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Art-based assignment in head and neck anatomical course, a dynamic experience

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Abstract:

In recent years, alternative uses of art within medical education have been explored and extended. We report here a method of art-based assignments in anatomy and histology, which we have incorporated into the head and neck course as a means of enlivening didactic lectures. One hundred and two first-year medical students at the Alborz University of Medical Sciences participated in a 15-week educational intervention, in which an art-based assignment method was employed. The learning module focuses on the human anatomy and histology of head and neck. In each session, after the teacher's lecture and practical work, students were given an assignment based on the topics of that session and based on the drawing. The learning outcome was evaluated twice, 1 week and 4 weeks after the course. Student's feedbacks were collected via an anonymous questionnaire at the end of the module. The data were analyzed by using the SPSS 20 software by paired and independent *t*-tests and the normality of data was evaluated by the Kolmogorov–Smirnov test. Most of students (90%) had rated the new format as very informative. Exam scores were significantly higher at 4 weeks tests ($P \leq 0.05$) and data showed significant difference in long-term retention of knowledge. The use of this module by medical students during their head and neck course improves their confidence through drawing. Teacher's feedback provides a step-wise approach that simplifies the learning of anatomy and histology. The strategy has appeal for visual, auditory, read/write, and kinesthetic learners.

Keywords:

Assignment, feedback, histology, medical education, undergraduate

Introduction

In recent years, science educators have begun to look more closely at what their students understand about some biological concepts and define understanding in different ways.^[1] As educators, it is necessary for us to innovate teaching practices to help the students in understanding the structure of the human body. Since the anatomy and histology are most commonly encountered by medical practitioners in the form of living anatomy and medical imaging, therefore students should also be encouraged to engage in teaching activities with an emphasis upon living anatomy.^[2] To achieve this goal, it

becomes important to use active-learning strategies. Active learning is defined as the student intentionally engaging in an activity to learn, making purposeful observations, and critically thinking about what they are doing and can be done in a myriad of ways, including flipped classrooms, drawing, retrieval practice, and modeling.^[3] Painting as a tool for teaching is becoming increasingly popular as it is fun and diffuses the formal academic context.^[4] Since anatomy is the science of studying body structures and their spatial relationships, the use of images in anatomical education is of particular importance.^[5]

Despite the opinions of both faculty and students regarding the lack of anatomical

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knowledge retention, few studies have been conducted to assess the actual education content gap. This study focuses on aiding student's retention of anatomical and histological knowledge of head and neck (as it is a complex region) through the medium of drawing and painting, along with teacher feedback.

Materials and Methods

Study design and setting

This study was conducted during the first semester of the 2020–2021 academic year in the Alborz University of Medical Sciences. Medical students in Iran join medical school directly after high school. In Iran, general medicine education is a 6-year course, which includes basic science education for the first two years. Anatomy is taught in the first 2 years of the course with concurrent teaching in anatomy, histology, and embryology. The medical curriculum is composed of traditional teaching modules designed for large groups of students.

Study participants and sampling

All invited first-year medical students ($n = 102$) participated in a qualitative research project. All of them had registered on a course entitled human head and neck anatomy and histology.

Ethical consideration

All participating students signed individual consent forms, and ethical approval was provided by the Ethics Committee of Alborz University of Medical Sciences (ABZUMS.REC.1397.97).

Data collection tool and technique

The lesson plan for each topic was designed to cover a wide range component. We had 15 sessions per semester. Each session lasted for 120 min and contained discussion (30 min), lecture with PowerPoint slides (30 min), and practical work in the laboratory (60 min). The class was started with reviewing the assignments of the previous session. During this part, the teacher observed each photo or drawing and identified student's mistakes for correction. After that, the topic of the new session was presented with teacher lecture, then the students went to the laboratory for practical session. Anatomy practical sessions included dissection of the corpse along with gross anatomy training by plastic models. In histology sessions, practical work was done with a light microscope. All histological images had the ability to move and zoom. In all practical sessions, the teacher was present and answered questions. At the end of class, the homework was given to the students (according to Table 1) and they had time to do until the next week. Emphasis was given to the students that the scientific quality of task and its delivered content was important, rather than

