

# Is cadaveric dissection vital in anatomy education? Perceptions of 1<sup>st</sup> and 2<sup>nd</sup> year medical students

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## Abstract

**Introduction:** The use of innovative ways of teaching anatomy as well as shortage of cadavers for dissection have raised questions as to whether dissection should continue to be used in teaching anatomy. This study aimed to assess the views of medical and dental students on the importance of dissection in learning gross anatomy, and whether they would prefer other ways of learning anatomy instead of cadaveric dissection.

**Materials and Methods:** First- and second-year students enrolled at the University of Nairobi (Kenya) were asked to fill an online questionnaire. Data gathered were analyzed using Statistical Package for Social Sciences.

**Results:** Ninety-eight (83 medical and 15 dental) students participated in the study. All students agreed dissection was useful in learning anatomy. Up to 95.2% of medical and 86.7% of dental students favored dissection. Most students strongly agreed or agreed that dissection helped them to develop three-dimensional (3D) awareness of the human body (94.9%), work as a team (89.8%), learn medical terminology (85.7%), and learn how to use basic surgical instruments (80.6%). Dissection was preferred to use of 3D models, prosected specimens, computer-aided learning techniques, or modern imaging techniques by 63.3%, 60.3%, 37.7%, and 34.4% of the students, respectively.

**Conclusion:** Dissection is an important resource for learning anatomy. Other teaching techniques should be used to supplement dissection rather than replace it.

**Key words:** Anatomy, cadaveric dissection, medical students

## INTRODUCTION

In recent years, the relevance and value of dissection as a tool for teaching anatomy to medical students have been under discussion at different fora (Mulu and Tegabu, 2012). Cadaveric dissection has been the main anatomy

learning tool for many medical schools for more than 400 years (Azer and Eizenberg, 2007). Innovative ways of teaching anatomy such as use of prosected specimens, three-dimensional (3D) models, radiologic pictures, and computer-aided learning (CAL) have raised questions as to whether dissection should at all be used in teaching anatomy (Azer and Eizenberg, 2007; Kennedy *et al.*, 2000; McLachlan and Patten, 2006; McNulty *et al.*, 2009; Turney, 2007). Opponents of dissection have stated that

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dissection is expensive, time-consuming, and is associated with physical and emotional stress of the students (Aziz *et al.*, 2002; Hussein *et al.*, 2014; McLachlan and Patten, 2006). This study purposed to assess the views of 1<sup>st</sup> and 2<sup>nd</sup> year medical students on the importance of dissection in learning gross anatomy, and whether they would prefer other ways of learning anatomy instead of cadaveric dissection.

## MATERIALS AND METHODS

### Subjects and Setting

This study enrolled 1<sup>st</sup> and 2<sup>nd</sup> year medical students at the University of Nairobi in Kenya, where cadaveric dissection is the main tool used for teaching gross anatomy. Both the Bachelor of Medicine and Surgery (MBChB) and Bachelor of Dental Surgery (BDS) students dissected the entire human body during their 1<sup>st</sup> year of study. Ninety-eight students completed an anonymous online-based questionnaire. All participants were informed of the aims of the study, and their involvement was voluntary. This survey was conducted between August 11, 2014 and September 10, 2014.

### Questionnaire

Variables collected in the self-administered questionnaire included the year of study, gender, whether they liked dissection, and reasons for liking or not liking dissection. Students were also asked to complete a 5-point Likert scale questions regarding (1) the advantages of learning gross anatomy through dissection and (2) whether they would prefer other techniques of learning anatomy instead of dissection.

### Statistical Analysis

Statistical analysis was done using the Statistical Package for Social Sciences (SPSS version 21) for Windows (SPSS Inc., Chicago, USA). The options in the 5-point Likert scale were coded as follows: Strongly agree (1), agree (2), not sure (3), disagree (4), and strongly disagree (5). Average satisfaction index was then derived from the sum of the product of the frequency (*n*) and the Likert scale response divided by total number of responses. The students' responses were compared on the basis of demographic variables including the course undertaken (MBChB or BDS) and year of study (1<sup>st</sup> year vs. 2<sup>nd</sup> year) using Mann-Whitney's U-test. *P* < 0.05 was considered significant.

## RESULTS

### Demographic Data

Ninety-eight students participated in the study. Out of them, 45 (45.9%) were 1<sup>st</sup> year medical students. Fifty-four (55.1%) participants were male students.

Table 1 summarizes the sociodemographic data of the study participants.

### Like for Dissection

The students were asked whether or not they liked dissection. Most students in both the MBChB (95.2%) and BDS (86.7%) groups liked cadaveric dissection as a tool for learning gross anatomy [Table 2]. The reasons for not liking dissection were strong smell of formalin (three students) and poorly preserved cadavers leading to difficulties in identifying structures (three students).

