International Journal of Research in Medical Sciences
Kumar A et al. Int J Res Med Sci. 2026 Oct;14(10):4707-4716
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20263545

Original Research Article

Perception, attitude and knowledge of anatomical structures observed in the dissection hall-MLS students, national university: dissection-based anatomy learning in MLS students

Anil Kumar[1]*, Khizer Hussain Afroze Mookane[2]

[1]Department of Anatomy, JIET Medical College and Hospital, Jodhpur, Rajasthan, India
[2]Department of Anatomy and Neurobiology, College of Medicine and Health Sciences (CoMHS), National University of Science and Technology (NUST), Sohar, Oman

Received: 23 August 2026
Revised: 21 September 2026
Accepted: 23 September 2026

***Correspondence:**
Dr. Anil Kumar,
E-mail: virgo.8977@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Cadaveric dissection remains an important component of anatomy education, but evidence on its value for allied health students is limited. This study assessed medical laboratory science (MLS) students' perceptions, attitudes, self-reported knowledge, and satisfaction regarding dissection hall-based anatomy learning.
Methods: A descriptive cross-sectional survey was conducted among 41 MLS students at the National University, Sultanate of Oman, during 2025. Data were collected using a 12-item, five-point Likert-scale questionnaire. Descriptive statistics, Wilcoxon signed-rank, Friedman, post-hoc Wilcoxon, and Spearman correlation tests were used. Statistical significance was set at $p<0.05$.
Results: Students showed highly favorable perceptions (mean 4.22±0.43) and attitudes (4.07±0.52) toward dissection-based learning. Satisfaction was moderately positive (3.56±0.74), while knowledge scores were comparatively lower (3.31±0.67). Perception and attitude were significantly higher than knowledge ($p<0.001$). Agreement was highest for perception (88.6%) and attitude (81.3%), but only 48.8% for knowledge. No significant correlations were found among the study domains.
Conclusions: The findings indicate that students value dissection and demonstrate positive attitudes, but these favorable responses do not necessarily translate into comparable perceived knowledge gains. Structured preparation, guided identification, faculty facilitation, and post-dissection reinforcement may help strengthen learning outcomes. Cadaveric dissection remains a valuable component of MLS anatomy education. A structured, learner-cantered, and blended approach may better convert positive dissection experiences into anatomical knowledge and competence.

Keywords: Cadaveric dissection, Anatomy education, Medical laboratory science, Student perception, Student attitude, Anatomical knowledge, Allied health education

INTRODUCTION

Human gross anatomy is fundamental to healthcare education, supporting clinical competence, interdisciplinary communication, and professional development.[1] Cadaveric dissection provides direct anatomical exposure while fostering three-dimensional orientation, appreciation of anatomical variation, teamwork, empathy, and professional attitudes.[2,3] However, curricular constraints, increasing enrolment, limited cadaver availability, and expanding digital resources are reshaping anatomy education.[4] Although anatomy is essential for MLS students, their perceptions and experiences of dissection remain comparatively

underexplored.[5] Furthermore, appropriate interpretation of Likert-scale data is essential when evaluating self-reported educational outcomes.[6] Therefore, this study assessed MLS students' perceptions, attitudes, and self-reported knowledge of anatomical structures encountered during dissection hall-based learning at the National University.

METHODS

Study design

This study employed a descriptive, cross-sectional survey design to assess the perception, attitude, and knowledge of anatomical structures observed in the dissection hall among MLS students at the National University. A structured, self-administered questionnaire consisting of 12 items on a 5-point Likert scale was distributed electronically using Google Forms. The design allowed efficient data collection from a defined cohort within a short period and provided quantifiable insights into students' views regarding dissection-based learning.

Study setting

The research was conducted in the college of medicine and health sciences (CoMHS), National University, Sultanate of Oman. Gross anatomy practical sessions for the MLS program involve dissection-hall–based learning using cadaveric specimens representing major body systems, including cardiovascular, respiratory, gastrointestinal, genitourinary, and reproductive systems.

Study population and sampling

The target population included all MLS students enrolled in the anatomy course during the academic year 2025. A convenience sampling method was used, with the survey link distributed through official university communication channels. Participation was voluntary, anonymous, and without academic incentives. Students aged ≥18 years who had attended at least one dissection-hall session were eligible.

Inclusion criteria

Registered MLS students at the National University, Attendance of at least one cadaveric dissection session, willingness to participate in the survey.

Exclusion criteria

Students who had not attended dissection hall sessions, Incomplete or duplicate responses.

Survey instrument

A 12-item questionnaire was developed based on themes commonly explored in anatomy education research, including students' perceptions of dissection, emotional responses, perceived relevance to future practice, and self-reported knowledge acquisition. Each item was rated on a 5-point likert scale (1=strongly disagree, 5=strongly agree).

The questionnaire included three domains perception (items assessing usefulness, engagement, and understanding). Attitude (comfort, motivation, and professional respect). Knowledge (self-assessment of structure identification and comprehension).

Content validity was ensured through expert review by two anatomists and one medical education specialist. A pilot test with 10 MLS students (excluded from final analysis) confirmed clarity and internal consistency.

