

An Investigation of Alternating Group Dissections in Medical Gross Anatomy

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- The pressure to produce well-rounded physicians and surgeons has forced medical schools to restructure or even eliminate parts of their curricula.
- In an attempt to compensate for lost time, some anatomy programs are implementing peer-teaching and alternating dissection schedules (where students dissect every other lab session).
- Other programs have turned to the use of prosections, or use the use of plastinated specimens, models, and computer based atlases.
- Some believe, however, that eliminating student participation in dissection may deprive students of important benefits of the dissection experience including:
 - Understanding 3-D relationships in the body (*McLachlan JC, et al. Medical Education 2004*)
 - Appreciation that natural variability exists in the human body (*Leung KK, et al. Advances in Health Science Education, 2006*)
 - Promotion of hand-eye coordination (*Moore NA. Anatomical Record. 1998 and Fitzpatrick CM, et al. Clinical Anatomy. 2001*)
 - Promotion of collaboration with peers (*Moore NA. Anatomical Record. 1998 and Fitzpatrick CM, et al. Clinical Anatomy. 2001*)
 - A first exposure to death (*Moore NA. Anatomical Record. 1998 and Fitzpatrick CM, et al. Clinical Anatomy. 2001*)

Introduction

- As a whole, past literature has been inconclusive regarding the use of alternating group dissections as an educational tool
 - In some instances, **no impact** on exam performance was noted while other work has suggested student **performance improved** when the alternating approach was utilized and still others **suggest the approach was detrimental** (*McWhorter DL, et al. Clinical Anatomy. 2004 and Granger NA, et al. Clinical Anatomy 2007*).
- Previous studies do agree, however, that an alternating approach saves students valuable time, though the effect on student performance remains unclear

- The present study examined the use of alternating dissection schedules by **analyzing data across four years**, rather than two, and by **employing more detailed subgroup analyses**:
 - As in past work, we compared anatomy scores across groups of students who practiced either a traditional or alternating dissection approach.
 - In addition, we have gone beyond the previous literature to investigate internal differences within the alternating group.
 - First, we compared overall exam performance for each dissection group;
 - Second, we explored the impact of dissection on practical exam performance. We asked the question, “**On a practical exam, are students more likely to correctly identify the structures that they dissected as opposed to those dissected by their counterparts?**”
- We hypothesized 1) **that course grades would not differ** between non-alternating and alternating students and 2) that student **performance** on individual practical exam questions **would not be dependent on whether students physically perform a given dissection.**

Methods

- In 2009, a **retrospective data analysis** was performed to investigate the potential benefits/pitfalls of the alternating dissection/peer-teaching system which had been implemented in 2007 for Medical Gross Anatomy.
- The **non-alternating group (NALT)** consisted of students from the previous two years, the graduating medical classes of 2009 (n=128) and 2010 (n=144) who had participated in a more traditional lab structure where students were present for every dissection assignment.
- The **alternating group (ALT)** consisted of students from the graduating medical classes of 2011 (n=132) and 2012 (n=135). Students in the ALT group were alphabetically assigned 4 to a cadaver and each group of four was divided into pairs, Dissection Teams A and B. Groups then alternated dissection assignments and peer teaching as indicated in the table below:

	Lab 5	Lab 6	Lab 7	Lab 8
Peer Teaching Group	Group B	Group A	Group B	Group A
Dissection Group	Group A	Group B	Group A	Group B

- **Aim 1 (Comparison of ALT and NALT Groups):**
 - Performance of the ALT and NALT groups were compared. Data for **comparisons consisted of exam scores** collected from two consecutive human gross anatomy courses (Medical Anatomy I and Medical Anatomy II).
 - For these analyses, **performance** in Medical Gross Anatomy I and II was defined as a **numerical course grade based on scores from 4 exams** (2 practical and 2 multiple choice) for each course

Aim 2 (ALT Group Comparison and Subgroup Analysis):

