Improving Learning Outcomes in Histology by Using Organized Lists of Histological Terms

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INTRODUCTION

Medical education demands the rapid integration of vast amounts of information, creating a challenging learning environment for students. Histology, for example, requires a mastery of complex cellular structures and their relationships to function. Structured learning tools, such as organized lists of histological terms, may enhance retention, improve confidence, and support students in mastering foundational concepts before they advance to integrative topics. This study evaluated whether structured histological term lists improve students' confidence and performance in identifying tissues and cell types, applying histological knowledge, and effectively using histological terminology.

METHODS

- A prospective educational intervention study was conducted with first-year medical students enrolled in Fundamentals of Biomedical Sciences I and II courses.
- Participants completed pre- and post-course surveys assessing their confidence in key histological skills using a 5-point Likert scale.
- For the intervention, students were given structured lists of histological terms and guidance on their effective use.
- Data were analyzed using the Wilcoxon signed-rank test to evaluate changes in confidence levels.
- Additional descriptive statistics were used for survey responses regarding perceived usefulness.

RESULTS

- Participants: 14 students completed both pre- and post-intervention surveys.
- Statistically significant improvements in confidence were observed in:
  - Tissue identification
  - Cell type identification
  - Application of histological knowledge
  - Use of histological terms in communication
- Student feedback:
  - Structured lists were reported as useful for improving understanding, confidence, and exam performance.

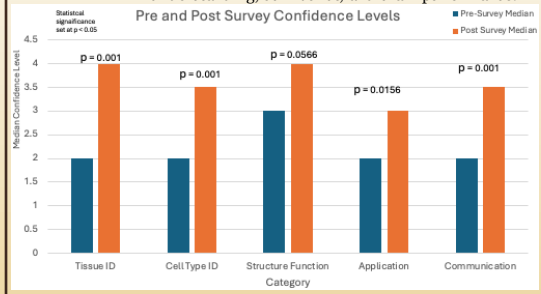

Figure e1: Pre- and post-survey median confidence levels of students across five histological categories. Confidence levels were measured before and after implementation of the organized histological lists.

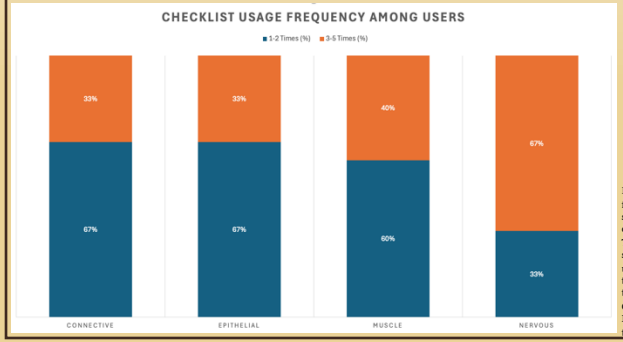

Figure e2: Checklist usage frequency among students who used checklists at least once. The stacked bar chart shows the percentage using each checklist 1–2 times (blue) and 3–5 times (orange) for Connective, Epithelial, Muscle, and Nervous tissues.

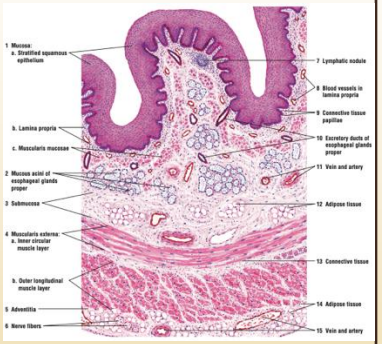

Figure e3: figure from *DiFiore's Atlas of Histology with Functional Correlations* shows an H&E-stained section of the upper esophagus, highlighting its structural complexity and cellular composition.

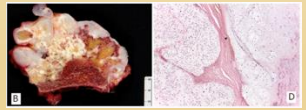

Figure e4: Demonstrates how a first-year medical student is expected to integrate gross anatomy and histology to identify disease processes, bridging the gap between structural and microscopic pathology.

CONCLUSION

Structured lists are standard tools in gross anatomy education that are used to help students master macroscopic structures. However, a similar approach has not been consistently applied to histology.

Our study demonstrated that structured histological lists can:
1) Enhance students' confidence and understanding.
2) Reduce cognitive load.
3) Bridge the gap between gross anatomy and histology.

By reducing cognitive load and providing a clear framework for learning, these lists may serve as a valuable educational tool in bridging the gap between gross anatomy and histology. Further research with larger sample sizes is recommended to validate these findings and explore broader applications in medical education.

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