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Original Article

Exploring students' understanding of structured practical anatomy

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الملخص

أهداف البحث: أدى التحول من المنهج التقليدي إلى المنهج المتكامل القائم على الجهاز والنظام إلى تجزئة مقررات علم التشريح. لذلك، أصبح من الضروري تنفيذ عملية التعلم النشط المنظم للتدريس العملي لعلم التشريح. تم تحقيق هذا الهدف باستخدام استراتيجية تدريس مبتكرة للدروس العملية، تسمى التشريح العملي المنظم. هدفت هذه الدراسة إلى توثيق استخدام التشريح العملي المنظم لتدريس التشريح العملي ولتقييم إدراك الطلاب للتعلم عن التشريح العملي المنظم.

طرق البحث: تم تقسيم الطلاب إلى ١٠ مجموعات صغيرة. وتم توزيع هذه المجموعات على محطات منظمة ذات طرق تدريس مختلفة. أخيرا، تم توزيع استبانة "دريم" لتقييم إدراك الطلاب للتعلم.

النتائج: من بين ما مجموعه ٤٨ نقطة أظهرت هذه الدراسة متوسط مجموع النقاط ٣٢ ± ٧ من ٤٨. وتم تصنيف الطلاب إلى أربع فئات حسب الدرجة الكلية لكل طالب؛ حصل ٥٦.٧٦٪ من الطلاب على درجات ٢٥-٣٦ في نطاق الفئة "الإيجابية"، و٢٧٪ في فئة "ممتاز" (٣٧-٤٨)، ١٥٪ في فئة "سلبية" (١٣-٢٤) و٠.٥٪ في فئة "سيئة للغاية" (أقل من ١٢). كان هناك عنصران في الاستبانة (١٣-٤٧) عبارة عن عناصر إيجابية قوية (أكثر من ٣ من ٤)، بينما كانت العناصر الأخرى في النطاق المتوسط الموجب (٢-٣ من ٤).

الاستنتاجات: يعتبر التشريح العملي المنظم أداة فاعلة تلعب دورا حيويا في تعزيز تدريس علم التشريح العملي. تقدم طريقة التدريس هذه ابتكارا في تدريس وتعليم مقررات علم التشريح. بالإضافة إلى ذلك، يمكن أن تشير نتائج إدراك الطلاب للتعلم إلى المجالات التي تتطلب مزيدا من الاستكشاف لزيادة فاعلية طرق التدريس.

الكلمات المفتاحية: التقويم والمنهج التربوي؛ العلوم التشريحية؛ تدريس التشريح؛ فعالية تعليم علم التشريح؛ إدراك التعلم

Abstract

Objectives: The shift from the traditional curriculum to an integrated organ and system-based one has fragmented anatomy courses. Thus, it has become necessary to implement a structured active learning process for the practical teaching of anatomy. We achieved this goal by using an innovative teaching strategy for practical sessions called structured practical anatomy (SPA). We aimed to document the use of SPA for teaching practical anatomy and to evaluate students' perceptions of it.

Methods: We subdivided the students into 10 small groups, which we then assigned to structured stations with different teaching modalities. Finally, we administered the Dundee Ready Education Environment Measure (DREEM) questionnaire to assess the students' perceptions of their learning.

Results: Out of 48 items, our study showed a mean total score of 32 ± 7 (out of 48). We classified the students into four categories according to each student's total score; 56.76% of the students had a score of 25–36 in the 'positive' category range, 27% in the 'excellent' category (37–48), 15% in the 'negative' category (13–24) and 0.5% in the 'very poor' category (below 12). Two items on the questionnaire (13–47) were strongly positive items (greater than 3 out of 4), whereas other items were in the positive medium range (2–3 out of 4).

Conclusions: SPA is an effective tool that plays a vital role in enhancing the teaching of practical anatomy. This teaching pedagogy offers an innovation in teaching and learning anatomy. Additionally, the results of the students' perceptions of their learning reflect areas that require further exploration to boost the effectiveness of teaching methods.