▪ Within the ALT group

- 1) **Exam scores** for the **Dissection Teams** were compared

- 2) A subgroup analysis was performed in which practical exam questions were coded after the examination as either “**α**”, “**β**”, or “**α&β**” **type questions**.
 - **α type questions:** Practical exam items Group A was solely responsible for dissecting

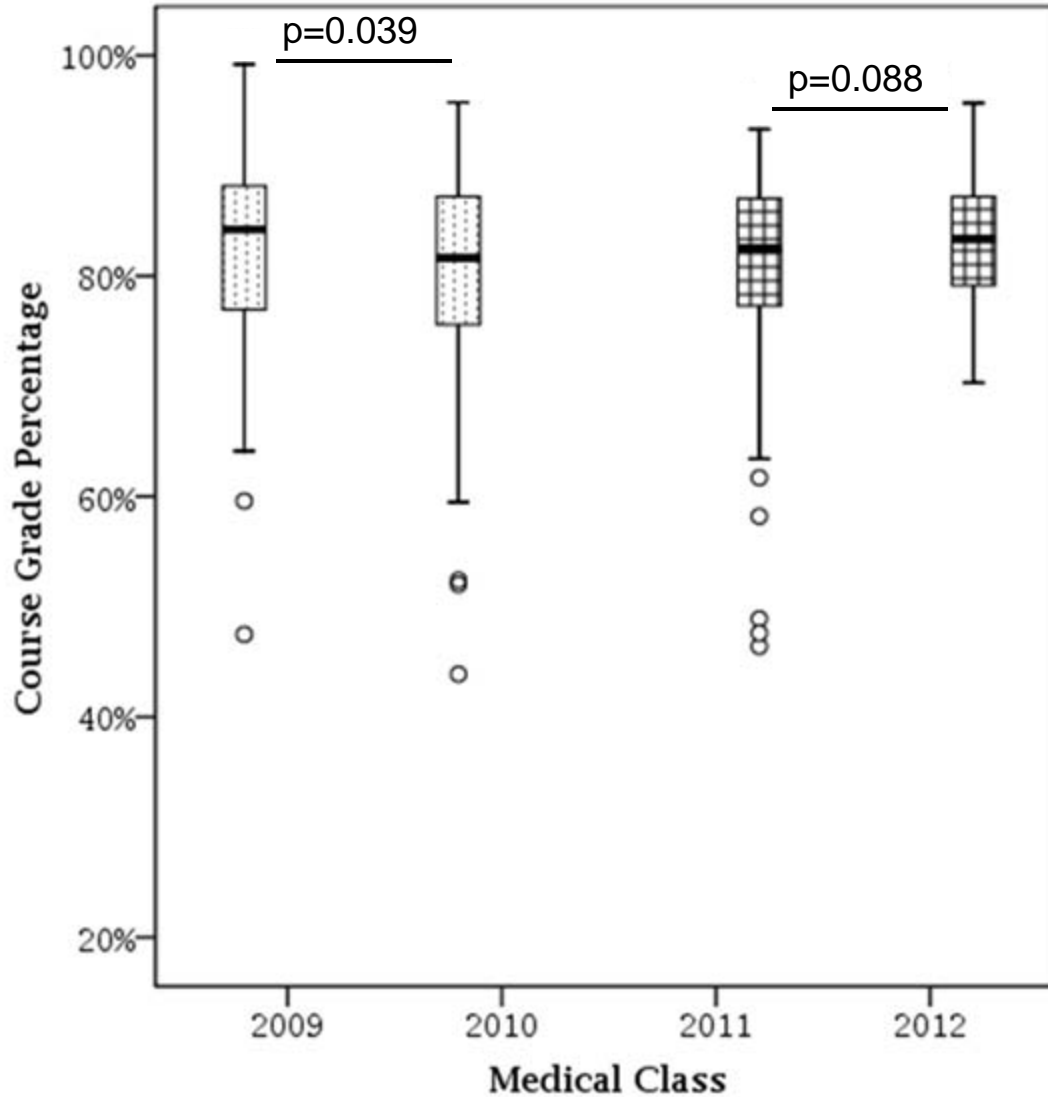
 - **B type questions:** Practical Exam items Group B was solely responsible for dissecting

 - **α&β type questions:** Practical exam items which either both or neither team dissected (e.g. a structure dissected in two different regions or a radiograph/ CT scans which all students has equal access to prior to the exam.)

