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Hands-On vs Hands-Off: Assessing student's preferences in Learning Styles of Practical Anatomy in Faculty of Medicine -Northern Border University

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Abstract

Background:

The field of anatomy education has long been debated in terms of the most effective instructional methods. Traditional cadaveric dissection has been a cornerstone, but advances in technology have introduced virtual dissection alternatives.

Objective:

This research aimed to investigate student preferences and learning styles concerning hands-on (cadaveric dissection) and hands-off (virtual dissection) approaches in practical anatomy education.

Materials and Methods:

A cross-sectional study was conducted among students enrolled in the MBBS program, Faculty of Medicine, Northern Border University, Arar, Saudi Arabia. Data were collected using a standardized, validated, self-administered questionnaire. Three-hundred eighty-six students participated in the study.

Results:

Females constituted (58.8%) of participants while males constituted 41.2%. If terms of Practical Anatomy learning

preferences, most participants (55.3%) preferred a balanced mix of hands-on and hand-learning styles, while (35.5%) preferred hands-on learning, and (14.2%) preferred hands-off learning. Students who were very satisfied with the current learning approach to Practical Anatomy sessions was 26.9%; however, a significant portion (15.8%) indicated that they were unsatisfied or very unsatisfied with the current learning approaches.

Conclusions:

Our study found that females were more likely in favor a hand-off learning style compared to the males; on the other hand, second-year students display a higher preference for hands-on learning approaches compared to first- and third-year students. The present study reveals the preferences and satisfaction levels of medical students regarding practical anatomy learning and highlights the importance of catering to diverse learning styles and needs.

Key Words: *Hands-off, Hands-on, Practical Anatomy, Teaching Strategies*

Introduction

Human anatomy is one of the most essential topics included in medical school curricula worldwide. All physicians, regardless of specialization, must have a thorough understanding of anatomy [1].

Because of the establishment of anatomy schools during the 18th and 19th centuries, anatomy education had become more formalized [2]. During this era and under the mentoring of expert anatomists, students participated in hands-on cadaver dissection. In the late 20th century, due to technological progress virtual anatomy software and emergence of three-dimensional (3D) models, an alternative tool for teaching and learning became available [3].

On the other hand, cadavers played a crucial and essential role in gross anatomy education for centuries because they give students a precise picture of anatomical structures [4].

In addition to anatomical knowledge, cadaveric dissection is viewed as crucial for imparting professional skills, such as collaboration, patient interactions, and a grasp of medical ethics [5].

In this regard, the best ways to teach anatomy have long been a topic of discussion [6]. While traditional cadaveric dissection remains a fundamental part of an anatomy curriculum, technological advancements have paved the way for alternatives such as virtual dissection [2].

Research suggests that compared to conventional teaching methods, the use of visual aids can enhance memory retention. Visual aids have proven to be a highly effective pedagogical approach. Employing graphical data over textual information has been found to lead to better knowledge assimilation for students [3,5].

Anatomy teaching has changed substantially during the last half-century. While dissection of cadavers was once the standard method of teaching, the use of this method has diminished. This decrease has occurred for a variety of reasons, including financial and ethical concerns [7-9].

Because of its adaptable and "hands-on" features, virtual reality (VR) has already proven to be a useful tool in health sciences teaching. It is currently used for procedural simulations, surgical skill enhancement, and gross anatomy education [10,11].

Recent advancements in hardware and software have made VR more accessible. As a result, numerous educational institutions are now incorporating VR into their anatomy curricula, which has allowed virtual reality (VR) to become more accessible [12].

Recently, VR and Augmented Reality (AR) have been integrated into anatomy education [13]. The interactive simulation through VR and AR applications can enhance students' understanding of complex anatomical concepts [14].

According to Flack and Nicholson, cadaveric-based instruction is still a crucial educational strategy in the health sciences that promotes professionalism, enhanced communication skills, and ethical awareness [10].