### Advantages of Dissection

All students agreed that dissection was a useful tool for learning anatomy [Table 3]. Most students strongly agreed or agreed that dissection helped them to develop 3D awareness of the human body (94.9%), work as a team (89.8%), learn medical terminology (85.7%), and learn how to use basic surgical instruments (80.6%). Up to 40.8% of the students were undecided as to whether dissection taught them how to respect the dead. More than two-thirds of the students disagreed that dissection is only necessary for those interested in surgical careers. None of the variables studied revealed statistically significant differences between 1<sup>st</sup> and 2<sup>nd</sup> year or MBChB and BDS students [Table 4].

### Should Dissection be Replaced by Other Methods of Learning Anatomy?

More than 60% of the students disliked the use of 3D anatomy models and prosected human specimens instead of dissection (average satisfaction

Table 1: Analysis of the study population

	Frequency <i>n</i> (%)
Gender	
Male	54 (55.1)
Female	44 (44.9)
Year of study	
First	45 (45.9)
Second	53 (54.1)
Course	
MBChB	83 (84.7)
BDS	15 (15.3)

MBChB - Bachelor of Medicine and Bachelor of Surgery, BDS - Bachelor of Dental Sciences

Table 2: Liking for cadaveric dissection

Course	Liking for cadaveric dissection?		
	Yes <i>n</i> (%)	No <i>n</i> (%)	Total <i>n</i> (%)
MBChB	79 (95.2)	4 (4.8)	83 (100)
BDS	13 (86.7)	2 (13.3)	15 (100)
Total	92 (93.9)	6 (6.1)	98 (100)

MBChB - Bachelor of Medicine and Bachelor of Surgery, BDS - Bachelor of Dental Sciences

indices >3). Although the students welcomed the use of computer-aided techniques and radiologic anatomy, none of these two methods had average satisfaction

indices of  $\geq 2$  [Table 5]. There were no statistically significant differences in the responses given by the different study groups [Table 6].

**Table 3: Advantages of dissection**

Advantages of cadaveric dissection	Frequency (%)					Average satisfaction index
	Strongly agree (1)	Agree (2)	Neutral (3)	Disagree (4)	Strongly disagree (5)	
Is a useful tool in learning anatomy	76 (77.6)	22 (22.4)	-	-	-	1.2
Helps develop 3D awareness of the human body	76 (77.6)	17 (17.3)	5 (5.1)	-	-	1.3
Helps students learn to work as a team	60 (61.2)	28 (28.6)	9 (9.2)	1 (1.0)	-	1.5
Helps students learn to respect the dead	12 (12.2)	16 (16.3)	40 (40.8)	22 (22.4)	8 (8.2)	3.0
Helps students learn how to use basic surgical instruments	33 (33.7)	46 (46.9)	11 (11.2)	8 (8.2)	-	1.9
Helps in learning medical terminology	42 (42.9)	42 (42.9)	7 (7.1)	6 (6.1)	1 (1.0)	1.8
Is only necessary for those interested in surgical careers	8 (8.2)	5 (5.1)	19 (19.4)	33 (33.7)	33 (33.7)	3.8

3D - Three-dimensional

**Table 4: Comparison of responses according to year of study and course undertaken**

Advantages of dissection	Year of study	n	Mean rank	P	Course	n	Mean rank	P
It is a useful tool in learning anatomy	First	45	51.57	0.359	MBChB	83	49.13	0.672
	Second	53	47.75		BDS	15	51.57	
It helps students work as a team	First	45	48.36	0.671	MBChB	83	48.94	0.595
	Second	53	50.47		BDS	15	52.60	
It helps develop 3D awareness of the human body	First	45	47.26	0.322	MBChB	83	49.67	0.844
	Second	53	51.41		BDS	15	48.53	
It helps students learn to respect the dead	First	45	52.14	0.414	MBChB	83	50.40	0.439
	Second	53	55.75		BDS	15	44.50	
It helps students learn how to use basic surgical instruments	First	45	46.64	0.322	MBChB	83	49.45	0.966
	Second	53	51.92		BDS	15	49.77	
It helps in learning the medical terminology	First	45	49.37	0.963	MBChB	83	49.71	0.851
	Second	53	49.61		BDS	15	48.33	
It is only necessary for those interested in surgical careers	First	45	45.29	0.158	MBChB	83	50.64	0.330
	Second	53	53.08		BDS	15	43.20	

MBChB - Bachelor of Medicine and Bachelor of Surgery, BDS - Bachelor of Dental Sciences, 3D - Three-dimensional

**Table 5: Use of other teaching methods instead of dissection**

Should dissection be replaced by	Strongly agree (1) (%)	Agree (2) (%)	Not sure (3) (%)	Disagree (4) (%)	Strongly disagree (5) (%)	Average satisfaction index
Prosected (predissected) human specimens	9 (9.2)	20 (20.4)	10 (10.2)	32 (32.7)	27 (27.6)	3.5
Computer-aided learning (simulation and videos)	15 (15.3)	30 (30.6)	16 (16.3)	21 (21.4)	16 (16.3)	2.9
Imaging techniques (radiologic anatomy)	24 (24.5)	24 (24.5)	16 (16.3)	25 (25.5)	9 (9.2)	2.7
Use of 3D models (plastic etc.)	14 (14.3)	12 (12.2)	10 (10.2)	25 (25.5)	37 (37.8)	3.6

