IMPLEMENTATION OF UNIVERSAL DESIGN FOR LEARNING IN HUMAN ANATOMY TEACHING

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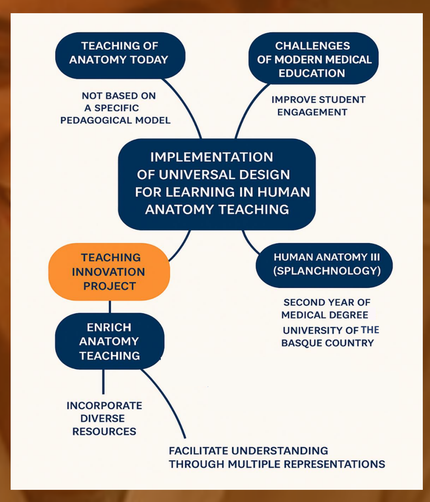
Introduction

The teaching of anatomy today is not based on a specific pedagogical model, but rather on a long-standing tradition. To address the challenges of modern medical education and improve student engagement, we designed and implemented a teaching innovation project based on Universal Design for Learning (UDL) principles in the practical sessions of the subject of Human Anatomy III (Splanchcnology) in the second year of medical degree at the University of the Basque Country. The aim was to enrich anatomy teaching by incorporating diverse resources and emphasizing clinical imaging to facilitate the understanding of anatomical structures through multiple representations.



Methodology

Learning Stations

Practical sessions were restructured into five rotating learning stations:

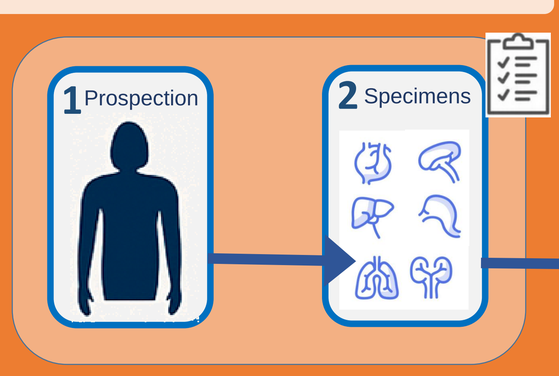
- Cadaver dissection [1]
- Isolated cadaveric specimens [2]
- Anatomical models and Human Planar Reconstructions [3]
- Digital simulators [4]
- Clinical imaging [5]

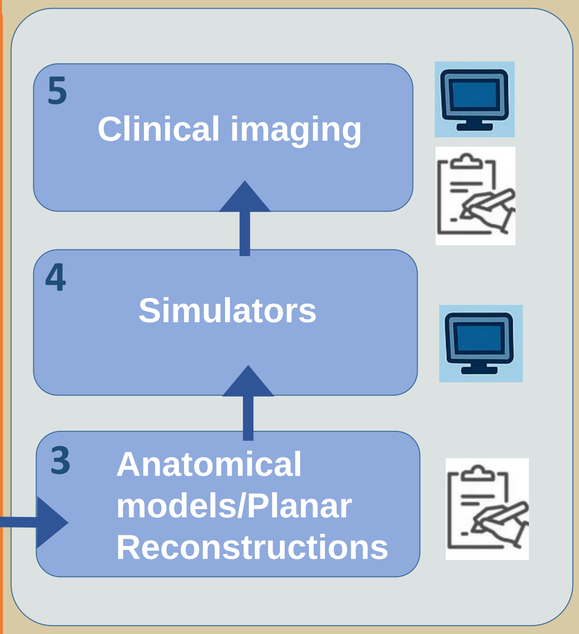
A final 15-minute free-choice period allowed students to revisit any station for self-directed learning.

PRACTICAL SESSION: Diagram showing the dynamics of the practical sessions

TECHNICAL NOTES

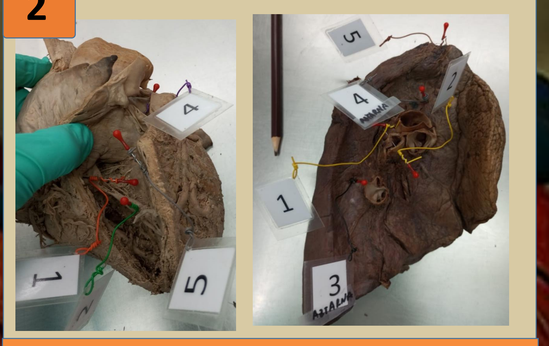
* 5 Stations: 15 minutes each (Total: 100 minutes)
* 8 student groups per session (5-6 each)
* Clear instructions at each station
* Final 15 minutes: Free exploration or review





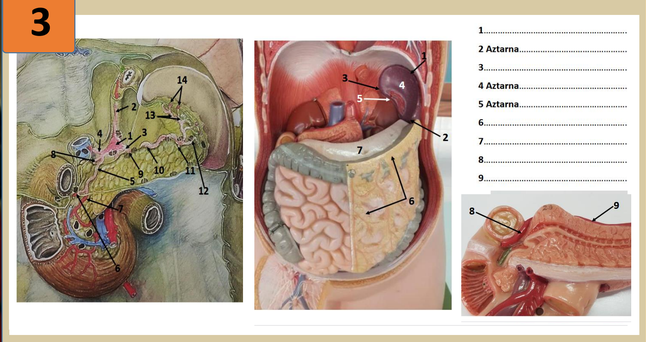
1 Peer tutors received specific training to guide their classmates and explain cadaver prosections.