- Multimodal and/or skewed score distributions warranted the use of nonparametric testing.
 - **Aim 1: Mann-Whitney tests** were utilized to compare performance of the ALT and NALT groups.
 - **Aim 2:** Performance on question types within each subgroup was first evaluated by **Kruskal-Wallis** analysis to assess the presence of significant variations.
 - A **Wilcoxon signed ranks test followed** the Kruskal-Wallis analysis and was used to identify specific differences between question types.

Results: Aim 1

Medical Anatomy I: Comparison of Medical Class Course Grades



Group

▨ NALT
▨ ALT

No significant differences were observed **between the NALT and ALT groups** in course grade for Medical Anatomy I ($p=0.581$):

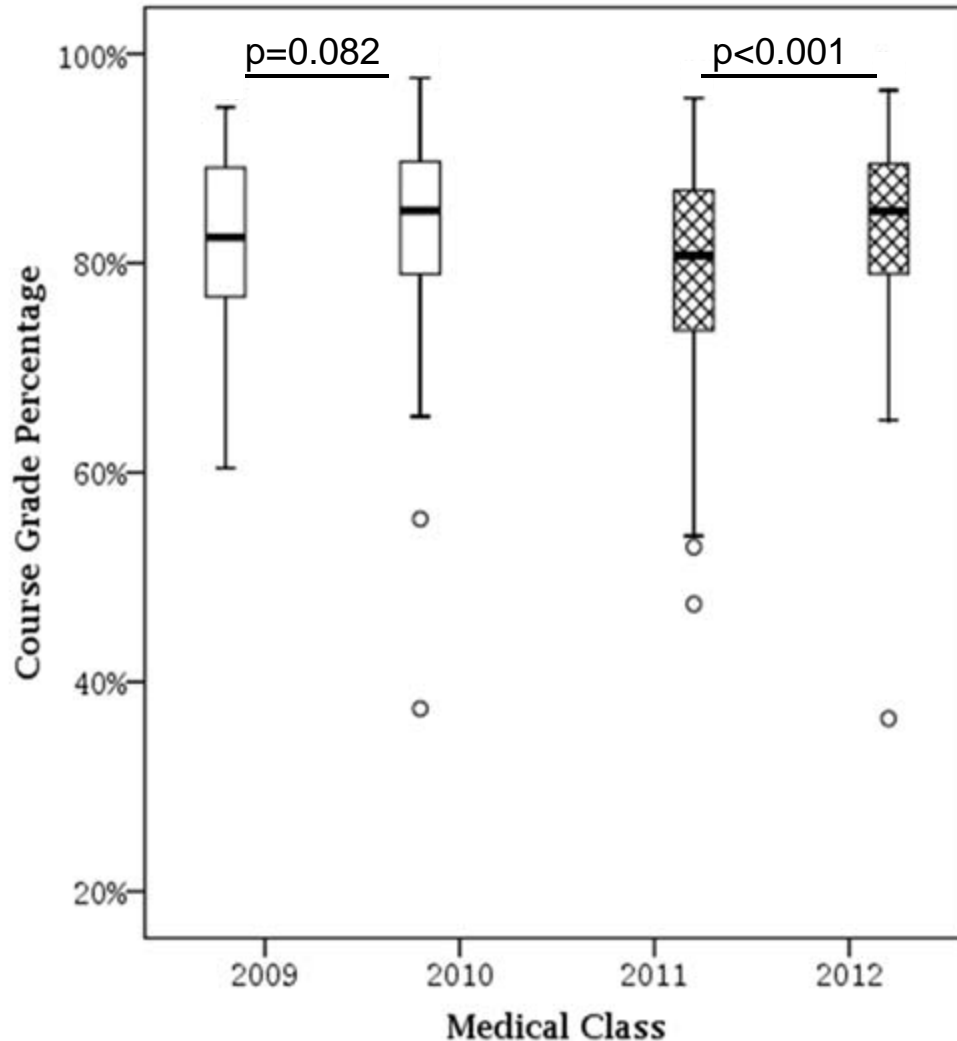
NALT

Median=82.8%
Range=43.9-99.2%

ALT

Median =83.0%
Range =46.4-95.7%

Medical Anatomy II: Comparison of Medical Class Course Grades



Group
 □ NALT
 ▨ ALT

No significant differences were observed **between the NALT and ALT** groups in course grade for Medical Anatomy II ($p=0.223$):

NALT

Median= 83.7%
 Range= 37.4-97.7%

ALT

Median =82.6%
 Range =36.5-96.6%

Medical Anatomy I

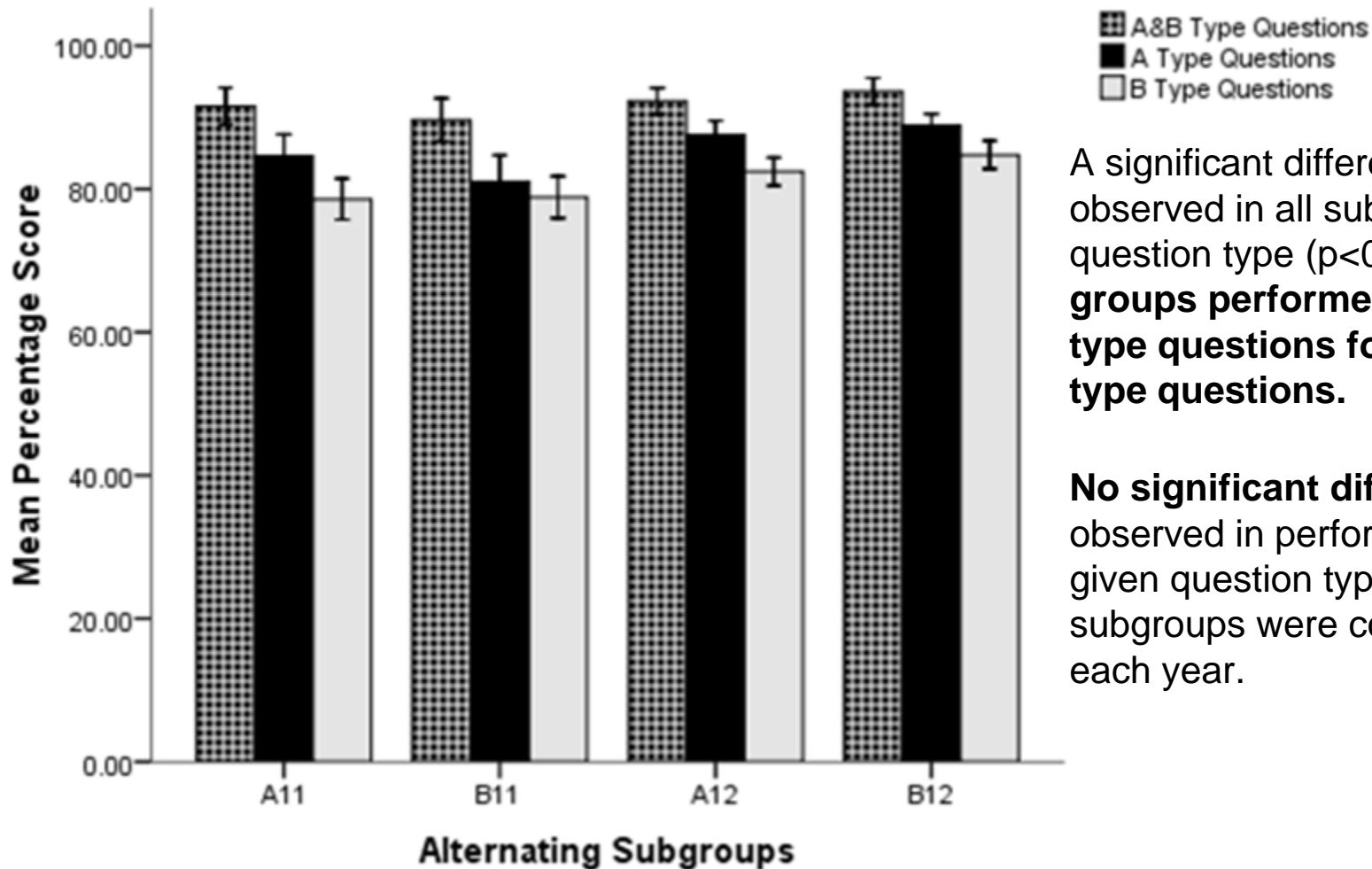
	Median	Range		Mean	Standard Deviation	Statistical Findings
		Min	Max			
<i>ALT Subgroups</i>						
A ₁₁	83.1%	47.6%	93.2%	81.2%	±8.8%	p=0.377
B ₁₁	81.3%	46.4%	93.3%	80.0%	±9.3%	A ₁₁ vs. B ₁₁
A ₁₂	81.8%	70.5%	93.9%	82.1%	±5.7%	*p=0.015
B ₁₂	85.2%	70.3%	95.7%	84.4%	±6.1%	A ₁₂ vs. B ₁₂