Data collection procedure

Data were collected over a two-week period using a structured Google Forms questionnaire. The introductory section explained the study purpose, voluntary participation, estimated completion time (5–7 minutes), and anonymous informed consent. To minimize duplicate responses, participants were restricted to a single submission through their Google account. Data were analysed using appropriate non-parametric tests, including the Mann–Whitney U test for comparisons between two groups and the Kruskal–Wallis test for comparisons among more than two groups. A p value <0.05 was considered statistically significant.

Ethical considerations

Ethical approval for the study was obtained from the Institutional Research and Ethics Committee of COMHS, National University. The registration number for the ethical approval is NU/COMHS/EBC0019/2025. Informed consent was obtained from all participants prior to data collection. Consent forms were provided in both English and Arabic languages to ensure full comprehension and voluntary participation. Participants were assured of the confidentiality of their responses, and data were anonymized before analysis.

Data management and statistical analysis

Quantitative data were analysed using IBM SPSS Statistics version 28.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics—including frequencies, percentages, median, and interquartile ranges—were calculated for all Likert items, acknowledging that Likert-type data are ordinal. Internal consistency reliability of the questionnaire was assessed using Cronbach's alpha.

RESULTS

A total of 41 MLS students participated in the study. Responses were assessed using a five-point Likert scale, ranging from 1 (strongly disagree/not confident) to 5 (strongly agree/very confident). The questionnaire evaluated four domains, as illustrated in Figure 1:

perception (Q6–Q8), attitude (Q9–Q11), knowledge (Q12–Q14), and satisfaction (Q16).

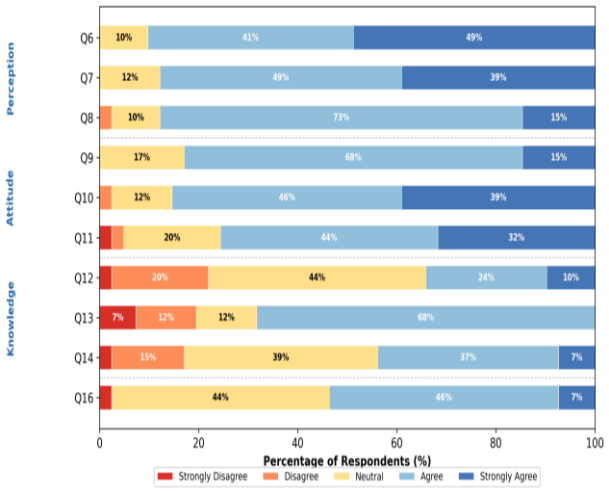

Figure 1: Distribution of Likert-scale responses across study items. Perception items (Q6–Q8) showed predominantly positive responses, whereas knowledge items (Q12–Q14) demonstrated greater variability, with more neutral and negative responses, particularly for Q12 (ability to identify anatomical structures).

Perception of dissection hall learning

Students demonstrated an overall favorable perception of anatomy learning through dissection hall exposure. For Q6, 37 students (90.3%) reported agreement or strong agreement, yielding the highest mean score among the perception items (4.39±0.67). Similarly, Q7 received agreement or strong agreement from 36 students (87.8%), with a mean score of 4.27±0.67. For Q8, 36 students (87.8%) expressed agreement or strong agreement, whereas only one student (2.4%) disagreed; the corresponding mean score was 4.00±0.59. Collectively, these findings indicate a consistently positive student perception of dissection-based anatomy learning (Table 1). The consistently high scores across individual items suggest that students strongly valued the dissection hall as an effective and meaningful learning environment for developing their understanding of anatomical structures.

Attitude toward anatomy learning

A predominantly positive attitude toward anatomy learning was observed among the participants. For Q9, 34 students (82.9%) agreed or strongly agreed with the statement, whereas 7 (17.1%) remained neutral. Q10 demonstrated the highest level of agreement within the attitude domain, with 35 students (85.3%) reporting agreement or strong agreement and a mean score of 4.22±0.76. For Q11, 31 students (75.6%) expressed agreement or strong agreement, while 8 (19.5%) were neutral and 2 (4.8%) disagreed. Overall, the mean scores across the three items ranged from 3.98 to 4.22, indicating a consistently favorable attitude toward anatomy learning and the educational value of dissection hall exposure.

Knowledge gained from dissection hall exposure

In contrast to the relatively favorable findings observed for perception and attitude, the knowledge domain showed greater variability and comparatively lower scores. For Q12, only 14 students (34.2%) agreed or strongly agreed, while 18 (43.9%) remained neutral and 9 (22.0%) disagreed or strongly disagreed. Although 28 students (68.3%) expressed agreement with Q13, none selected the "strongly agree" response. For Q14, 18 students (43.9%) agreed or strongly agreed, whereas 16 (39.0%) reported a neutral response. The mean scores across the three knowledge items ranged from 3.20±0.95 to 3.41±0.97, indicating a generally positive perception of knowledge acquisition; however, the relatively modest scores suggest that the perceived contribution of dissection-based learning to knowledge development was less pronounced than its influence on students' perceptions and attitudes.