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Keywords: Anatomical sciences; Anatomy teaching; Assessment and educational methodology; Effectiveness of anatomy education; Perception of learning

Introduction

Cadaver dissection has long been the cornerstone of teaching practical anatomy to medical students and remains a fundamental discipline of training for all surgeons.[1–4] Colleges that still follow the traditional curriculum prefer to use cadaver dissection to teach practical anatomy.[5,6] Some medical colleges have introduced the anatomy dissection course as an elective, which medical students have greeted with positive enthusiasm.[7,8] Cadaver dissection has several advantages in terms of gaining knowledge, skills, and attitudes.[9,10] Dissection is also ideally suited to self-directed learning; students explore the subject at their own pace in a practical way according to their own personal interests. It is an active learning process with a self-discovering protocol.[11] Likewise, dissection can provide an opportunity for the three-dimensional awareness of anatomy.[12]

With the change in medical education from a discipline-based curriculum to other curricula, such as problem-based learning (PBL) and integrated curricula, the amount of time available for anatomy dissection has been reduced. *Tomorrow's Doctors*, published by the General Medical Council in 1993, called for lowering the factual burden present in medical school programs.[13] However, even earlier, there was a decline in the emphasis on the teaching of anatomy.[14] Additionally, there are other limitations, such as the difficulty in acquiring cadavers; the cost of transporting, maintaining, and disposing of them; and a shortage of qualified anatomists.[15] The lack of cadavers has resulted in a high student/cadaver ratio, which inevitably detracts from the value of dissection as a useful learning activity. The challenge for professors of anatomy has been to decide how to best integrate anatomy into the new curriculum, and to utilise a number of teaching modalities along with more traditional approaches to introduce anatomy to medical students.[5,15] New strategies for studying anatomy have evolved, such as the use of plastic models, plastinated specimens,[16,17] pre-dissected formalin-embedded specimens, virtual computer-based cadavers, and software multimedia.[9,18–20] Some studies have reported on the use of clinical anatomy in the form of imaging.[21–24] During the new era of medical education, it has become necessary to introduce a novel instructional technique for practical anatomy teaching. Structured practical anatomy (SPA) is an innovative teaching method based on small-group learning strategy (SGLS); it is guided by specific organized instructions to ensure that students acquire a perception of learning through a series of stations in an active manner.

When the Jazan Faculty of Medicine shifted from the traditional curriculum to an integrated organ/system-based one, the anatomy course was integrated into nine other system courses. Hence, the time allocated for teaching practical anatomy was greatly shortened, and the traditional dissection of cadavers was no longer possible. Several modalities have been employed to teach practical anatomy, including the use of pre-dissected formalin-embedded specimens, plastinated specimens, dried bones, plastic models, and surface anatomy. The strategy has also shifted from didactic group teaching and cadaver dissection to SPA, which uses different anatomical materials to understand anatomy. However, students' views of the current strategy for teaching practical anatomy have not been evaluated.

This study aimed to document the use of SPA to teach practical anatomy and to appraise students' perspectives of learning practical anatomy via SPA at the Jazan Faculty of Medicine. The Dundee Ready Education Environment Measure (DREEM) survey is a standard tool that is commonly employed to assess the learning environment of medical education and health professions.[25] We administered DREEM to objectively gauge how students perceive learning anatomy using SPA. Further, we harnessed it to pinpoint SPA's strengths and weaknesses.

Materials and Methods

Description of structured practical anatomy

SPA sessions took place in the interactive anatomy lab, which is equipped with state-of-the-art technology to ensure that the learning environment is suitable for this innovative method of practical teaching. There are ten dissection tables with interactive computers and adjustable light, supported by a high-definition camera at each table.

The SPA session usually began with a 15-min pre-lab talk, where the teacher introduced the objectives of the session and students' expected participation. The students were divided into ten groups of 6–8 people, and a leader was assigned to each group. Ten structured stations were used in each practical session; each group stayed at each station for 10 min. Each group had to pass through the ten stations and accomplish all assigned tasks by the end of the practical session. The students were guided by the instructions displayed on the interactive screens, in addition to assistance from the faculty members (Figure 1).

Different types of specimens were distributed to the ten stations; these included pre-dissected formalin-embedded specimens, plastinated specimens, dry bones, and plastic models. Less frequently, stations were assigned to engage with surface anatomy specimens at the interactive anatomy table, cross-sectional anatomy, short films, and stations of clinical anatomy (Figure 2). Each practical session had 2–3 stations with identification questions or a case problem and multiple-choice questions (MCQs), as well as matching or short-answer questions to be answered by the group as a formative assessment. The students also were assigned to identify the structures by themselves and captured snapshots for the identified structures, which they took notes of in their records (Figure 3). At the end of the session, the students were informed of their performance via an announcement of the results by the faculty members.