Table 1: Lesson plan during the educational semester

Session	Title	Practice	Assignment
1, 2	Anatomy of skull bones	Bone	Drawing
3	Bone histology	Microscope	Drawing
4, 5	Anatomy of face bones	Bone	Drawing
6	TM joint histology	Microscope	Drawing
7	Anatomy of neck muscles	Molaug-cadaver	Body painting
8	Muscular tissue histology	Microscope	Drawing
9	Anatomy of neck vessels	Molaug-cadaver	Drawing
10	Vascular tissue histology	Microscope	Drawing
11	Anatomy of neck nerves	Molaug-cadaver	Body painting
12	Nervous tissue histology	Microscope	Drawing
13	anatomy of facial muscles	Molaug-cadaver	Body painting
14	Anatomy of parotid region	Molaug-cadaver	Body painting
15	Parotid gland histology	Microscope	Drawing

their technical artistic ability. There were two models of assignments: drawing and body painting.

In the drawing assignments given for histology and anatomy topics, students were free to use any style, color, or painting tool. In the body painting assignments that used only in gross anatomy subjects, the important point was surface anatomy according to the anatomical landmarks that may be on the person's body. They should take a photo of the area after painting and bring the printed photo with them to the next class session after naming the anatomical elements. An example of students' drawing is shown in Figure 1. In the next session of the class, the students first presented their homeworks. One staff member was involved in histology session and another one for anatomy. Then, it was discussed and the students' problems were solved in the classroom. Assessment of the module took place at two-time intervals 1 week and 4 weeks after the final last session with the same questions. The exam included 24 tests based on the specific learning outcomes of the teaching session, images, and laboratory components with several item formats: multiple choice (single best answer), short answer fill-in-the-blank, and short answer essay questions. The questions varied in difficulty according to Bloom's (1956) taxonomy with 60% at the knowledge level and 40% at the comprehension level. Student's feedbacks were collected via an anonymous questionnaire at the end of the module. The questionnaire consisted of six questions, including motivation, usefulness, a favorite of method, repeatability, effective feedback, and motivated to study. The respondents' agreements/disagreements were noted with a set of statements by using a 5-point Likert scale (ranging from 1 which means "strongly disagree" to 5 which means "strongly agree"). All subjects were asked to respond to the questionnaire and their responses were guaranteed to be confidential. A code was defined for all students, and all students' information has been reviewed anonymously.

The data were analyzed by using the SPSS 20 software (IBM Company, USA). The normality of data was evaluated by the Kolmogorov–Smirnov test. Data were analyzed by paired and independent *t*-tests. Scores on questions from the end-of-semester and next month’s exams were used to measure learning outcomes.

Results

A total of 102 completed forms were received. Seventy (68.6%) of them were female and 32 (31.3%) were male. The age distribution was 18–19 (94%) and 19–21 (6%). Figure 2 shows quantitative feedback data (using a Likert 5-point scale) achieved for specific aspects of the module. The majority of the students (>90%) had rated the new format as very informative [Figure 2].

Overall, the feedback after the module was very positive. The students stated that after seeing the structure of head and neck anatomy through drawing, the subsequent cadaveric demonstration was better understood when compared to before (i.e., without prior drawing demonstrations and practice).

Analysis of the mean test scores for the first and second exams shows that learning occurred during the teaching

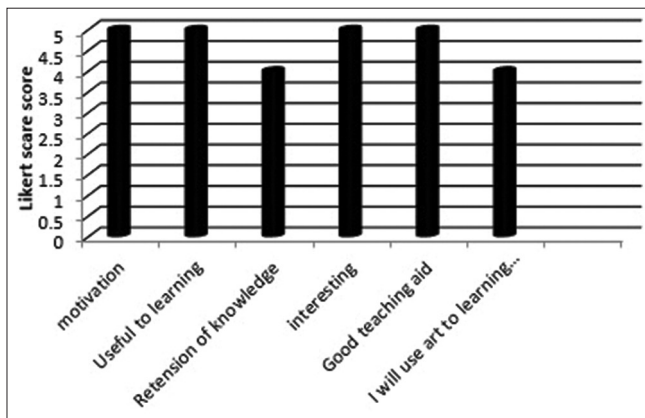


Figure 1: Quantitative feedback data (using a Likert 5-point scale) achieved for specific aspects of the module. The majority of the students (>90%) had rated the new format as very informative

session. The results showed that the mean score of students immediately after the last session was 14.92 while the score 1 month after the experiment was 17.42 ($P \leq 0.05$). It is indicating the impact of module on the retention of information.

