a persistent and continuing erosion of the time available for teaching

anatomy, together with concomitant loss of academic staff, has become an all too familiar reality (Beahrs, 1986; Prentice *et al.,* 1977). This has led to an ongoing programme by many Anatomy Departments to modify their curricula and teaching methods, leading in some instances to the merging of gross anatomy with related subjects such as histology and embryology (Cotton, 1999). It is imperative, therefore, in view of the changes that have occurred, to carefully consider any factors that may adversely affect the efficient teaching and learning of anatomy, and as far as possible, to eliminate them. Teachers of anatomy are well aware that certain topics/concepts within the fields of gross anatomy, histology and embryology regularly pose problems for students. These problems are believed to be chiefly of a conceptual nature. Students are required to visualise 3-dimensional (3D) structure in order to understand and learn the relevant information. In a subject such as embryology, this problem is often compounded when 3D changes occur across a 4th dimension, namely time. The perception among teaching staff that anatomy presents unique and challenging problems has been highlighted in a recent survey of medical students at the University of Natal, South Africa (Manning *et al*., 1993), in which the students identified anatomy and physiology as the most difficult subjects to understand. Although there is a general awareness among academics that certain fields of anatomy pose problems for students, no data, as far as we are able to establish, are available to enable a meaningful assessment of the situation. This lack of data originates in part from a perception amongst some Veterinary educators that the existence of problem topics in anatomy is 'common knowledge', an assertion that is not reflected in the literature.

Students who are admitted to the Veterinary medicine course at the Ahmadu Bello University Zaria, Kaduna Nigeria are stringently selected, chiefly on the basis of their performance during the 1st year of University tuition. While these students have a high intellectual capacity, many experience difficulties in the basic sciences. It was thus the aim of this study to assess which topics/concepts in embryology were perceived as problematic by undergraduate students in Veterinary Medine. The outcome of this study could then be used to address and alleviate the identified problems. A questionnaire was designed to gather information from students regarding which topics/concepts they found problematic, to give possible reasons for the problems experienced, and to suggest possible solutions.

The course description is such that anatomy (including an embryology component) and basic histology courses are presented in the 2nd year of the Veterinary Medicine curriculum at the Ahmadu Bello University Zaria, Kaduna Nigeria. The embryology is presented during the first semester. The students were given two assessment tests before the final examination during the first semester as in the lecture schedules.

The embryology course is presented as a series of lectures, using smart board drawings, overhead transparencies. Embryology is taught mainly during the first semester. A practical session involving dissection of bovine placentas and aspects of organogenesis are presented as lectures before the relevant sections pertaining to gross anatomy. For example, the development of the heart and lungs and the pericardial and pleural cavities are presented before studying the anatomy of the thorax. A separate examination is held in embryology although it forms an integral part of the gross anatomy syllabus.

Recommended reference material for anatomy, embryology and histology are available in the Faculty Library.

MATERIAL AND METHODS
The open-ended questionnaire was administered to 2nd year students at the Faculty of Veterinary Medicine of Ahmadu

Bello University Zaria, Kaduna-Nigeria. The study and questionnaire were approved by the course instructor Prof. S. A. Ojo of the Faculty of Veterinary Medicine, Ahmadu Bello University Zaria, Kaduna-Nigeria. The questionnaire was designed to elicit responses from the students and not to 'suggest 'ideas. It was administered at the end of the academic year to ensure that all aspects of anatomy, histology and embryology had been dealt with before completion of the questionnaire. The students were requested to give information on whether they were taking embryology for the 1st time or whether they had completed a course in this subject previously. The students were requested to identify problem areas/topics, give reasons for the area/topic being problematic, and suggest a means of solving the problem. Students could list as many problem topics as they wished. Limited guidelines were given in the questionnaire, requesting the students to be specific regarding the identification of problem topics. We also explained this requirement verbally, as well as giving a brief overview of the reasons for the study, before administering the questionnaire.

Students were allowed to take the questionnaire away with them to ensure time for thought as to which areas had been problematic during the course. Questionnaires were retained by the students for a period of approximately 7 days.

On retrieval of the questionnaires, topics identified as problematic by the students were grouped by us, owing to the wide range of explanations/terminology used by the students in their replies.

In order to determine which areas/topics students perceived as most or least difficult, the number of responses to a particular topic was calculated as a percentage of the total number of respondents to the questionnaire.

RESULTS

Seventy-six students of a total of 104 completed the questionnaire, giving a return rate of 73.1%. Analysis of the results indicated no difference in the number or type of problem topics experienced by weaker (< 59%), average (59-69%), or stronger (> 69%) students in embryology (raw data not shown). These categories were based on the final marks obtained by the students and represented the average of final examination mark and the student's year mark, which carried equal weight.