Each station had written instructions to direct the students, and to ensure that the learning process was student-centred, wherein learning occurs through practical experience. The stations were designed to reinforce theoretical anatomy, anatomical terminology, spatial relations, and three-dimensional structures. The students were encouraged to talk with each other in the same group and to consult textbooks, atlases, or internet resources to identify the required structures and answer the questions. The instructor's role was that of a facilitator rather than a supervisor.

Students' perceptions of learning

We discussed the bilingual DREEM survey (in English and Arabic) with a focus group comprising 10 students to guarantee that they understood the expressions involved. We used a subscale of the questionnaire that contains 12 statements relevant to the students' perceptions of learning (Table 1). We administered the anonymous survey face-to-face in the teaching room. We asked the students to read each statement carefully and to respond using a 5-point Likert-type scale ranging from *strongly agree* to *strongly disagree*.

We scored the items in the following manner: 4 for *strongly agree* (SA), 3 for *agree* (A), 2 for *uncertain* (U), 1 for *disagree* (D), and 0 for *strongly disagree* (SDis). However, 2 of the 12 items were negative statements with reverse scoring: 0 for SA, 1 for A, 2 for U, 3 for D, and 4 for SDis. We calculated each student's total score and grouped the students into the following four categories:

Scale 37–48: *excellent*
Scale 25–36: *positive*
Scale 13–24: *negative*
Scale 0–12: *very poor*

We have presented the results as the number and percentage of students in each category for the total number of surveyed students and for each of the four groups (male and female students in their second and third years). We interpreted the overall score, as well as the strengths and

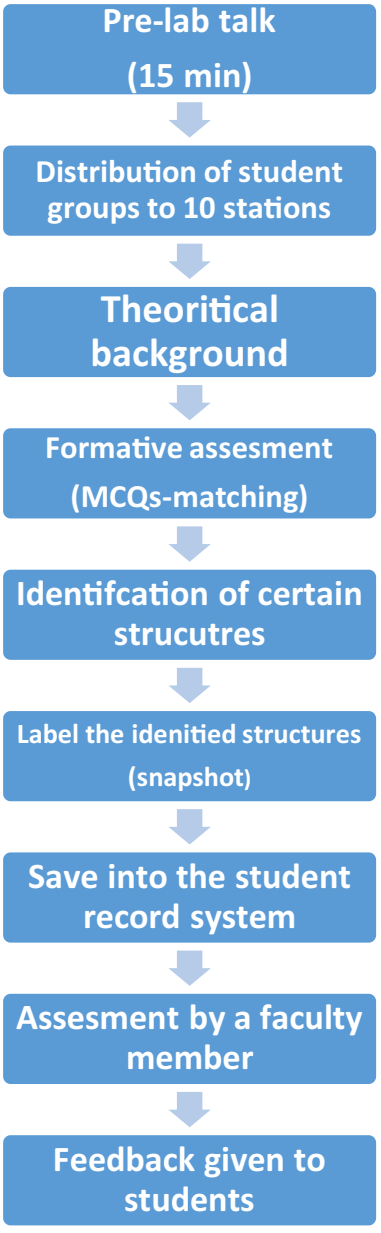

Figure 1: A flow chart describes the steps of an SPA session.

Figure 2: Student groups during an SPA session in the interactive anatomy lab.