Satisfaction with the dissection hall experience

Regarding overall satisfaction, 22 students (53.6%) reported being either satisfied or highly satisfied (agree/strongly agree), whereas 18 (43.9%) expressed a neutral response. Only one student (2.4%) strongly disagreed, and none selected the disagree category. The overall mean satisfaction score was 3.56±0.74, reflecting a moderately positive level of satisfaction with dissection hall learning. However, the relatively high proportion of neutral responses indicates that students' satisfaction was comparatively less pronounced than their overall perceptions and attitudes toward learning in the dissection hall.

Domain-level descriptive analysis and normality

Domain-level analysis showed that perception had the highest mean score (4.22±0.43), followed by attitude (4.07±0.52), satisfaction (3.56±0.74), and knowledge (3.31±0.67). Median scores were 4.33, 4.00, 4.00, and 3.33, respectively. Perception demonstrated the smallest variability (IQR=0.33), whereas knowledge showed the widest distribution (IQR=1.33). Shapiro–Wilk testing indicated significant departures from normality for perception (W=0.880), attitude (W=0.937), and satisfaction (W=0.795; all $p<0.05$), while knowledge scores were not significantly non-normal (W=0.951). Given the ordinal Likert-scale data and distributional characteristics, subsequent inferential analyses employed non-parametric statistical methods.

Internal consistency of the questionnaire

Internal consistency analysis demonstrated low-to-questionable reliability across the assessed domains. Cronbach's α was 0.355 for perception, 0.411 for attitude, and 0.512 for knowledge, while the overall nine-item scale

showed a coefficient of 0.600. The Shapiro–Wilk test indicated significant departures from normality for perception, attitude, and satisfaction scores ($p<0.05$), whereas the knowledge scores did not significantly deviate from normality. Given the ordinal nature of the Likert-scale data, limited sample size, and non-normal distribution observed in several domains, subsequent inferential analyses were conducted using non-parametric methods. These findings indicate that the domain-level scores should be interpreted with appropriate caution regarding internal consistency.

Table 1: Perception of dissection hall–based learning among medical laboratory science students (Q6–Q8).

Item	Strongly disagree, N (%)	Disagree, N (%)	Neutral, N (%)	Agree, N (%)	Strongly agree, N (%)	Mean±SD
Q6	0 (0)	0 (0)	4 (9.8)	17 (41.5)	20 (48.8)	4.39±0.67
Q7	0 (0)	0 (0)	5 (12.2)	20 (48.8)	16 (39.0)	4.27±0.67
Q8	0 (0)	1 (2.4)	4 (9.8)	30 (73.2)	6 (14.6)	4.00±0.59

Table 2: Attitudes of medical laboratory science students toward anatomy learning, based on responses to questions 9–11.

Item	Strongly disagree, N (%)	Disagree, N (%)	Neutral, N (%)	Agree, N (%)	Strongly agree, N (%)	Mean±SD
Q9	0 (0)	0 (0)	7 (17.1)	28 (68.3)	6 (14.6)	3.98±0.57
Q10	0 (0)	1 (2.4)	5 (12.2)	19 (46.3)	16 (39.0)	4.22±0.76
Q11	1 (2.4)	1 (2.4)	8 (19.5)	18 (43.9)	13 (31.7)	4.00±0.92

Table 3: Assessment of students' self-reported knowledge gained through dissection hall-based learning (Q12–Q14).

Item	Strongly disagree, N (%)	Disagree, N (%)	Neutral, N (%)	Agree, N (%)	Strongly agree, N (%)	Mean±SD
Q12	1 (2.4)	8 (19.5)	18 (43.9)	10 (24.4)	4 (9.8)	3.20±0.95
Q13	3 (7.3)	5 (12.2)	5 (12.2)	28 (68.3)	0 (0)	3.41±0.97
Q14	1 (2.4)	6 (14.6)	16 (39.0)	15 (36.6)	3 (7.3)	3.32±0.91

Table 4: Students' satisfaction with the dissection hall learning experience (Q16).

Likert response	Frequency, N	%
Strongly disagree	1	2.4
Disagree	0	0.0
Neutral	18	43.9
Agree	19	46.3
Strongly agree	3	7.3
Mean±SD	—	3.56±0.74

Comparison of domain scores with the neutral midpoint

All four domains demonstrated mean scores significantly above the neutral midpoint of 3, indicating an overall favorable response among the participants. Notably, a substantial discrepancy was observed between perception (88.6% agreement) and knowledge (48.8% agreement).

This finding suggests that although students perceived the dissection experience positively and recognized its educational value, this favorable perception was not accompanied by a comparable level of self-reported knowledge acquisition or competence. The observed gap highlights the need to strengthen dissection-based teaching strategies with structured guidance, active learning, and appropriate assessment methods to translate positive perceptions into demonstrable learning outcomes. One-sample Wilcoxon signed-rank tests demonstrated that scores in all four domains were significantly higher than the neutral midpoint of 3.

Perception showed the highest mean score (4.22), with a large effect size ($p<0.001$, $r=0.882$), followed by attitude (mean=4.07; $p<0.001$, $r=0.871$) and satisfaction (mean=3.56; $p<0.001$, $r=0.793$), all demonstrating large effects. Knowledge also exceeded the neutral midpoint (mean=3.31; $p=0.007$), with a moderate effect size ($r=0.466$). Thus, positive responses were strongest for perception and attitude, while knowledge showed a comparatively smaller magnitude of effect.

