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Using Drawing Assignments to Improve the Effectiveness of After-Class Review for Regional Anatomy

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Abstract: Regional Anatomy is a compulsory clinical course for medical students, focusing on morphological science. The study of the adjacency and layers of human morphological structures should always be illustrated with images. Based on the "blended teaching model" implemented by the teaching and research section, the research team effectively adopted the traditional drawing method and carried out after-class consolidation of the Regional Anatomy course through drawing assignments via the Xuexitong APP for clinical students of the 2022 cohort. Results showed that compared with the control group, the experimental group with after-class drawing assignments achieved significantly higher scores in both specimen practice assessments and final theoretical exams. This study aims to retain the advantages of traditional teaching models while accumulating experience for the application of blended teaching models in teaching practice.

Keywords: Xuexitong; Regional anatomy; Drawing; After-class review

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1. Introduction

Regional anatomy is a compulsory clinical course for clinical medicine majors, characterized by strong practicality. On the basis of systematic anatomy, it plays a key role in helping students connect basic medicine with clinical medicine. Therefore, mastering regional anatomy is crucial for students' subsequent practice in clinical courses. Against the backdrop of the mobile Internet era, the teaching and research section where the author works has gradually transformed the traditional "regional anatomy classroom" into an "online + offline" blended teaching mode based on the Erya platform in recent years (hereinafter referred to as the blended teaching mode) [1,2]. In the process of teaching practice, the author found that the blended teaching mode has obvious advantages and characteristics compared with traditional teaching methods. However, some advantages of the traditional teaching mode can also be continued in the new teaching mode.

Regional anatomy is a morphological science. The study of the adjacency and layers of human

morphological structures should always be accompanied by images for explanation. In the traditional teaching mode, compared with slides and 3D models, traditional drawing is easier to highlight the hierarchical and adjacent relationships of local human structures [3,4]. Therefore, how to use traditional drawing in the new teaching mode to help students deepen their memory and understanding of knowledge points and apply it in clinical case analysis is a key issue that the author has been exploring during the transition period of different teaching modes [5].

The Xuexitong platform is a widely used online professional learning platform in the field of education. It is characterized by being accessible on mobile terminals such as smartphones and tablet computers, allowing students to learn without being restricted by time and place [6]. At present, most mainstream domestic educational institutions apply Xuexitong in teaching and learning during the pre-class and in-class periods, while the application of Xuexitong in after-class review is limited and the mode is single. After-class review is an important part of regional anatomy, and students' investment in after-class review greatly affects their learning outcomes. The author conducted a preliminary study on the application effect in the clinical medicine major of our university by using drawing assignments on the Xuexitong platform for after-class review of regional anatomy, aiming to retain the advantages of the traditional teaching mode and accumulate certain experience for the blended teaching mode in teaching practice [7].

2. Research objects and methods

2.1. Research objects

Students from Groups 1–2 (28 students, experimental group) and Groups 3–4 (27 students, control group) of the 2022 clinical medicine major at Guangxi Medical University were selected as the research objects. There were no statistically significant differences in age or academic performance in previous anatomy-related courses between the two groups of students ($P > 0.05$), indicating they were comparable [8].

2.2. Teaching content

The textbook used was Regional Anatomy (9th edition, People's Medical Publishing House) edited by Cui Huixian and Li Ruixi. The same teaching plan was implemented, including 30 class hours of theoretical teaching and 30 class hours of experimental teaching.

2.3. Teaching methods

Both groups adopted an online-offline blended teaching mode based on the Erya platform. The teaching modes for the pre-class and in-class stages were the same for both groups. In the after-class stage, students in the control group were required to complete case analysis tasks in the "Discussion" section of Xuexitong, while students in the experimental group, in addition to case analysis, were assigned drawing tasks in the discussion section [9,10].

2.4. Drawing assignment plan

(1) Scope of drawing: Key knowledge points such as local partitions, body surface projections, and important structures of each part;

(2) The teacher of each class selects 1-2 pictures for explanation and draws them by hand with chalk on the blackboard;

(3) Requirements for drawing: Colored pencils and electronic drawing are both acceptable, without being restricted to forms or creative methods;

(4) Simplified procedure: Students' drawing assignments are posted in the discussion area in the form of pictures, and there is no need to hand in paper or electronic versions of the assignments;

(5) Emphasize the originality of drawing assignments. It is allowed to simulate drawing, but it is not allowed to copy and paste others' drawings directly;

(6) Confirm that the drawing method is the final assessment method for the usual performance, so as to correct students' learning attitude [11].