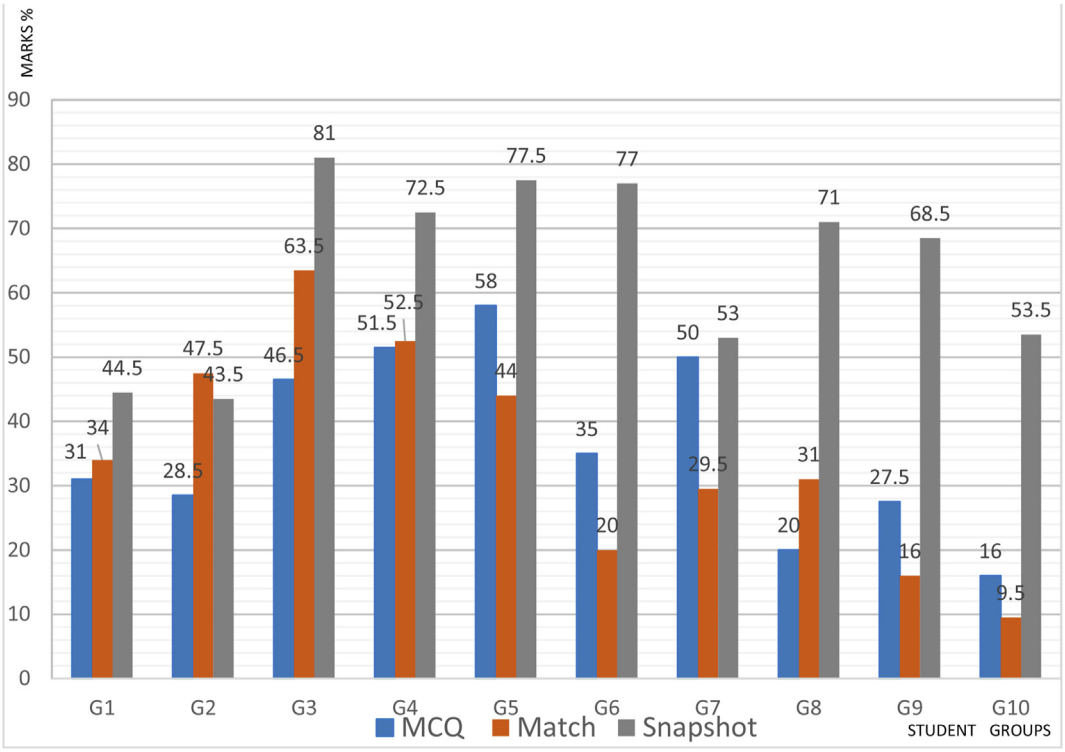

Figure 3: Formative assessment of student groups with different instructions during SPA session.

Table 1: A list of the statements (English/Arabic) used for measurement of the students' perception of learning in the DREEM survey.

Statements
1. I am encouraged to participate during teaching sessions توفر لي هذه الطريقة التشجيع الكافي للمشاركة
7. The teaching is often stimulating تعتبر هذه الطريقة محفزة لي في العملية التعليمية
13. The teaching is student centered الطالب هو المحور الأساسي في هذه العملية التعليمية
16. The teaching helps to develop my competence تساعد هذه الطريقة على تطوير قدراتي
20. The teaching is well focused يعتبر التدريس مركزا بصورة جيدة
22. I feel I am being well prepared in anatomy اشعر بان هذه الطريقة اعدتني اعداداً جيداً في مادة التشريح
24. The teaching time is put to good use يستغل الوقت المخصص للتدريس استغلالا جيدا
25. *The teaching over emphasizes factual learning* تركز هذه الطريقة على تلقين المعلومات فقط
38. I am clear about the learning objectives of the course تتضح في هذه الطريقة الأهداف التعليمية للمادة الدراسية
44. The teaching encourages me to be an active learner التعليم بهذه الطريقة يجعلني أكثر تفاعلا
47. Long term learning is emphasized over short term learning تساعد هذه الطريقة على تثبيت المعلومات لمدى أطول
48. The teaching is too teacher centered يرتكز التعليم باستخدام هذه الطريقة على المدرسين أكثر من الطالب

Table 2: The mean score ± SD for the second- and third-year male and female students for the subscale of perceptions of learning after using the SPA.

Patches	Students that participated	Enrolled students	Participation rate	Scores*
Total number of students	222	327	68%	32.099 (±7.123)
2nd-year males	66	105	63%	27.212 (±7.437)
2nd-year females	72	100	72%	33.694 (±5.924)
3rd-year males	38	51	75%	34.763 (±7.613)
3rd-year females	46	71	65%	34.528 (±4.726)
F statistic	7.540			
p value*	<0.0001			
Multiple comparisons and *p* value@	2nd-year males vs. 2nd-year females, $p < 0.01$ 2nd-year males vs. 3rd-year males, $p < 0.01$ 2nd-year males vs. 3rd-year females, $p < 0.01$			

Note: The mean score (±SD) is presented out of a possible maximum of 48.
The *p* value* is based on a one-way analysis of variance (ANOVA) test.
The *p* value@ is based on Tukey, Bonferroni, and Holm.

weaknesses of each item. We have presented the outcomes as the mean ± standard deviation (SD) using Excel Microsoft Office (Version 2019) and SPSS.

Results

Students' perceptions of learning

Second- and third-year students of the Jazan Faculty of Medicine took part in the survey voluntarily. Of the 205 students (105 males and 100 females) in the second year, 138 (66 males and 72 females) participated in the survey (for a participation rate of 63% among males and 72% among females). Of the 122 students (51 males and 71 females) in the third year, 84 (38 males and 46 females) took part in the survey (for a participation rate of 75% among males and 65% among females) (Table 2).