Comparison among perception, attitude, and knowledge domains

The Friedman test demonstrated a statistically significant difference among the composite scores for perception, attitude, and knowledge (χ^2=38.694, df=2, p<0.001). Kendall's coefficient of concordance (W=0.472) indicated a moderate-to-large effect, demonstrating meaningful variation in students' responses across the three domains. Post-hoc analysis with Bonferroni adjustment showed that perception and attitude scores were significantly higher than knowledge scores (both p<0.001), whereas perception and attitude did not differ significantly (p=0.389). These findings indicate that students' responses to dissection hall-based learning were not uniform across domains, with more favorable perceptions and attitudes than perceived knowledge acquisition.

Post-hoc comparison of domains

Post-hoc pairwise analysis using the Wilcoxon signed-rank test with Bonferroni adjustment demonstrated no statistically significant difference between perception and attitude scores (adjusted p=0.389). In contrast, perception scores were significantly higher than knowledge scores (test statistic=20.5, adjusted p<0.001), and attitude scores were also significantly higher than knowledge scores (test statistic=52.0, adjusted p<0.001). These findings indicate that students' perceptions and attitudes toward dissection hall-based learning were significantly more favorable than their perceived knowledge acquisition, while perception and attitude scores were comparable. The results demonstrate a clear divergence between students' affective responses to dissection-based learning and their perceived knowledge outcomes.

Correlation among study domains

Spearman's rank correlation analysis revealed weak positive correlations among all assessed domain pairs, with correlation coefficients ranging from ρ=0.085 to 0.279. However, none of these associations reached statistical significance (p>0.05), suggesting that perception, attitude, knowledge, and satisfaction were not significantly correlated with one another in the study population (Figure 5). The strongest correlation was observed between perception and attitude (Spearman's ρ=0.279, p=0.077); however, this association did not reach statistical significance. A weak and non-significant correlation was also observed between perception and knowledge (ρ=0.171, p=0.285). Overall, the findings suggest that perception, attitude, knowledge, and satisfaction were not significantly correlated with one another among the study participants.

Agreement analysis

Agreement analysis demonstrated variation across the four assessed domains. The proportion of students reporting agreement or strong agreement was highest for perception (88.6%), followed by attitude (81.3%). In comparison, less than half of the students agreed with the knowledge-related statements (48.8%). Favorable responses for satisfaction were reported by 53.7% of students. Conversely, neutral or unfavourable responses accounted for 11.4%, 18.7%, 51.2%, and 46.3% for perception, attitude, knowledge, and satisfaction, respectively. Overall, students reported predominantly positive perceptions and attitudes toward dissection hall learning, whereas agreement with knowledge-related outcomes and satisfaction was comparatively lower.

Overall findings

Overall, MLS students reported highly favorable perceptions and attitudes toward dissection hall-based anatomy learning, with mean scores of 4.22 and 4.07, respectively. Both domains were significantly higher than the neutral midpoint and demonstrated large effect sizes, indicating a strong positive response toward cadaveric dissection as an educational experience. In comparison, the knowledge domain yielded a lower mean score of 3.31 with greater variability, suggesting relatively modest perceived gains in anatomical knowledge. Friedman's test demonstrated significant differences across the three domains, while post-hoc analysis confirmed significantly higher perception and attitude scores than knowledge scores. These findings indicate that although students valued the dissection experience and expressed positive attitudes toward anatomy learning, these favorable perceptions did not necessarily translate into a comparable level of perceived knowledge acquisition. Furthermore, the absence of significant correlations among the domains suggests that positive perceptions and attitudes alone may not be sufficient to ensure effective knowledge development. Integrating dissection with structured demonstrations, guided identification, clinically oriented discussions, and other complementary teaching strategies may therefore enhance the translation of students' positive dissection experiences into deeper anatomical understanding and competency.

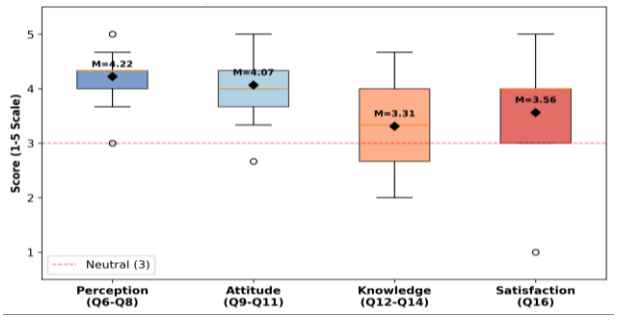

Figure 2: Presents domain-level score distributions. Perception (M=4.22) and Attitude (M=4.07) domains have higher medians and tighter distributions compared to knowledge (M=3.31) and Satisfaction (M=3.56). The diamond markers represent the mean values, confirming the hierarchical pattern: perception>attitude>satisfaction>knowledge.

