

Students' and Doctors' Performance in an Anatomy Knowledge Test: A Comparison between Traditional and Clinical Anatomy

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ABSTRACT

Purpose: The study compared test performance in an anatomy knowledge test between medical students from a traditional anatomy course, a clinical anatomy course, from clinical clerkships, and practicing doctors.

Methods: The study participants were 66 students from a traditional anatomy course, 48 students from a clinical anatomy course, 45 from clinical clerkships and 22 practicing doctors. The students were of the classes of 2002 at University of Zambia and the doctors were at Lusaka University Teaching Hospital. All participants took an identical anatomy knowledge test that had two subtests: traditional and clinical. Each subtest had 20 multiple-choice questions.

Results: On average, the doctors failed the traditional anatomy subtest, while the other groups passed it. The students from the traditional curriculum failed the clinical anatomy subtest. The students who had completed a clinical anatomy course had the best performance in both subtests.

Conclusions: The results support Sinclair's hypothesis¹ that there exist anatomy curricula that directly support clinical practice (Clinically Oriented Anatomy Teaching) and those, which do not support clinical practice directly (Traditional Anatomy). The results also show that doctors forget the traditional anatomy at the time of their practice and that students who have completed a clinically oriented anatomy course learn anatomical knowledge required for clinical practice while those from the traditional course do not.

INTRODUCTION

A major goal of teaching anatomy in the traditional curriculum is to lay the foundations of body structure and function upon which other basic sciences and clinical sciences can be built^{2,3}. However, some scholars have claimed that students forgot their anatomy by the time they required it in clinical practice^{4,5,6}. This is considered particularly true for anatomy courses that are conducted in the traditional approach, i.e., without

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anchoring it in clinical context^{7,8}. The calls for increasing clinical context in anatomy teaching have been around for a long time^{9,10}. In more recent times Clinical Oriented Anatomy Teaching (COAT) programmes have emerged, and anatomy courses and textbooks have replaced pure anatomy courses and textbooks^{11,12,13,14,15,16,17,18,19}. Clinical anatomy is considered critical in understanding medical physical examination, interpreting clinical images, diagnosis and clinical procedures^{20,18}.

The debate about the merits of clinical anatomy approach over the traditional and vice-versa continues and is unresolved². The disputing scholars cite several reasons including the following: that change to the new clinical approaches has resulted in a decline of students' understanding and knowledge of anatomy^{21,2,3,22}; that there is lack of clarity on what is and how clinical anatomy differs from traditional anatomy; and that there is scarce empirical evidence that supports the change to clinical approaches^{11,22}.

The present paper, reports of a study comparing medical students from a traditional course, not taught in clinical context; an anatomy course taught in clinical context; clinical clerkships, and practicing clinicians (doctors), in terms of performance in an anatomy knowledge test consisting of traditional (non-contextual fact oriented) items and clinical (clinically contextualised) items. The findings may contribute to the empirical evidence being sought in informing decisions for change to clinical approaches.

MATERIALS AND METHODS

Two subtests, one traditional and the other clinical were prepared and compiled into one research test paper. Twenty questions were randomly selected from 394 multiple-choice questions (MCQ) from a question bank²³, which was considered to be representative of traditional anatomy kind. The 20 questions considered representative of clinical anatomy were randomly selected from a 110-item question bank from an existing clinical anatomy course. Additionally, four anatomists also medically qualified, agreed very strongly, on a 5-point Likert scale, with the categorization of the items into their respective traditional and clinical categories.

The Likert scale is a tool that collects information about perceptions of respondents on a continuum scale e.g. 1 for very poor, in increasing order to 5 for Very good.

The study population consisted of 191 participants divided into four groups. Group A consisted of 66 first year preclinical students who had completed a year of lectures and practicum in human gross anatomy (dissections inclusive), histology and embryology. Group B consisted of 48 second year preclinical students who had a year earlier completed the traditional anatomy course but had in addition completed a 16-week long clinical anatomy course that included lectures on the nature of clinical anatomy, the role of anatomy in clinical practice and seminars built around a selected group of clinical conditions. Group C comprised 45 students who were in either a junior or senior clerkship rotation, all had completed the both the traditional and clinical courses, 1 – 4 years ago. Finally, Group D comprised of 22 practicing clinicians of senior house-officer, registrar, and consultant ranks working at a university teaching hospital, none of which had completed the clinical anatomy course.

All the groups took the written MCQ test without receiving prior warning. The two preclinical student groups were each assembled under the pretext of a special anatomy session. However, once at the 'session' the true nature of the session was explained and the students informed that the results would not contribute to their academic records and that taking the test was voluntary. Sixty-six of 70 students from Group A attended the session and all present took the test. Forty-eight of 50 from Group B attended their session and all present took the test. The clinical students (Group C) took their test after a regular inter-departmental seminar. Forty-five of the 47 students present took the test. Of the 219 doctors working at the university teaching hospital, 50 were invited to a special research seminar, and 33 attended. Of those in attendance 22 (Group D) took the test. For all the groups the time allowed for the test was one hour.