Table 2 displays the mean total score for the subscale of students' perceptions of learning. All scores were in the positive category, which ranged from 25 to 36 (out of 48), with a mean score of 32 ± 7 for the total number of students of the four groups. The scores for second-year male and female students were 27 ± 7 and 34 ± 6, respectively, while both male and female third-year students had

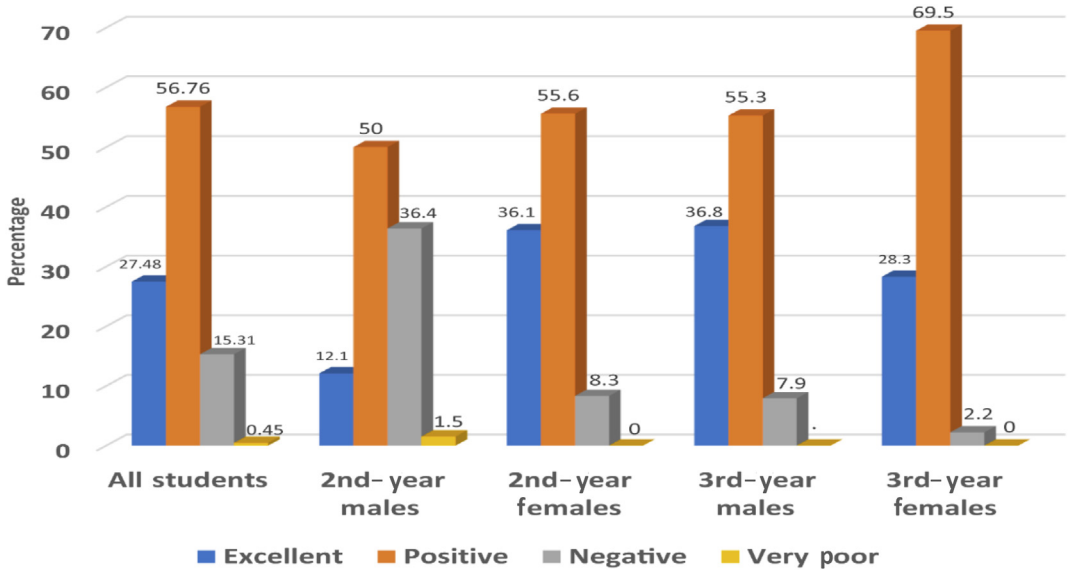

Figure 4: Students' perceptions of learning after using SPA.

Table 3: Responses to each item on the subscale of students' perceptions of learning. The results are presented as the mean ± SD (number of respondents).

Item #	Item	All students (n = 222)	2nd-year males (n = 66)	2nd-year females (n = 72)	3rd-year males (n = 38)	3rd-year females (n = 46)	*p* value*
1	I am encouraged to participate	2.797 ± 1.011	2.318 ± 1.125	2.861 ± 0.983	3.053 ± 0.899	3.174 ± 0.677	<0.0001
7	The teaching is often stimulating	2.928 ± 0.944	2.273 ± 1.117	3.194 ± 0.725	3.105 ± 0.831	3.304 ± 0.511	<0.0001
13	The teaching is student-centred	3.145 ± 0.851	3.031 ± 0.935	3.167 ± 0.839	3.605 ± 0.547	2.891 ± 0.823	0.340
16	The teaching helps me to develop my competence	2.794 ± 0.959	2.125 ± 1.047	3.086 ± 0.794	3.079 ± 0.850	3.043 ± 0.665	<0.0001
20	The teaching is well focused	2.315 ± 1.068	1.803 ± 1.193	2.417 ± 1.004	2.579 ± 0.948	2.674 ± 0.790	<0.0001
22	I feel I am being well prepared in anatomy	2.563 ± 1.127	1.848 ± 1.206	2.764 ± 1.055	2.789 ± 0.935	3.087 ± 0.725	<0.0001
24	The teaching time is put to good use	2.468 ± 1.165	1.797 ± 1.086	2.667 ± 1.196	2.865 ± 1.004	2.783 ± 0.964	<0.0001
25	The teaching overemphasises factual learning	2.237 ± 1.149	2.297 ± 1.281	2.099 ± 1.185	2.474 ± 1.059	2.174 ± 0.950	0.695
38	The learning objectives of the course are clear	2.604 ± 1.023	2.062 ± 0.966	2.942 ± 0.983	2.579 ± 1.130	2.889 ± 0.714	<0.0001
44	The teaching encourages me to be an active learner	2.890 ± 0.947	2.391 ± 1.107	3.169 ± 0.810	3.079 ± 0.882	3.000 ± 0.667	<0.0001
47	Long-term learning is stressed over short-term learning	3.023 ± 0.997	2.561 ± 1.152	3.347 ± 0.842	3.108 ± 0.906	3.109 ± 0.823	<0.0001
48	The teaching is too teacher-centred	2.620 ± 1.079	3.045 ± 0.919	2.375 ± 1.080	2.605 ± 1.346	2.400 ± 0.863	<0.0001