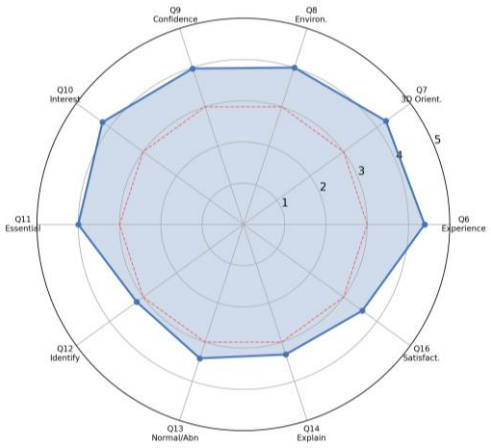

Figure 3: Radar chart illustrating item-level mean scores across the assessed domains. Perception (Q6, Q7) and interest in anatomy (Q10) showed the highest scores, whereas knowledge (Q12, Q14) and satisfaction (Q16) were comparatively lower. The red dashed circle denotes the neutral midpoint (3). All items exceeded the neutral threshold, although knowledge-related items showed only marginally higher scores.

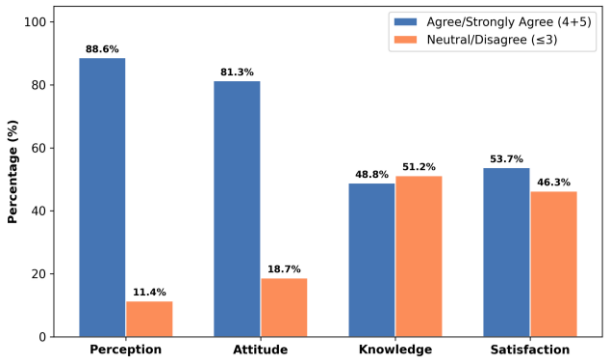

Figure 4: Compares the percentage of respondents who agreed/strongly agreed (score 4+5) versus those who were neutral or disagreed (≤3) across domains.

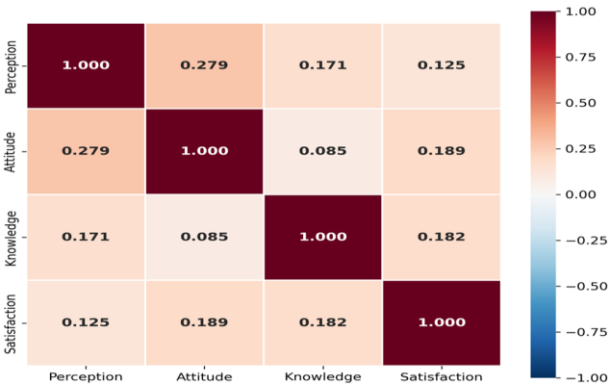

Figure 5: Spearman correlation matrix showing weak, non-significant correlations among perception, attitude, knowledge, and satisfaction (ρ=0.085–0.279; all p>0.05).

DISCUSSION

The present study explored the perception, attitude, self-reported knowledge, and satisfaction of MLS students regarding anatomical structures observed during dissection hall sessions. The findings demonstrate an overall favourable perception of dissection-based anatomy learning, with particularly strong responses in the perception and attitude domains. However, the comparatively lower scores observed for knowledge acquisition and satisfaction indicate that positive attitudes toward the dissection experience do not necessarily translate into equivalent levels of perceived anatomical knowledge. This distinction is important when considering the role of cadaver-based teaching in the education of students from allied health disciplines.

Positive perception of dissection-based anatomy learning

One of the most prominent findings was the highly favourable perception of the dissection hall as a learning environment. The composite perception score was 4.22±0.43, and 88.6% of students selected either "agree" or "strongly agree" across the perception domain. Furthermore, the perception score was significantly higher than the neutral midpoint of 3 ($p<0.001$), with a large effect size ($r=0.882$). These findings indicate that the students did not merely demonstrate a modestly positive opinion; rather, their responses reflected a strong and consistent endorsement of dissection-based anatomy learning.

The present findings are consistent with previous research demonstrating that students generally perceive cadaveric dissection as an effective and meaningful approach to anatomy education. Asante et al reported that 84.5% of medical students considered dissection to make anatomy learning more interesting, while approximately 87% believed that it helped them retain what they had learned theoretically. Similarly, 90.1% reported that dissection deepened their understanding of anatomy and 83.2% indicated that it provided a three-dimensional perspective of anatomical structures.[7] These observations are broadly comparable with the strong perception scores observed among MLS students in the present study.

Dissabandara et al also demonstrated that the majority of students in a modern, problem-based medical curriculum had positive perceptions of cadaveric dissection. Regular attendance was associated with more favorable perceptions, including the belief that dissection made learning more interesting and that non-attendance would disadvantage anatomy learning.[8]

The consistency between these findings and those of the present study supports the continued educational value of direct exposure to anatomical structures despite the increasing availability of alternative teaching modalities. The favorable perception observed in the present MLS cohort may be particularly relevant because laboratory

science students may encounter anatomy from a different professional perspective than medical students. For MLS students, direct observation of anatomical structures may provide a tangible framework for understanding tissues, organs, regional relationships, and the structural basis of pathological processes. The dissection hall therefore has the potential to bridge theoretical knowledge with three-dimensional anatomical reality.