Discussion

In this study, we explored the influence of actual drawing and painting exercises on retention of histology and anatomy-associated knowledge. The students were well engaged during the sessions and they had fun while learning. Questionnaire feedback demonstrates that program was found to be a useful experience. It gives students a chance to study the elaborate on anatomical knowledge they gained in the dissection room. This is in agreement with majority of studies where in them students reported that they enjoyed the anatomy sessions by body painting or drawing.^[6,7] Furthermore, students stated that actual drawing is a valuable tool to learn histology. This is consistent with results of Cracolici *et al.* (2019)^[8] in which most students considered art to be a good resource to learn concepts in medicine.

The significant difference between students’ scores on the first exam when compared to the second demonstrated that learning occurred during the teaching session. It shows that drawing and correction by the student, positively improved the outcome.

Findings of this study support previous research on the benefits of active-learning strategies in anatomical education.^[9]

A study by Lufler *et al.*^[10] demonstrated that participation in medical gross anatomy increases students’ visuospatial ability, and students’ preexisting visuospatial ability is predictive of performance in medical gross anatomy. Another research showed that the combination of art with education can conceptualize students understanding and facilitate learning outcomes and improve knowledge retention.^[11] In contrast, some studies have concluded the opposite results. Jariyapong

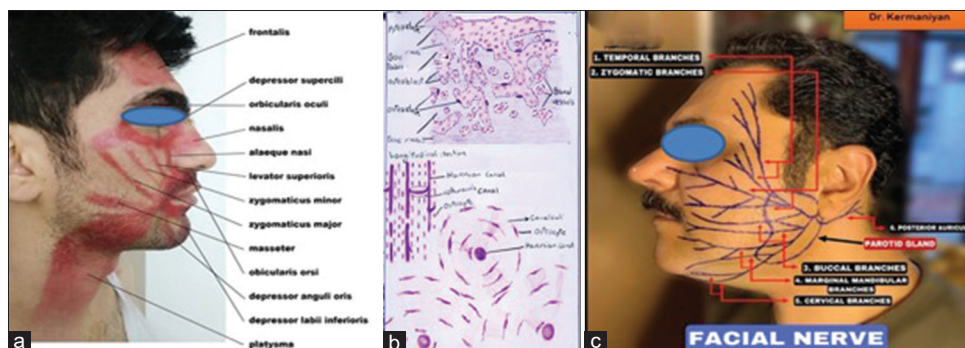


Figure 2: (a) Facial muscles that are stretched on the person's face. (b) Drawing related to bone histology and ossification. (c) The innervation of facial skin is painted on the person's face

et al.^[12] found that there was no statistically significant difference in knowledge retention between control and experimental groups using body paint to learn anatomy of the hand. One study assessed drawing-associated knowledge retention, but only without staff feedback and immediately after the intervention, using direct posttests.^[13]

The novelty of this study is giving students individual feedback on their assignments with direct observation. Feedback acts as a tool to self-assessment and reflection on performance. Effective feedback is an essential part of the learning process and promotes self-reflection and motivates the learner to work toward their desired outcome.^[14] Teaching was more effective with an opportunity for students to reflect and discuss their experiences and provide fellow students with feedback on their performance.^[15] In keeping with this line of thinking, we speculated that “doing art” might profoundly inform students’ learning of anatomy and histology.

The program has provided an opportunity for improvement of learning by feedback opportunities, enhanced training, and mistakes correction. Active-learning strategies reach all types of learners in the visual, auditory, kinesthetic, and tactile schemes. Nonetheless, it is necessary to stress that designing experiential learning is not without challenges and limitations. For example, it can be more time-consuming to teach through art demonstrations compared with a lecture-based teaching program, while it is not suitable for all subjects teaching and should not be overused. Also focus should be on the knowledge of anatomy, not the artistic nature of painting.

Limitation and recommendation

Among the limitations of designing, art-experiential learning for teaching compared to a lecture-based educational program is spending more time for feedback and discussion during class sessions, and it is also not suitable for all teaching subjects and should not be overused. It is recommended to use in other educational courses to learn surface anatomy topics.

Conclusion

We hypothesized that creating visual art would subjectively improve the learning process and lead to student-based personal incorporation of art into their future medical education regardless of subject. These findings confirm the benefits of active-learning strategies and the use of art for student exercises may be particularly beneficial for all students’ learning in anatomy courses.

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Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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