The example is as follows:

(1) Explain the composition of the elbow joint arterial network and emphasize its importance;

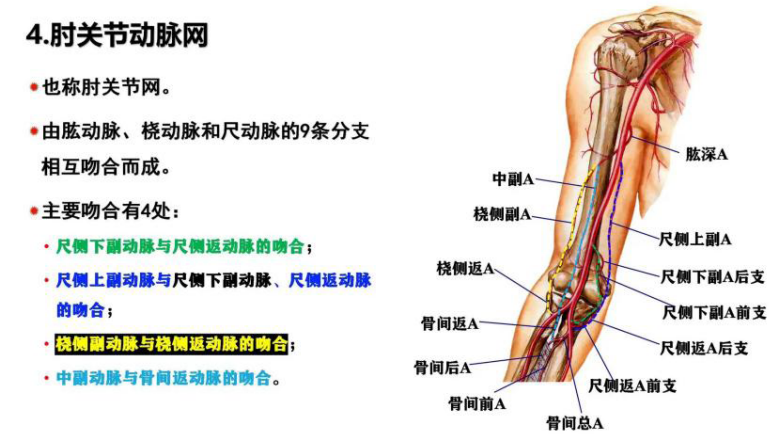

Figure 1. Composition of the elbow joint arterial network.

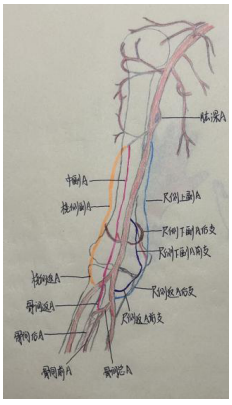

Figure 2. Students' electronic drawing.

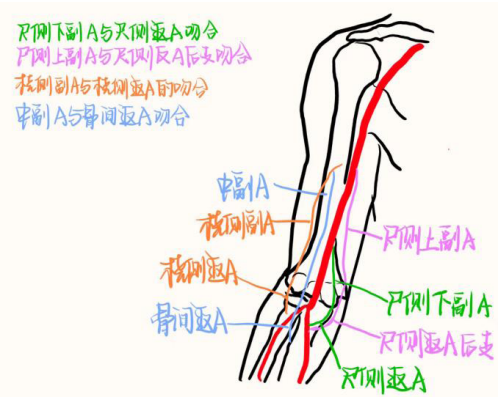

Figure 3. Students' colored pencil drawing.

(2) Teacher's demonstration: first draw the humerus, ulna and radius that constitute the elbow joint (the 3 bones are in the same color), then draw the 3 main arterial trunks running in the arm and elbow: brachial artery, ulnar artery and radial artery (in red), draw the branches of the 3 main arterial trunks (still in red), and finally connect the branches in series (each arterial pathway is in one color, and not all in the same color);

(3) Assign homework in the discussion area: elbow joint arterial network;

(4) Students post their drawings in the discussion area.

2.5. Assessment methods

2.5.1. Performance evaluation

Both the experimental group and the control group of students will be assessed through the following methods: unified standards for practical specimen assessment with random physical object evaluation; unified standards for marking the final theoretical examination; phase tests, etc. The composition ratio of the final evaluation results is shown in **Table 1**.

Table 1. Composition ratio of final evaluation results

Course performance composition		Assessment score composition		Assessment methods
Item	**Proportion**	**Item**	**Proportion**	
Process assessment score (usual performance)	40%	Online comprehensive score (comprehensively formed by online autonomous learning completion, in-class quizzes, chapter self-tests and interactive data flow)	20%	Online exam (automatically generated by network platform data)
		Practical specimen assessment	10%	On-site real-time assessment and scoring
		Phase tests (2 times)	5%	Online exam (automatically scored upon online completion)
		Offline classroom evaluation	5%	Assessment and scoring among TBL classroom learning groups
		Subtotal	40%	
Final exam score	60%	Final exam	60%	Closed-book on-site computer-based exam
Total	100		100%	

2.5.2. Questionnaire survey

Questionnaires will be distributed, and the evaluation content includes: understanding and memorizing knowledge, systematically mastering knowledge, enhancing learning interest, improving comprehensive analysis ability, and the close connection between basic knowledge and clinical practice. The evaluation results include: agree, disagree.