Favorable attitude toward anatomy learning

The attitude domain also demonstrated a strongly positive pattern, with a composite mean score of 4.07±0.52. Approximately 81.3% of students agreed or strongly agreed with the attitude-related statements. The score was significantly higher than the neutral midpoint ($p<0.001$), with a large effect size ($r=0.871$). Importantly, the Friedman analysis demonstrated that perception and attitude did not differ significantly from one another after post-hoc comparison (Bonferroni-adjusted $p=0.389$). This suggests that students' positive perceptions of the dissection experience were accompanied by similarly favorable attitudes toward anatomy learning.

These results are consistent with the findings of Asante et al., who reported an overall positive attitude toward cadaveric dissection among medical students and concluded that students regarded dissection as an important component of anatomy education.[7] Similarly, the systematic review and meta-analysis by Alamneh et al reported a pooled favorable attitude toward ethical cadaver dissection of approximately 67.5% among medical and health-sciences students, with favorable attitudes reported in approximately 73% of the included Indian studies.[9] The higher proportion of favorable responses in the present study may reflect the specific educational context, the students' exposure to the dissection hall, or differences in questionnaire design and participant characteristics.

A particularly important observation is that the positive attitude was demonstrated in an MLS cohort rather than exclusively among medical students. This supports the growing recognition that cadaveric anatomy can have educational value across health-professional programs. A recent study by Elbeshbeishy et al involving 454 medical and allied-health students, found that students across disciplines generally recognized the educational value of cadaveric dissection, although medical students expressed stronger support than allied-health students for increasing dissection exposure and regarding dissection as conducive to learning.[5]

The present findings therefore suggest that dissection-based anatomy teaching should not necessarily be viewed as a learning strategy reserved for medical students. Instead, appropriately structured cadaveric exposure can be incorporated into allied-health curricula according to the specific learning outcomes and professional requirements of each discipline.

Knowledge acquisition: a relative area of weakness

In contrast to perception and attitude, the knowledge domain produced a considerably lower mean score of 3.31±0.67. Only 48.8% of respondents agreed or strongly agreed with the knowledge-related statements, whereas 51.2% were neutral or disagreed. Although the knowledge score was statistically higher than the neutral midpoint ($p=0.007$), the corresponding effect size was moderate ($r=0.466$), considerably smaller than those observed for perception and attitude.

This discrepancy represents one of the most important findings of the present study. Students clearly valued the dissection experience and expressed favorable attitudes toward anatomy learning, but their perceived knowledge gains were substantially less pronounced. The Friedman test confirmed significant differences among the perception, attitude, and knowledge domains ($\chi^2=38.694$, $df=2$, $p<0.001$; Kendall's $W=0.472$). Subsequent pairwise analysis demonstrated significantly higher perception scores than knowledge scores and significantly higher attitude scores than knowledge scores, both with Bonferroni-adjusted $p<0.001$.

This finding should not necessarily be interpreted as evidence that dissection is ineffective for knowledge acquisition. Rather, it may indicate that exposure to a cadaver alone is insufficient to ensure effective identification, interpretation, and retention of anatomical structures. Anatomy learning requires active engagement, repeated identification, appropriate guidance, and integration of structures with function and clinical relevance. In a dissection hall, students may encounter considerable anatomical variation, partially dissected structures, complex spatial relationships, and unfamiliar terminology. Without adequate preparation and faculty facilitation, students may appreciate the experience without necessarily achieving equivalent gains in anatomical knowledge.

Previous studies support the educational importance of structured engagement during dissection. Dissabandara et al found that regular attendance was associated with more favorable perceptions of dissection, suggesting that meaningful engagement and repeated exposure may influence learning experiences.[8] Similarly, the systematic review by Qatanani et al emphasized that pedagogical preparation and structured interventions can influence students' experiences with human dissection and reduce distress, particularly when audiovisual preparation and graded exposure are incorporated.[10]

The relatively modest knowledge score in the present study therefore provides an important curriculum-development signal. Dissection sessions may be strengthened through clearly stated learning objectives, pre-laboratory orientation, guided identification of structures, small-group activities, labelled images, prosections, specimen-based questioning, and post-

laboratory reinforcement. Such strategies could help convert students' favorable attitudes into more demonstrable anatomical knowledge.

Differences between perception and knowledge

The marked difference between the 88.6% agreement rate for perception and the 48.8% agreement rate for knowledge deserves particular attention. This approximately 40-percentage-point gap indicates that students' appreciation of the learning environment was substantially greater than their confidence in knowledge acquisition. The statistical analysis further demonstrated that perception and knowledge were significantly different, whereas perception and attitude were not. This pattern may reflect the distinction between the affective and cognitive dimensions of learning. Students can find an educational activity interesting, valuable, and motivating without necessarily achieving mastery of the intended content.

The dissection hall may therefore provide an excellent environment for engagement, curiosity, and professional development, but cognitive gains may depend on how the experience is pedagogically structured. This interpretation is also supported by findings from Elbeshbeishy et al who reported differences between medical and allied-health students in their perceptions of the educational value of dissection. Although both groups recognized the benefits of cadaveric learning, medical students showed stronger endorsement of its role in anatomical understanding and professional development.[5] The authors suggested that differences in curriculum emphasis and anticipated professional roles may influence how students perceive the relevance of dissection.