To ensure that the anatomical knowledge test was reliable enough for statistical analysis, the reliability test was done, while the assumption that the respondents represented a normally distributed group was also tested before conducting cross-tabulation analysis of variance to detect differences.

Test reliability was measured for each of the two subsets using Cronbach's alpha. Cronbach's alpha measures reliability using the split-half internal consistency technique. The test for normality was done with the Q-

Q test for normal probability and the detrended normal probability plots. Homogeneity of variance was tested by the Levene test. Multiple comparisons of the groups' scores (analysis of variance) were done using the Bonferroni pairwise method.

RESULTS

The Cronbach's alpha for the traditional subtest were 0.88 (Group A), 0.91 (Group B), 0.94 (Group C), and 0.96 (Group D). For the clinical subset the Cronbach's alpha were 0.91, 0.88, 0.87, and 0.98 respectively.

In the test for normality, the points in the Q-Q test clustered along the line (see figure 1 and 2) for both subtests.

Figure 1 Q-Q Plot for Test 1 and Test 2 Subsets

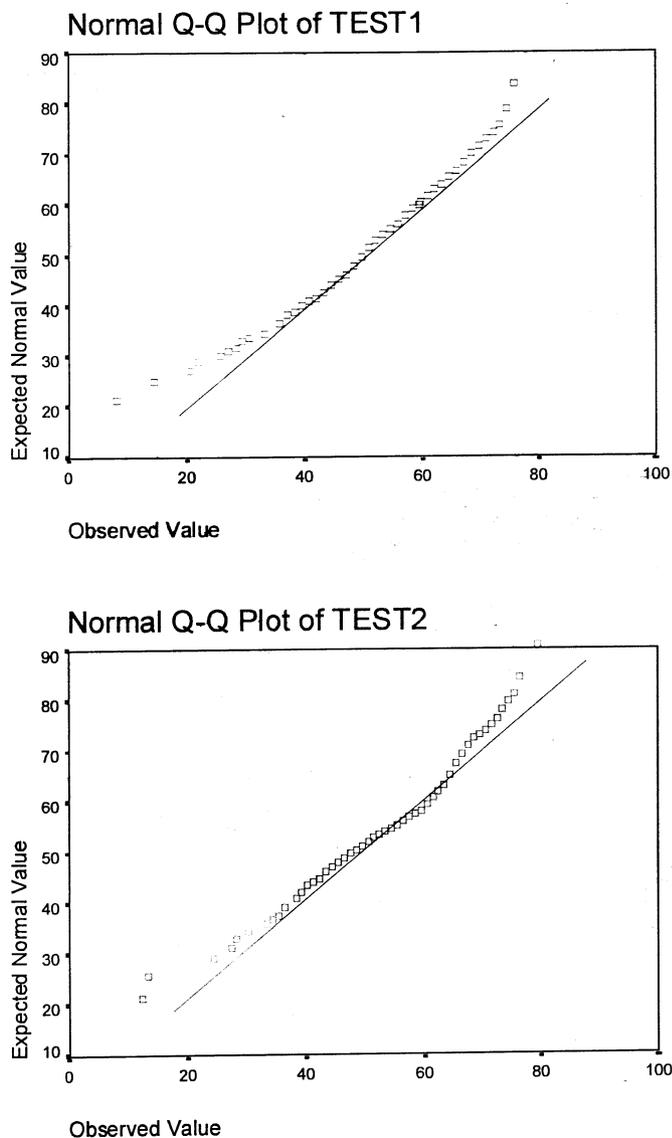
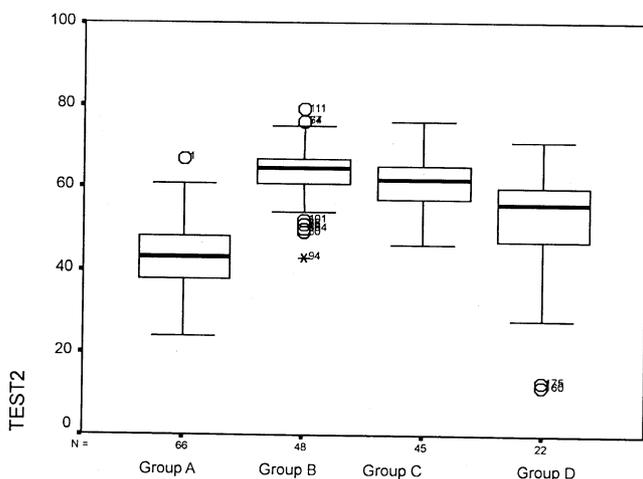
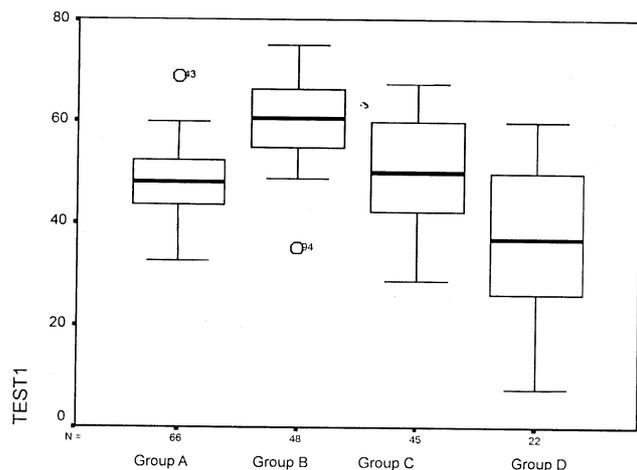