Medical Anatomy II

	Median	Range		Mean	Standard Deviation	Statistical Findings
		Min	Max			
<i>ALT Subgroups</i>						
A ₁₁	81.6%	53.9%	95.8%	80.3%	±8.7%	p=0.199
B ₁₁	78.6%	47.4%	93.7%	78.9%	±8.3%	A ₁₁ vs. B ₁₁
A ₁₂	85.0%	71.0%	96.5%	84.2%	±6.6%	p=0.935
B ₁₂	84.0%	36.5%	95.0%	83.3%	±9.4%	A ₁₂ vs. B ₁₂

Results: Aim 2

Comparison of Question Types Per Subgroup
Medical Anatomy I



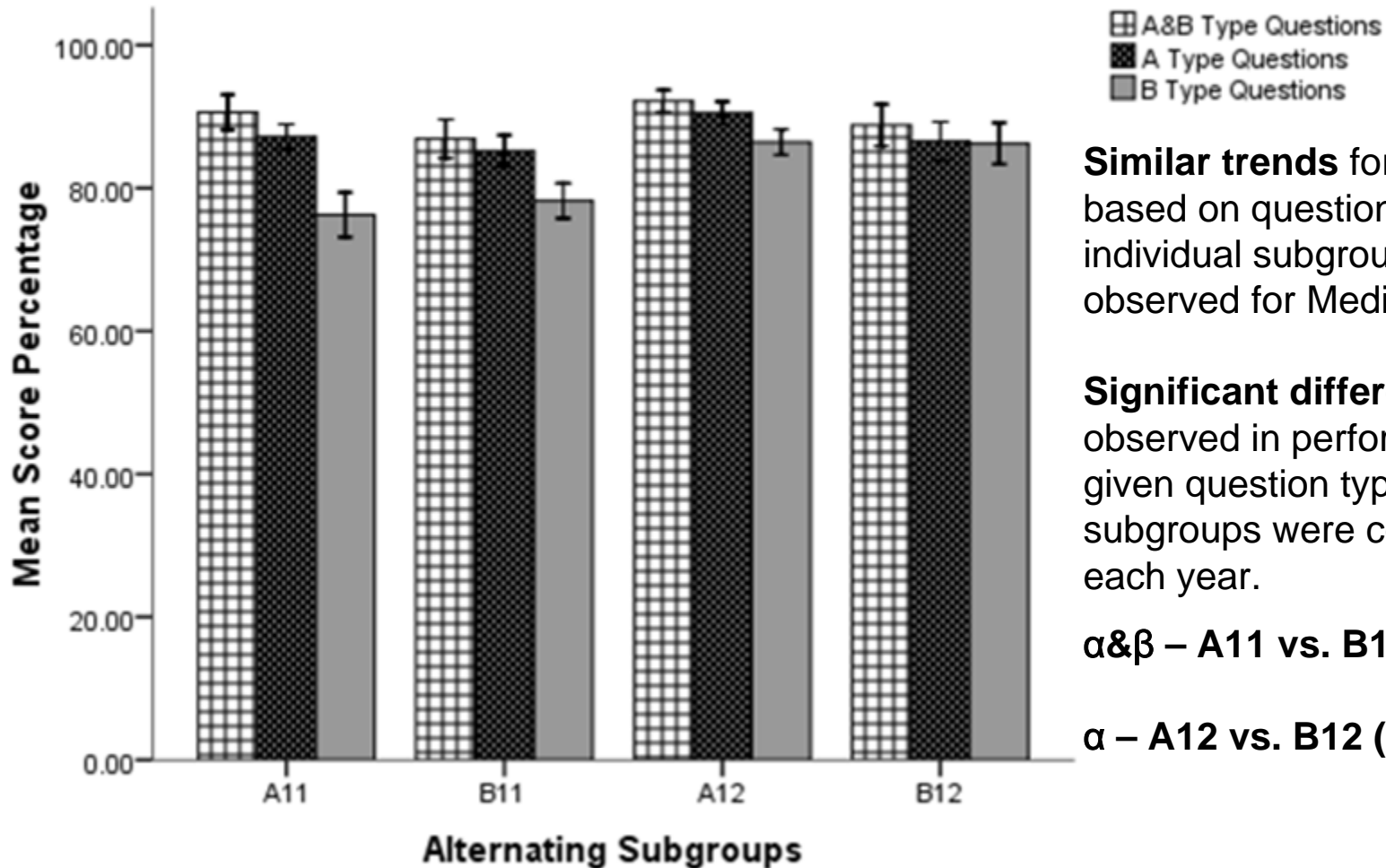
Error bars: 95% CI

A significant difference was observed in all subgroups for question type ($p < 0.001$). **All groups performed best on α & β type questions followed by α type questions.**

No significant differences were observed in performance on a given question type when the A/B subgroups were compared for each year.

Results: Aim 2

Comparison of Question Types Per Subgroup
Medical Anatomy II



Error bars: 95% CI

Similar trends for performance based on question type in individual subgroups were observed for Medical Anatomy II.

Significant differences were observed in performance on a given question type when the A/B subgroups were compared for each year.

$\alpha\&\beta$ – A11 vs. B11 ($p=0.029$)

α – A12 vs. B12 ($p=0.018$)

Discussion

- NALT participants performed in an equal manner to ALT participants during Medical Anatomy I and II suggesting that despite the reduction in laboratory time by half, the alternating schedule was as effective as the more traditional approach.

Conclusion

- The present work demonstrates that an alternating dissection schedule in conjunction with peer-teaching has no detrimental effects on student performance when compared to students who attend every dissection assignment
- This approach provides students with more unscheduled time for independent learning while still allowing them to participate in cadaveric dissection.
- It reduces the student-to-cadaver ratio and the student-to-faculty ratio by half
- It promotes more active student participation during dissection and allows students the opportunity to collaboratively interact with their peers via peer-teaching, at an early stage in medical training.

Acknowledgements

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