For MLS students, therefore, anatomy teaching may benefit from explicitly linking dissection observations to their future professional roles. Rather than focusing exclusively on naming structures, practical sessions could emphasize tissue organization, organ relationships, anatomical landmarks, and the structural basis of clinically relevant laboratory findings. Such contextualization may improve the perceived relevance of anatomy and potentially enhance knowledge retention.

Satisfaction with the dissection hall experience

The satisfaction domain produced a mean score of 3.56±0.74, with 53.7% of students reporting agreement or strong agreement. Although the satisfaction score was significantly higher than the neutral midpoint ($p<0.001$; $r=0.793$), almost 44% of students selected a neutral response. Thus, satisfaction was positive overall but less pronounced than perception and attitude. This finding is noteworthy because satisfaction is likely influenced by factors beyond the educational value of dissection itself. These may include the organization of practical sessions, availability of specimens, laboratory environment, duration of sessions, number of students per specimen, faculty supervision, clarity of instructions, and students' confidence in identifying structures. Previous studies have identified time requirements, difficulty in locating structures, and environmental factors such as preservative odor as potential challenges associated with cadaveric dissection.[7,8]

Rahman et al reported that although 92% of students found dissection exciting and 96.8% found it interesting, approximately half reported distress or emotional discomfort during their initial exposure. Importantly, 95.6% favoured receiving an advanced explanation before dissection and 94.8% supported prior video presentation.[11] These findings suggest that positive educational experiences can coexist with challenges related to preparation and adaptation.

The present study did not directly evaluate the specific causes of neutral satisfaction responses; therefore, explanations regarding environmental or organizational factors should be regarded as possible interpretations rather than direct findings. Nevertheless, the moderate satisfaction level provides a rationale for obtaining qualitative feedback from students to identify specific barriers and opportunities for improvement.

Relationship among perception, attitude, knowledge, and satisfaction

An important finding was the absence of statistically significant correlations among the study domains. Spearman correlation coefficients ranged from $\rho=0.085$ to 0.279, and none of the associations reached statistical significance (all $p>0.05$). The strongest observed association was between perception and attitude ($\rho=0.279$, $p=0.077$), but even this relationship did not reach statistical significance.

These results suggest that the four domains may represent relatively distinct dimensions of students' experiences. In particular, a favorable perception of dissection does not necessarily imply greater perceived knowledge acquisition or satisfaction. This finding reinforces the importance of evaluating anatomy education using multidimensional outcomes rather than relying solely on student satisfaction or overall perception. The relatively low internal consistency coefficients observed in the present questionnaire also need to be considered when interpreting these relationships.

Cronbach's alpha was 0.355 for perception, 0.411 for attitude, 0.512 for knowledge, and 0.600 for the overall nine-item scale. These values indicate limited internal consistency, particularly within the individual three-item domains. The low reliability may partly reflect the small number of items within each domain and the possibility that individual items assess different aspects of the construct. Therefore, the findings should be interpreted primarily as exploratory evidence of students' responses rather than as definitive measures of latent psychological

constructs. Future studies should consider using a validated and sufficiently comprehensive instrument, with additional items within each domain and formal psychometric evaluation.

Implications for anatomy education in MLS programs

The findings have several implications for the design of anatomy education for MLS students. First, the high perception and attitude scores indicate that students are receptive to cadaver-based learning and that dissection hall exposure remains educationally relevant even in an allied-health curriculum. Second, the lower knowledge score indicates that exposure alone should not be considered synonymous with effective learning. Dissection should instead be embedded within a structured educational sequence involving pre-session preparation, guided practical exploration, faculty facilitation, active identification, and post-session reinforcement.

The increasing availability of digital anatomy resources should also be viewed as complementary rather than necessarily substitutive. Elbeshbeishy et al reported that both medical and allied-health students recognized the benefits of virtual resources, including flexibility and enhanced visualization, while cadaveric dissection retained important advantages related to hands-on learning and professional development.[5]

A blended approach may therefore be particularly appropriate for MLS students. For example, students could receive annotated images, 3D models, or short preparatory videos before entering the dissection hall, followed by direct observation and identification of structures during practical sessions. Post-dissection image-based quizzes or structured reflection could then reinforce learning. Such an approach may be especially valuable for structures that are difficult to identify during initial cadaveric exposure.

Professional and ethical dimensions of dissection

Beyond anatomical knowledge, cadaveric education may contribute to professional development. The dissection hall provides students with an opportunity to develop respect for the human body and appreciate the ethical responsibilities associated with the use of donated human remains. Recent literature emphasizes that cadaver-based education can contribute to professionalism, empathy, respect, and professional identity formation.[5,10] The systematic review and meta-analysis by Alamneh et al found that knowledge and favorable attitudes toward ethical cadaver dissection were present in approximately two-thirds of medical and health-sciences students globally.[9] The authors emphasized the importance of an appropriate and supportive dissection environment and psychological preparation of students before exposure to cadavers.