3D - Three-dimensional

**Table 6: Comparison of responses regarding use other teaching methods instead of dissection between 1<sup>st</sup> and 2<sup>nd</sup> year students as well as between Bachelor of Medicine and Bachelor of Surgery and Bachelor of Dental Sciences students**

	Year of study	n	Mean rank	P	Course	n	Mean rank	P
Prosected (predissected) human specimens	First	45	46.43	0.309	MBChB	83	50.84	0.257
	Second	53	52.10		BDS	15	42.10	
Computer-aided learning (simulation and videos)	First	45	47.21	0.451	MBChB	83	49.75	0.836
	Second	53	51.44		BDS	15	48.13	
Imaging techniques (radiological anatomy)	First	45	46.43	0.313	MBChB	83	48.86	0.591
	Second	53	52.10		BDS	15	53.03	
Use of 3D models	First	45	45.73	0.209	MBChB	83	49.25	0.829
	Second	53	52.70		BDS	15	50.90	

MBChB - Bachelor of Medicine and Bachelor of Surgery, BDS - Bachelor of Dental Sciences, 3D - Three-dimensional

## DISCUSSION

In recent years, the relevance of cadaveric dissection in learning anatomy has been questioned. Some medical schools have all together abandoned dissection and replaced it with other tools such as prosected specimens and computer programs. In our set up, however, dissection is the main mode of teaching gross anatomy for both medical and dental students.

This study indicated that most students liked cadaveric dissection and even ranked it as the most important resource for learning anatomy. These findings concur with reports from previous studies (Azer and Eizenberg, 2007; Karau *et al.*, 2014; Mulu and Tegabu, 2012). Dissection is the key in the training of a medical student as it helps the student to develop the 3D awareness of the human body in both visual and tactile ways (Granger, 2004). The present study reports that up to 94.9% of students agree that dissection helped them appreciate the 3D structure of the body. One student said, “although cadaveric dissection was involving, I was able to appreciate how different parts looked in a real body specimen rather than how they appear in the anatomy atlases and videos. It was a good way of blending theoretically acquired knowledge (from books and dissection videos) with the practical knowledge.”

Dissection is important in building interpersonal skills such as the ability to work in a team. This virtue is significant because it establishes a routine by which the students continue to work with in later years as clinicians (Granger, 2004; Lempp, 2005). In the current study, 89.8% of the students either strongly agreed or agreed that dissection helped them work as a team. The students reported that dissection “provided a good platform for discussion with table mates” which “made the learning process even easier.” Previous studies have reported that the bonding of the dissection team helps foster coping with distress of the dissection laboratory as well as stress of 1<sup>st</sup> year in medical school (Hussein *et al.*, 2014; Mulu and Tegabu, 2012).

Dissection is a practical subject and therefore imparts to the student’s basic surgical skills such as handling of surgical instruments (Granger, 2004; Moore, 1998). In the current study, 80.6% of the students agreed that dissection taught them how to handle basic surgical instruments. Furthermore, more than two-thirds of the students disagreed that dissection was only necessary for those interested in surgical careers. This suggests that the value of dissection goes beyond surgical interests. Besides teaching students on the use of surgical instruments, dissection helps students to learn the language of medicine. Most medical terminologies are based on Terminologia Anatomica, and it is in the dissection

laboratory where the students first come across these terms (Kachlik, *et al.*, 2008; Rosse, 2001).

Innovative ways of teaching anatomy such as the use of prosected specimens, 3D models, radiologic pictures, and CAL have led some to raise questions as to whether dissection should at all be used in teaching anatomy (Azer and Eizenberg, 2007; Kennedy, *et al.*, 2000; McLachlan and Patten, 2006; Turney, 2007). In the current study, however, more than 60% of the students rejected the use of 3D models and prosected specimens instead of dissection. This further reinforces the value of cadaveric dissection in anatomy learning.

The current study found that 49% of the students welcomed the use of imaging instead of dissection. Imaging techniques such as ultrasonography, computer-aided tomography scans, and magnetic resonance imaging when used to supplement dissection offer a number of advantages to the students. Visualizing anatomy in real time such as during ultrasonography enables the students to appreciate dynamic aspects such as how anatomy is influenced by different physiologic states (McLachlan, 2004; Miles, 2005; Swamy and Searle, 2012). Unfortunately, the use of these imaging techniques is limited by their cost, lack of the 3D touch sensation, and the need for understanding the radiologic principles of each technique.

It is noteworthy that 45.9% of the students in the present study approved the use of CAL techniques instead of dissection. Studies have demonstrated that CAL techniques are more useful in students’ revision rather than in their primary teaching, and are useful in complementing learning using other resources such as dissection and textbooks (Azer and Eizenberg, 2007; Jastrow and Vollrath, 2003, 2002).

## CONCLUSION

This study further reinforces the importance of dissection in learning anatomy. The student survey indicates that other teaching techniques, in particular, radiologic anatomy and computer-aided learning techniques may be used to supplement dissection rather than to replace it.

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### Conflicts of Interest

There are no conflicts of interest.

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