Note: less than 2 = weak, 2–3 = medium (area for improvement), above 3 = strong.
The p value* is based on based on a one-way ANOVA.

Table 4: Percentages of students' responses for each item on the DREEM questionnaire.

Item #	Item	Strongly disagree (SDis) %	Disagree (D) %	Uncertain (U) %	Agree (A) %	Strongly agree (SA) %
1	I am encouraged to participate	10	54	44	208	90
		2.5%	13.3%	10.8%	51.2%	22.2%
7	The teaching is often stimulating	11	27	56	205	107
		2.7%	6.7%	13.8%	50.5%	26.4%
13	The teaching is student-centred	2	20	59	177	146
		0.5%	5.0%	14.6%	43.8%	36.1%
16	The teaching helps me to develop my competence	9	35	83	184	87
		2.3%	8.8%	20.9%	46.2%	21.9%
20	The teaching is well focused	22	76	120	138	50
		5.4%	18.7%	29.6%	34.0%	12.3%
22	I feel I am being well prepared in anatomy	23	55	96	143	89
		5.7%	13.5%	23.6%	35.2%	21.9%
24	The teaching time is put to good use	23	80	69	150	73
		5.8%	20.3%	17.5%	38.0%	18.5%
25	The teaching overemphasises factual learning	45	146	96	76	37
		11.3%	36.5%	24.0%	19.0%	9.3%
38	The learning objectives of the course are clear	12	47	98	167	72
		3.0%	11.9%	24.7%	42.2%	18.2%
44	The teaching encourages me to be an active learner	5	37	68	184	106
		1.3%	9.3%	17.0%	46.0%	26.5%
47	Long-term learning is stressed over short-term learning	7	37	48	164	149
		1.7%	9.1%	11.9%	40.5%	36.8%
48	The teaching is too teacher-centred	78	172	97	37	20
		19.3%	42.6%	24.0%	9.2%	5.0%

scores of 35 ± 8 and 35 ± 5, respectively. There was a significant difference between the scores of second-year male and female students, second-year male and third-year male students, and second-year male and third-year female students ($p < 0.01$).

We classified the students into four categories according to their scores. Figure 4 depicts the percentage of students in each category. We calculated the DREEM score of the four categories for each of the four groups (second- and third-year male and female students); 56.71% of the students scored in the positive category, which ranged from 25 to 36 out of 48. The *excellent* category, with a score of 37–48, comprised 27% of the total (range: 12%–36%). The *negative* category, which ranged from 13 to 24, amounted for 15% (range: 2%–36%), whereas the *very poor* category, with scores below 12, comprised 0.5% (Figure 4).

We determined the outcomes of the individual items of the students' perceptions of learning for the overall number of students and for each of the four groups (second- and third-year male and female students). The strong positive items