Two of the 76 (2.6 %) respondents experienced no specific problems in embryology. The remaining respondents (97.4 %) identified a total of 10 problem topics. 61.8 % of respondents cited development of heart and cardiovascular system as problematic. The development of face/head, foetal membrane/placentation particularly 3 D pictures (31.6%), development of body form, urogenital (including external genitalia) (27.6%), and organogenesis (25%) were also identified as problem topics. Other problem topics observed includes: the pharyngeal arches, pouch and grooves (22.4%), the development of liver (19.7%), the formation of body cavities/mesenteries (18.4%) and gastrulation (5.3%) (Table 1). More than half of the students (53.9 %) indicated that these problems stemmed from an inability to visualize or comprehend the sequence of events that characterize these developmental processes, particularly in 3 D. The embryology notes (included in the gross anatomy manual were also considered to be too comprehensive, detailed and difficult to understand (46.1%) (Table 2). Scheduling more time for embryology, extra tutorials and reduction of detail (53.9%), more diagrams/simple sketch (52.6%), use of more visual aid, particularly 3 D models (51.3%) and improving the quality of the lectures or changing their format by including physical specimens to demonstrate structural changes (40.9%) were perceived by the students as possible solutions to the problems (Table 3).

Table I: Problem topics identified by students in embryology

Problem topic/concept	Number of responses	% of responses*
Development of heart and cardiovascular system	47	61.8
Development of face/head	24	31.6
Foeatal membranes/placentation particularly 3 D pictures	24	31.6
Development of body form	21	27.6
Urogenital (including external genitalia)	21	27.6
Organogenesis	19	25
Pharyngeal arches, pouch and grooves	17	22.4
Development of liver	15	19.7
Formation of body cavities/mesentries	14	18.4
Gastrulation	4	5.3

* Number of responses expressed as a percentage of total number of respondents

Table II: Student perceptions of reasons for problems in embryology

Possible reasons for problems	Number of responses	% of responses*
Difficult to visualise/orientate, particularly 3D	41	53.9
Notes not adequate –too detailed/confusing	35	46.1
Insufficient time	26	34.2
Lack of 3D sketches and simple sketches	26	34.2
Not properly integrated with anatomy and histology	9	11.8

* Number of responses expressed as a percentage of total number of respondents

Table III: Suggested solutions to problems in embryology

Possible solutions for problems	Number of responses	% of responses*
Simplify, cut detail/spend more time	41	53.9
Simplify, cut detail/spend more time	40	52.6
Use more visual aids, particularly 3 D models	39	51.3
Improve lectures/change format of lectures	31	40.9

* Number of responses expressed as a percentage of total number of respondents

DISCUSSION

The respondents who completed the questionnaire identified a wide range of perceived problem topics in embryology. The greatest number of problem topics being identified as the development of heart and cardiovascular system (61.8%) followed by the development of face/head, foetal membrane/placentation particularly 3 D pictures and then the development of body form and urogenital (including external

genitalia). This is not in agreement with work carried out by Soley and Kramer (2001) where they reported that in the embryology component, students most frequently (70 %) indicated organogenesis in general or aspects of organogenesis (development of the liver, heart or urogenital tract) as problem topics. As noted in the introduction, the relevant embryology is presented as didactic lectures prior to the dissection and study of the various body regions covered in the gross anatomy course. De Lahunta (1978) has pointed out that, although some parts of a gross anatomy course are best preceded by lectures in embryology, other sections, for example the development of the heart, are best understood after dissection of this organ. Student responses as to why they believed they had experienced problems with the identified topics in all aspects of anatomy were dominated by their perception that they could not visualize 3D structure or orientate themselves on the material being studied. The responses also strongly indicated that the complexity of the material dealt with, coupled with the volume of work, too little time, notes were also too comprehensive, detailed and a paucity of visual material (simple sketches/illustrations) impacted negatively on their ability to understand certain topics. There is certainly some substance in these assertions. Changes to the content of anatomy curricula have not always kept pace with reduction in time for teaching (Soley and Kramer, 2001).

CONCLUSION

This survey succeeded in identifying a range of problem topics/concepts experienced by undergraduate students of Veterinary Medicine taking a traditional anatomy curriculum. While it is true that the information supplied by a survey of this nature is only valid for a particular group of students at a particular time, some of the specific problem topics (e.g. development of heart and cardiovascular system) experienced by this group of veterinary

students are mirrored in other studies of veterinary, medical and dental students. There appears to be a need, therefore, for an assessment of 'universal' problem topics experienced by all students of gross anatomy, embryology and histology. We believe that these universal problem topics exist in many anatomy courses, despite the application of innovative teaching methods and advanced audio-visual technologies. Only by identifying these topics can suitable strategies (within the constraints of the particular curriculum) be devised for their resolution.

This study illustrates the value of obtaining student opinions and perceptions when addressing curriculum and teaching issues. This is in agreement with other studies (Barrett and McDonald, 1986; Nnodim, 1988 and Parkin and Rutherford, 1990). Barrettett and McDonald cautioned, however, that although students are able to judge how a course is presented and organised, and make useful comments on aspects such as intelligibility, their own workload and assignment difficulty, 'course content, the quality of the material, the currency and accuracy of content and appropriateness of course objectives can best be evaluated by colleagues in the same subject area.

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