Gradually, online anatomy education is becoming a replacement for conventional face-to-face instruction. Online anatomy education lacks tactile and kinesthetic elements but promotes active learning [15]. Overall, the paradigm has

shifted from traditional anatomy to integration of virtual and digital technologies and provides diverse environments for student learning.
This study aims to investigate student preferences and learning styles concerning hands-on (cadaveric dissection) and hands-off (virtual dissection) approaches in practical anatomy education.

Materials and Methods

A cross-sectional study was conducted among medical students in the Faculty of Medicine, Northern Border University (NBU), Arar, Kingdom of Saudi Arabia from April 16th, 2024 to Jun 18th, 2024. Data were collected using a standardized, validated, self-administered questionnaire.
Students who did not provide consent or fully complete the questionnaire were excluded.
The questionnaire was designed, relying on existing verified measures. To ensure the validity of the questionnaire's concept, the procedure was rigorously documented. Before official data collecting began, a pilot group of ten students were invited to complete the questionnaire.
Data were analyzed using the SPSS Version 22 after which data trends and associations were examined.
The Local Committee of Bioethics (HAP-09-043) of Northern Border University approved the study before the data collection (approval number: 37/24/H dated April 15, 2024).

Results

Our research investigated students' preferences for learning style of Practical Anatomy. Table 1 provides the demographic characteristics of study participants. Three-hundred eighty-six students first, second, and third year MBBS students from Faculty of Medicine, Northern Border University responded to the study questionnaire. Females constituted 58.8% of participants, while males constituted 41.2%.
Most of the participants (55.3%) preferred a balanced mix of hands-on and hands-off learning styles, while 35.5% preferred hands-on learning, and 14.2% preferred hands-off as illustrated in Table 2.

Our findings revealed that 26.9% of students were very satisfied with the learning approach; however, a significant portion (15.8%) reported that they felt unsatisfied or very unsatisfied with the current approaches (Table 3).
Among different teaching strategies, virtual 3D simulations were the most preferred learning activity (46.6% strongly approved of it). Independent dissection and instructor demonstrations were also generally well-received (Table 4).
Our study found that females were more likely to favor a hands-off learning style compared to males; on the other hand, the study found that second-year students displayed a higher preference for hands-on learning approaches compared to first- and third-year students as shown in Table5.

Discussion

Our current study assessed the preferences, learning styles, and satisfaction levels of first-, second-, and third-year MBBS students of (NBU) while learning Practical Anatomy. The findings of our study provide important insights into the preferred methods of learning anatomy among medical students and their satisfaction levels with the current learning strategies.
Our study results indicated that most participants (50.3%) preferred a balanced mix of hands-on and hands-off learning strategies. These findings suggest the importance of using diverse teaching strategies to help improve learning outcomes. These findings support the outcomes of a study by Lait and Piplani in which the effectiveness of active learning approaches in improving students' learning outcomes is emphasized[16] . Gender was found to be significantly associated with preferences in learning styles with females showing a higher preference for hands-on learning compared to males. It is consistent with the study by Plait and Piplani, which stated that male students were less interested in learning with

cadavers than were their female counterparts[17]. The current study found that the academic level had a significant effect on Practical Anatomy learning preferences since second-year students reported a higher preference for a hands-on learning approach compared to first- and third-year students. Our findings contradict those of the Plait and Piplani study, which reveals that the "Activist" style negatively correlated with anatomy scores in direct entry Year 2 students[18].

Regarding satisfaction with current anatomy learning sessions, most participants expressed neutral to satisfied sentiments with a notable proportion (56.7%) of the participants indicating satisfaction or high satisfaction with learning. However, a significant minority (15.8%) reported being unsatisfied or very unsatisfied, a result that suggests areas for improvement in current teaching methodologies. Educators should consider these findings when designing anatomy curricula and strive to enhance satisfaction levels and optimize student learning experiences.