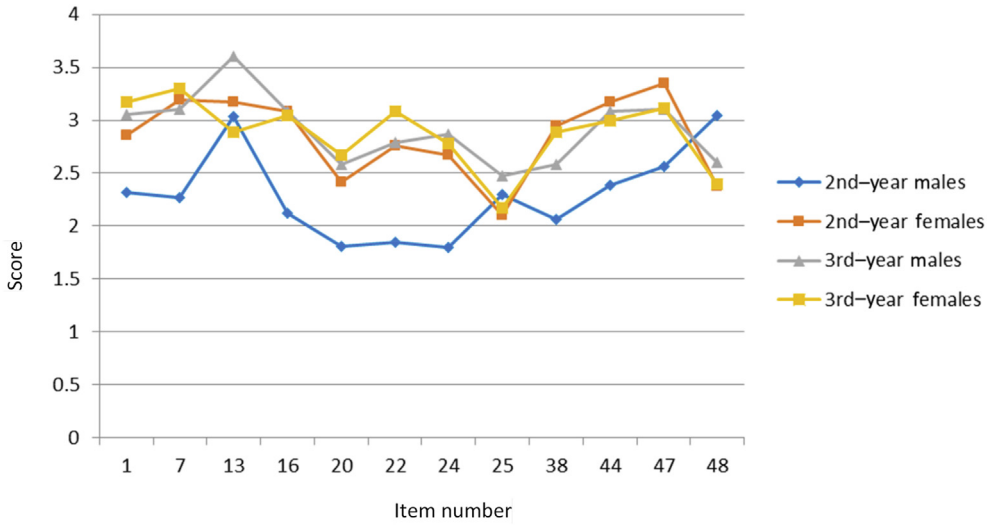

Figure 5: Responses to each item on the subscale of students' perceptions of learning for the four groups of students.

with scores above 3 are items 13 and 47, whereas the other items lie in the positive medium range with scores of 2–3, which indicates that these items could be improved. None of the items had a score of less than 2. The mean highest score for the total number of students was 3.2 for item number 13, while the mean lowest score was 2.2 for item 25 (Table 3, Figure 5) (see Table 4).

Discussion

With the shift from a traditional, discipline-based curriculum to an integrated, system-based one, anatomy has been presented in units that have been integrated into body systems, placing a broad emphasis on spatial relationships between organs.[26–28] With time, it became necessary to mitigate the drawbacks of the traditional curriculum, which included a teacher-centred learning environment, too many students with passive attitudes, and decreased motivation. It thus became essential that less information, which is more clinically relevant, be delivered using approaches designed to optimise and integrate the learning and understanding of anatomy with other units.[29] A decrease in the time available to teach anatomy should not negatively impact a doctor's ability to competently examine a patient, to make a diagnosis, and to communicate findings to a patient and other medical professionals.[14,30–33]

There is a returning tendency toward using the traditional method of cadaveric dissection in teaching/learning anatomy. Dissection enables one to learn anatomy with pertinent clinical correlates and builds discipline independent skills, which are crucial requirements of the modern health care setup. Some practices adopted in dissection enhance certain behaviours that successfully instil the key components of professionalism such as integrity, respect, and compassion among students.[34] However, dissection alone cannot provide a uniform learning experience and hence needs to be complemented with other pioneering learning methods in the future education model of anatomy.[35] SPA allows for the use of all methods available to teach anatomy. All present or future innovative techniques could be easily incorporated into this structured approach.

In this study, we documented the use of an alternative strategy for teaching practical anatomy. The SPA model has many educational advantages, which may compensate for the limitations of cadaver dissection, and further adapt the curriculum to the advanced requirements of modern medical education. Although SPA sessions involve a lot of time and effort in terms of arranging the stations and formulating the instructions, we found the feedback from the students to be encouraging. The learning process was carried out in an active, enthusiastic manner with group interactions and active learning, rather than passive teaching. We suggested the use of SPA to satisfy the main objectives of practical anatomy, which include supporting theoretical anatomy, identifying anatomical structures, memorising anatomical terminology, understanding the relationships among organs, discussing clinical relevance, and realising the three dimensional concept of different structures. We designed the instructions for each station to promote critical thinking and to construct schemata for the identification of anatomical structures and their spatial relations.

Theoretical evidence supports the advantages attributed to SPA. Verification from the field of educational psychology has shown that knowledge retention is fostered when students are actively involved in their learning.[36] SPA is also supported by the view of cognitive psychology that learning is a constructive process in which learners connect new information to their existing knowledge networks, thereby forming and reinforcing meaningful connections among concepts. This process is optimised when prior knowledge is activated and students are encouraged to discuss and explain new information in groups of peers. Many medical schools have thus incorporated active learning methods into their courses.[37] Moreover, knowledge retrieval is facilitated when knowledge is acquired in a simulated situation resembling that in which it will be applied.[22] Therefore, learning based on performing tasks is expected to facilitate the transfer of knowledge from educational settings to the workplace.