2.6. Statistical processing

The results of this study will be analyzed using SPSS 22.0. Measurement data will be expressed as mean ± standard deviation (SD) and tested by *t*-test; count data will be expressed as percentages and tested by χ^2 test; $P < 0.05$ indicates that the difference is statistically significant.

3. Results

3.1. Assessment of practical specimens

The experimental group had a significantly better understanding of specimens than the control group, and the scores of the experimental group were significantly higher than those of the control group. The difference between the two groups was statistically significant ($P < 0.05$), as shown in **Table 2**.

3.2. Final theoretical examination

The scores of the experimental group were significantly higher than those of the control group. The difference between the two groups was statistically significant ($P < 0.05$), as shown in **Table 2**.

Table 2. Comparison of scores in practical specimen assessment and final theoretical examination between the control group and the experimental group (mean ± SD, points)

Group	n	Practical specimen assessment	Final theoretical examination
Control group	27	95.74 ± 1.78	63.07 ± 12.74
Experimental group	28	99.29 ± 9.27	69.92 ± 9.39

3.3. Results and analysis of the questionnaire survey

The results of the questionnaire survey on learning effects between the control group and the experimental group showed that students who participated in the review after the drawing assignment class were better in understanding and memorizing knowledge, enhancing learning interest, improving comprehensive analysis ability, and establishing a close connection between basic knowledge and clinical practice (**Table 3**).

Table 3. Comparison of the learning effects questionnaire survey between the control group and the experimental group

Survey content	Control group		Experimental group	
	Agree	Disagree	Agree	Disagree
Understanding and memorizing knowledge	25	2	27	1
Mastering knowledge systematically	25	2	27	1
Enhancing learning interest	24	3	24	4
Improving comprehensive analysis ability	25	2	27	1
Close connection between basic knowledge and clinical practice	24	3	28	0

4. Discussion

Under the new normal, the development of the environment and technology has given birth to teaching models that are more in line with the needs of learners [12]. The after-class review session, as one of the key steps that widens the gap in students' learning efficiency, is easily overlooked in higher education. The fundamental reason is that college students have transitioned from a high school education with low freedom to a higher education with broad freedom. Educational researchers often focus on pre-class preparation and in-class teaching, neglecting the significant role of after-class review in higher education teaching. This paper researches after-class drawing assignments for clinical medicine majors with the help of the Xuexitong platform, hoping to arouse the attention of educational researchers to students' after-class review. Different disciplines have different ways of after-class review, but the impact of the after-class review model on students' learning and teachers' teaching is always positive feedback. Under the modern teaching model, the fine traditions in traditional teaching should continue to play a role. The drawing method has always been a highlight in anatomy teaching. Professor Huo Kun from China Medical University, who is regarded as a "soul painter" by a large number of medical students on Bilibili, teacher Zhang Bo from Zhejiang Chinese Medical University who has been reported by many media, and the team of Professor Sui Hongjin, together with anatomy teachers from Dalian Medical University, Guangdong Medical University, Air Force Medical University and Peking University, have collected, sorted out and revised the blackboard drawings often used in teaching over the years, and developed several new blackboard drawings based on the key and difficult points in the teaching syllabus and teaching, which are

compiled into the book Learning Anatomy through Drawing for Beginners [13]. Behind these cases, there is an outstanding advantage of the drawing method in the process of anatomy learning: anatomy drawing enables students to memorize knowledge points efficiently. In the same period of time, compared with words, drawing can closely connect more scattered anatomy knowledge points and deepen students' memory. The author of this paper introduces drawing into anatomy teaching in the form of after-class assignments, which, to a certain extent, realizes the visualization and explicitness of classroom knowledge, and is more conducive to students' mastery of the layers, adjacencies, and clinical integration of topographic anatomy [14,15].

5. Conclusion

In conclusion, with the widespread application of the blended teaching model, using the "Discussion" section of the Xuexitong APP to consolidate students' learning of the Topographic Anatomy course after class in the form of drawing assignments is a reference method for after-class review in the teaching of medical morphology courses. The sample size of this study is small and the evaluation system is not perfect. Limited by these factors, its effectiveness still needs further research and exploration by the author.

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Disclosure statement

The authors declare no conflict of interest.

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