Our study has crucial consequences for learning Practical Anatomy as it highlights the importance of diversification of different teaching strategies that integrate various learning styles. Student learning outcomes and performances can be enhanced by incorporating hands-on dissection sessions and virtual 3D simulations. Additionally, instructors and curriculum committees should foster an inclusive learning environment that accommodates the diverse preferences and needs of students, regardless of gender or academic level.

Limitations and Future Directions

It is important to discuss our study limitations. The response bias was highly expected because of the cross-sectional study design and self-reporting data collection method. Future research could employ longitudinal designs and objective assessment measures to further explore the relationship between learning preferences, academic performance, and career outcomes among medical students.

Conclusion

The present study describes preferences and satisfaction levels of medical students regarding practical anatomy learning and highlights the importance of catering to diverse learning styles and needs. By understanding and addressing these preferences, instructors and curriculum committees can foster an inclusive learning environment that accommodates the diverse preferences and needs of students, regardless of gender or academic level. This research contributes positively to the field of practical anatomy education and will provide evidence-based insights to institutions, curriculum developers, and teachers to enhance performance, learning outcomes, and effectiveness of practical anatomy instruction.

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Table 1: Study participant's characteristics

Participant's characteristics (n=386)		Frequency	Percent
Gender	Male	159	41.2
	Female	227	58.8
Academic level	1st year MBBS	115	29.8
	2nd year MBBS	158	40.9
	3rd year MBBS	113	29.3

Table 2: Preferences to learn practical anatomy

(n=386)	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	P. value
I better learn when doing things myself.	10 (2.6%)	29 (7.5%)	73 (18.9%)	108 (28.0%)	166 (43.0%)	0.000*
I prefer learning by observation of others	21 (5.4%)	33 (8.5%)	121 (31.3%)	131 (33.9%)	80 (20.7%)	0.000*

Visualization of 3D gives better understanding of anatomy structures	9 (2.3%)	28 (7.3%)	64 (16.6%)	105 (27.2%)	180 (46.6%)	0.000*
I prefer to learn collaboratively with others.	22 (5.7%)	33 (8.5%)	109 (28.2%)	110 (28.5%)	112 (29.05%)	0.000*

Table 3: Satisfaction with the current learning of practical anatomy sessions

How are you satisfied with the current learning of practical anatomy sessions?	Frequency	Percent	P. value
Very unsatisfied	17	4.4	
Unsatisfied	44	11.4	
Neutral	106	27.5	0.000*
Satisfied	115	29.8	
Very satisfied	104	26.9	

Table 4: Students preferences of different teaching strategies

(n=386)	Strongly Dislike	Dislike	Neutral	Like	Strongly like	P. value
Independent dissection	13 (3.4%)	35 (9.1%)	114 (29.5%)	112 (29.0%)	112 (29.0%)	0.000*
Instructor demonstrations	11 (2.8%)	29 (7.5%)	123 (31.9%)	112 (29.0%)	111 (28.8%)	0.000*
Group dissection.	15 (3.9%)	44 (11.4%)	91 (23.6%)	121 (31.3%)	115 (29.8%)	0.000*
Virtual 3D simulations	7 (1.8%)	16 (4.1%)	64 (16.6%)	119 (30.8%)	180 (46.6%)	0.000*

Table 5: Association of participant's characteristics with preferences in learning styles of practical anatomy

Participant's characteristics		How do you prefer to learn practical anatomy						P. value
		Hands-on		Hands-off		Balanced mix		
		n	%	n	%	n	%	
Gender	Male	66	48.2%	8	14.5%	85	43.8%	0.000*
	Female	71	51.8%	47	85.5%	109	56.2%	
Academic level	1st year	47	34.3%	5	9.1%	63	32.5%	0.005*
	2nd year	57	41.6%	30	54.5%	71	36.6%	
	3rd year	33	24.1%	20	36.4%	60	30.9%	