Nowadays, ever more medical schools worldwide are implementing student-centred learning approaches.[38] The use of multiple modalities for teaching anatomy helps to reach as many types of learners as possible since students have different learning styles.[39] One trial of three groups of students used each of the following: cadaver dissections, computerised resources, or both; the results indicate that the best method is a combination of both resources, which complement one another.[18] Both students and instructors agreed that the use of dissection and/or prosection was the most efficient teaching approach, followed by other methods. A multimodal approach has therefore been suggested. Medical students prefer improved learning materials during laboratory teaching and diverse pedagogical materials.[40,41] The acceptability of learning anatomy through cadaveric prosection and multimedia software takes user preferences into account. The authors concluded that students favoured the best of both approaches to study the subject matter.[20] Various reports on the three most common modalities employed to teach anatomy (formalin-embedded specimens, plastinated specimens, and computer-assisted learning) imply that there are pros and cons for each modality. Conversely, according to some studies, students trained with only prosection or plastinated specimens believed that their anatomical knowledge was misleading and ineffective.[17] There is consensus among some authors that computer-assisted learning is at least as effective as traditional instruction.[19,20] Further, students of medicine preferred multimedia learning to cadaveric prosection for self-guided, independent study.[21,22] It would be optimal to include a multimodal teaching strategy in the contemporary anatomy curriculum. As such, it seems that students prefer a combination of approaches to explore the subject matter.[42] SPA allows for the incorporation of multiple modalities since it permits the use of ten different stations in each practical session.

Our results from the DREEM survey regarding students' perceptions of learning via SPA showed an overall mean

score of 32.10 ± 7.13 out of 48. Likewise, we identified one report that dealt with students' views of learning for a single course of obstetrics and gynaecology, taught to final-year medical students allocated to eight teaching hospital sites in the West Midlands region (UK).[43] The students' perspectives on learning after completing the course ranged from 33.83 to 35.21, with a mean of 34.52. In addition, at Lund University in Sweden, the mean score of students' views of learning was 34/48 after curriculum reforms were made in 2003 and 2005.[44] In a comparison of students' stances on learning between the beginning of the year and the end of the year among first-year medical students at the University of East Anglia Medical School (UK), the expected score was 37.94 ± 4.10, whereas the actual score was 34.57 (±4.78).[45] Interestingly, second-year students in the United Arab Emirates in the integrated curriculum had a score of 33.36 ± 5.21, while in the discipline-based curriculum, the students scored 29.57 ± 5.80.[46] The DREEM survey was administered to final-year medical students at the College of Medicine at King Saud bin Abdulaziz University for Health Sciences (KSAU-HS), a four-year graduate entry program with a hybrid curriculum (integrated learning modalities with a combination of traditional and PBL). The study signalled that the mean students' perception of learning was 36.44 (out of 48).[47]

Other colleges with a traditional, discipline-based curriculum, such as the College of Medicine at King Abdulaziz University, had a score of 22/48 for undergraduate students.[48] During the shift from a traditional curriculum to a PBL curriculum at Kuwait University Medical School, the scores were 28 (25.3−30.2) and 26 (24.9−26.9) for male and female students, respectively.[49]

The overall scores of the DREEM survey in our study are comparable to those reported by other colleges. The results showed good differentiation between the different groups of students. This may be due to the years tested (second- and third-year students), as well as the different educational environment experienced by male and female students.

The scores for the individual DREEM items clearly indicate where the priorities lie for improvements. Two items scored above 3, while all other items scored above 2 (out of 4). There was no item with a score below 2, which could be characterised as a weak item. We recorded the lowest mean score of 2.27 ± 1.15 for item 25: '*The teaching overemphasises factual learning*'. This suggests that the students are looking for more experiential learning domains in the learning process. We recorded the highest mean score of 3.15 ± 0.85 for item 13: '*The teaching is student-centred*', which meets the main goal of SPA. This implies that students prefer learning through practical experience and are looking for more motivating, active work.

Conclusion

We documented the use of SPA as a strategy to teach practical anatomy; it proved effective in enhancing the teaching of practical anatomy at the Jazan Faculty of Medicine. The total mean score for students' perceptions of learning was 32 ± 7.12 (out of 48) for all students. SPA employs several modalities for learning anatomy, and paves the way forward for innovations in teaching and learning anatomy by incorporating other modalities. We also found DREEM to be helpful in assessing the students' views of learning and for providing useful diagnostic information, which can aid in identifying priority areas for improvement.

Recommendations

We recommend SPA as a teaching method for practical anatomy to strengthen medical students' perspectives on learning. SPA supports all the principles of medical education such as active learning, small group discussion, and student-centred learning. Further investigations are required to explore SPA's effectiveness in terms of test performance, engagement, and motivation measures.

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Conflict of interest

The author has no conflict of interest to declare.

Ethical approval

The ethics research committee at the Faculty of Medicine at Jazan University approved of this work (Reference #FMRERC14-02-17; February 14, 2017).

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