Similarly, Qatanani et al reported that structured educational interventions, particularly audiovisual preparation and graded exposure, can reduce distress associated with anatomical dissection.[10] These findings are relevant to the present study because improving the learning environment should involve not only cognitive preparation but also appropriate orientation to professional conduct, ethical handling of human remains, and respectful behavior within the dissection hall.

Strengths

A strength of the present study is that it evaluates multiple dimensions of the dissection experience rather than focusing solely on student satisfaction. The use of descriptive and non-parametric inferential analyses allowed comparison of domain scores despite the ordinal nature of the Likert-scale data and the relatively small sample. The analysis also examined internal consistency, domain differences, correlations, and agreement patterns, providing a multidimensional picture of the students' responses.

Limitations

However, several limitations should be acknowledged. First, the study involved only 41 MLS students, which limits the statistical power and generalizability of the findings. Second, the cross-sectional design captures perceptions at a particular point in time and cannot establish whether dissection exposure produces sustained improvements in anatomical knowledge. Third, the knowledge domain was based on self-reported responses rather than an objective anatomical knowledge assessment; therefore, the reported knowledge score should not be interpreted as a direct measure of actual anatomical competence. Fourth, the relatively low Cronbach's alpha coefficients indicate limited internal consistency of the individual domains. Finally, because the study was conducted within a single institutional context, the findings may not be directly generalizable to MLS students in other universities or educational systems.

Future studies should include larger, multicentric samples and longitudinal designs, together with objective measures such as structured practical examinations, image-identification tests, or pre- and post-intervention knowledge assessments. Qualitative interviews or focus-group discussions could also help explain why students demonstrate highly positive perceptions but comparatively modest knowledge gains.

CONCLUSION

Overall, the present study demonstrates that MLS students at the National University view dissection hall-based anatomy learning positively and exhibit favorable attitudes toward the experience. Perception and attitude scores were substantially higher than knowledge scores, and both demonstrated large effects relative to the neutral midpoint. In contrast, knowledge showed a moderate positive effect and substantially greater variability. The absence of

significant correlations among the domains further indicates that positive perceptions and attitudes should not automatically be interpreted as evidence of equivalent knowledge acquisition.

The findings support retaining cadaveric exposure as an important component of anatomy education for MLS students while emphasizing the need for structured, learner-centered, and outcome-oriented dissection sessions. Integration of preparatory audiovisual materials, image-based resources, guided identification, faculty facilitation, and post-dissection reinforcement may help bridge the gap between students' positive experiences and their actual anatomical learning. Such an integrated approach could preserve the unique educational value of cadaveric dissection while addressing the specific learning needs of allied health students.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Ortadeveci A, Ermez MN, Oz S, Ozden H. A survey study on distance anatomy education: challenges unique to anatomy. Surg Radiol Anat. 2021;44(1):41–7.
2. Boscolo-Berto R, Tortorella C, Porzionato A, Stecco C, Picardi EEE, Macchi V, De Caro R. The additional role of virtual to traditional dissection in teaching anatomy: a randomised controlled trial. Surg Radiol Anat. 2021;43(4):469–79.
3. Al-Hor M, Almahdi H, Al-Theyab M, Mustafa AG, Seed Ahmed M, Zaqout S, et al. Exploring student perceptions on virtual reality in anatomy education: insights on enjoyment, effectiveness, and preferences. BMC Med Educ. 2024;24:1405.
4. Wickramasinghe N, Thompson BR, Xiao J. The opportunities and challenges of digital anatomy for medical sciences: narrative review. JMIR Med Educ. 2022;8(2):34687.
5. Elbeshbeishy R, Salama R, Goud BKM, Babiker R, Jhancy M, Hamed N, et al. Unveiling the perceptions of medical and allied health students towards cadaveric dissection and virtual resources in anatomy education: a cross-sectional study. BMC Med Educ. 2025;25:829.
6. Sullivan GM, Artino AR. Analyzing and interpreting data from Likert-type scales. J Grad Med Educ. 2013;5(4):541–2.
7. Asante EA, Maalman RS, Ali MA, Donkor YO, Korpisah JK. Perception and attitude of medical students towards cadaveric dissection in anatomical science education. Ethiop J Health Sci. 2021;31(4):867-74.
8. Dissabandara LO, Nirthanan SN, Khoo TK, Tedman R. Role of cadaveric dissections in modern medical curricula: a study on student perceptions. Anat Cell Biol. 2015;48(3):205-12.
9. Alamneh YM. Knowledge and attitude towards ethical cadaver dissection among medical and health sciences students, 1997-2020: a systematic review and meta-analysis. Transl Res Anat. 2021;2:100149.
10. Qatanani AM, Fishman O, Khamar D, Rosenzweig S. Personal preparation of medical students for the human dissection experience: a systematic review. Med Sci Educ. 2023;33(5):1271-81.
11. Niazur Rahman SM, Karim CF, Alam T, Shirin L, Anwar KS. Dissecting cadaver in anatomy: medical undergraduates' impression as they perceived. J Anat Soc India. 2016;65(1):62-4.

Cite this article as: Kumar A, Mookane KHA. Perception, attitude and knowledge of anatomical structures observed in the dissection hall-MLS students, national university: dissection-based anatomy learning in MLS students. Int J Res Med Sci 2026;14:4707-16.