2



Self-evaluation checklist – Last 5 minutes

3



Teacher's feedback and corrections for the next practical session

4

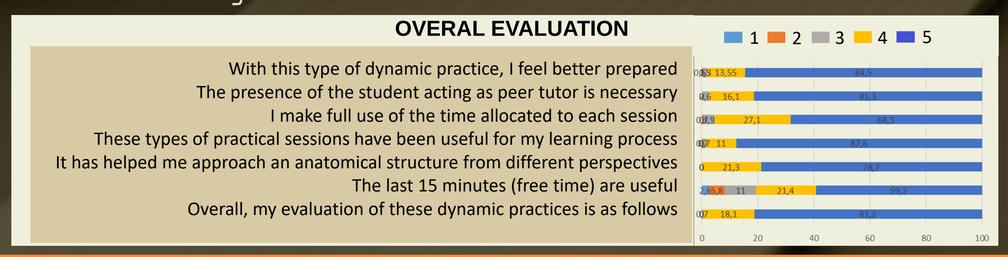
A navigation guide is available in the simulator for each practical session

5

Teacher's feedback and corrections for the next practical session

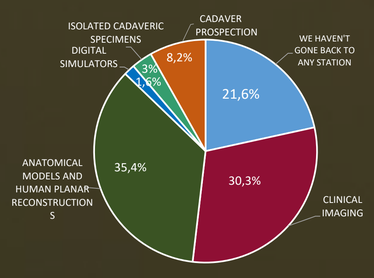
Assessment of the project

A total of 155 students participated, and learning outcomes and satisfaction were assessed through exam results and Likert-scale surveys. Results indicate enhanced student engagement and satisfaction. The variety of resources improved their anatomical understanding.



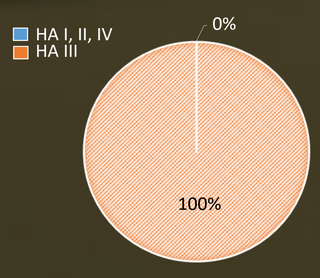
Percentage of students (n = 155) selecting each Likert score (1 = strongly disagree to 5 = strongly agree) for items related to the overall evaluation of the dynamic anatomy practice sessions based on the UDL approach. A large majority of students rated the experience positively, with between 78.7% and 87.6% selecting scores 4 or 5 across the different statement, indicating a clearly positive reception and high level of satisfaction with the UDL-based teaching practices

Which workstation was most frequently revisited during the 15-minute free-choice period?



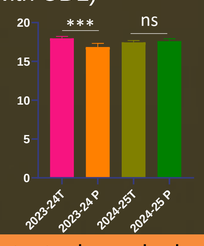
Students frequently return to the clinical imaging and reconstruction station, as the time initially allocated is often insufficient to complete all tasks.

Which type of practical session do you prefer: the one based on the UDL model (HAIII) or the one used in other anatomy courses (HAI, II, IV)?



All students (100%) reported a preference for the UDL-based teaching methodology over the traditional approach used in other anatomy courses.

Comparison of theoretical and practical exam scores between two academic years: 2023–2024 (without UDL) and 2024–2025 (with UDL)



Wilcoxon test showed significantly lower practical vs. theoretical scores in 2023–2024 (p = 0.0001), but no difference in 2024–2025 (p = 0.0696). No between-group differences were found (Mann-Whitney, n.s.); 2024–2025 practical exam added clinical imaging and isolated specimens requiring higher interpretative skills.

Comparison of Student Ratings Across Learning Stations

Students evaluated the five UDL-based learning stations using a 5-point Likert scale. Cadaver dissection and isolated cadaveric specimens received the highest ratings, particularly for realism and anatomical understanding. Anatomical models and planar reconstructions were also positively assessed. Clinical imaging stood out for helping students understand anatomical relationships, enhancing clinical relevance, and supporting future professional practice. Although the digital simulator received more moderate in-session scores, students noted in the open feedback section that it was especially useful for self-directed learning outside scheduled practice hours. Time constraints were more evident in the clinical imaging station. Friedman's test revealed significant differences in student perceptions across stations ($p < 0.05$)

Student Feedback and conclusion

The feedback emphasized the engaging nature, dynamic structure, and multimodal learning environment. Students particularly valued the integration of clinical images in deepening their understanding of anatomy from different perspectives and connecting, alongside cadaveric material, more closely with clinical reality.

This pedagogical transformation represents a more inclusive and student-centered anatomy education model, promoting autonomy, motivation, and deeper learning.

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