Figure 2: Box-plots of Marks Distribution on Test 1 and Test 2 Sub-tests



The Levene test for homogeneity was significant ($F=15.2$, p value < 0.0005 ; $F = 9.9$, p value < 0.0005) for the traditional and clinical anatomy components, respectively.

The scores on the two subtests were expressed as a percentage of correct answers and all the questions had been weighted equally. Interestingly, the doctors performed poorly on the traditional subtest (mean score 38, SD 3.2, range 71 - 12), and the students from the traditional course failed the clinical anatomy subtest (mean score 43, SD 1.0, range 62 - 13). On both subtests the clinical anatomy group had the best performance (see table 1).

Table 1: Descriptive Statistics of the Performance of the Participants' Group on the Anatomy Test and the Bonferroni Tests for Statistical Differences of the Scores

TestGroup	Traditional Anatomy Test			Clinical Anatomy		
	Mean	(SD)	Bonferroni (Sig.) Group D	Mean	(SD)	Bonferroni (Sig.) Group D
Group A (n = 66)	48	(1.0)	0.000	43	(1.0)	0.027
Group B (n = 48)	61	(1.2)	0.000	64	(1.1)	0.000
Group C (n = 45)	51	(1.1)	0.000	62	(1.0)	0.000
Group D (n = 22)	38	(3.2)	-	50	(3.0)	-

* The Bonferroni column is a cross-tab comparison for significance with the corresponding groups in the rows

The students from the clinical anatomy course were significantly different from the other groups.

DISCUSSION

For the traditional subtest differences between the doctors and students from Group A, Group B and Group C were significant and all the groups performed better than the doctors. This may be because the doctors had forgotten the traditional anatomy they learned at least 5 years ago. While it is expected that doctors would forget the anatomy they learned five years ago the study also compares the extent of forgetting between traditional and clinically oriented anatomy. A method that enhances recall of earlier learning would be supported in that case.

For the clinical subtest, students from Group A achieved a mean score of 43, which was lower than the University pass mark of 50, thus, as a group can be said to have failed the clinical component. They were also significantly different from the students that had completed the clinical anatomy course. The doctors performed marginally better (mean score 48) on the clinical subtest and thus were not significantly different from Group A. This could be because, generally, the doctors had universal poor command of anatomical knowledge. Nonetheless, the fact that the doctors performed better on the clinical subtest than on the traditional subtest may suggest they had retained and/or acquired anatomical knowledge that was relevant to their clinical practice. The findings suggest that the anatomy that is useful for clinical work should be pronounced in the teaching of anatomy rather than wholesale teaching

of anatomy of facts that would be forgotten and not used in the latter professional life.

The fact that clinical anatomy students obtained high scores in the clinical subtest suggest that a clinical anatomy course does result in achieving anatomical knowledge required for clinical practice. On one hand, it should be expected that students who had done a clinical anatomy course should pass this component, however, if the traditional anatomy course achieves learning of anatomy for clinical practice, as some proponents of the traditional approach claim, both pre-clinical cohorts would pass the clinical component. The traditional course, on the contrary, did not result in acquiring knowledge required for clinical practice. In medical schools where the amount of time has been drastically reduced, given that students value anatomy as course relevant to their practice²⁴, and a decision has to be made about how to teach anatomy; this study upholds the proposition by Smith²⁵ that schools that have irreversibly lost time for anatomy must, at least, instruct in clinically relevant anatomy to prepare students for practice immediately after graduation.

The results indicate that practicing clinicians forget more of the traditional anatomy and retain/or acquire a more clinically relevant anatomical knowledge base. The results also suggest that a clinical anatomy course does result in achieving anatomical knowledge required for clinical practice while the traditional course does not. The results strengthen the assertions already in the literature that suggest that anatomy teaching should be clinically oriented in order to narrow the gap between the anatomy that is taught in preclinical years and that which is used on the clinical wards.

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