Implementation of Case Studies in the Undergraduate Cadaveric Classroom

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Abstract

Learning and studying human anatomy is often associated with using rote knowledge. Novice students often memorize terms and structures in the laboratory with little reasoning skills. In attempt to promote application, integration, and critical thinking skills we introduced a **case based study** into the human anatomy course at CSU. Early implementation suggested little change in student's ability to solve novel problems using simple recall in attempt to answer case study questions. Here, we describe a novel approach using a 5-step method to promote critical thinking. Results suggest students application and integration during the case studies correlated with overall class performance.

Methods

The implementation of case based study in the undergraduate cadaveric classroom at CSU provides students the opportunity to acquire critical thinking skills early in their career. Here, we are looking at a unique 5-step approach that let students engage with the information while solving novel problems.

BMS 301 Laboratory → Case Study Presentation (100 students) → iClickers → Answers in Canvas

The implemented case studies investigated students' ability to recognize anatomical relationships, their ability to use directional terms, and integrate knowledge. The unique 5-step presented to the students is composed of:

1. **Definitions**
2. **Establish a timeline**
3. **Determining which systems could be involved**
4. **Unique pieces in the case**
5. **Broad appropriate questions**

These individual steps are used by the students in order to ask the right questions and to prevent simple recall. The weekly iClicker points are collected in canvas and averaged for each individual student. Those averages are then compared with student outcomes.

Results

Fig. 1A

Lab Exams versus Case Studies 2016
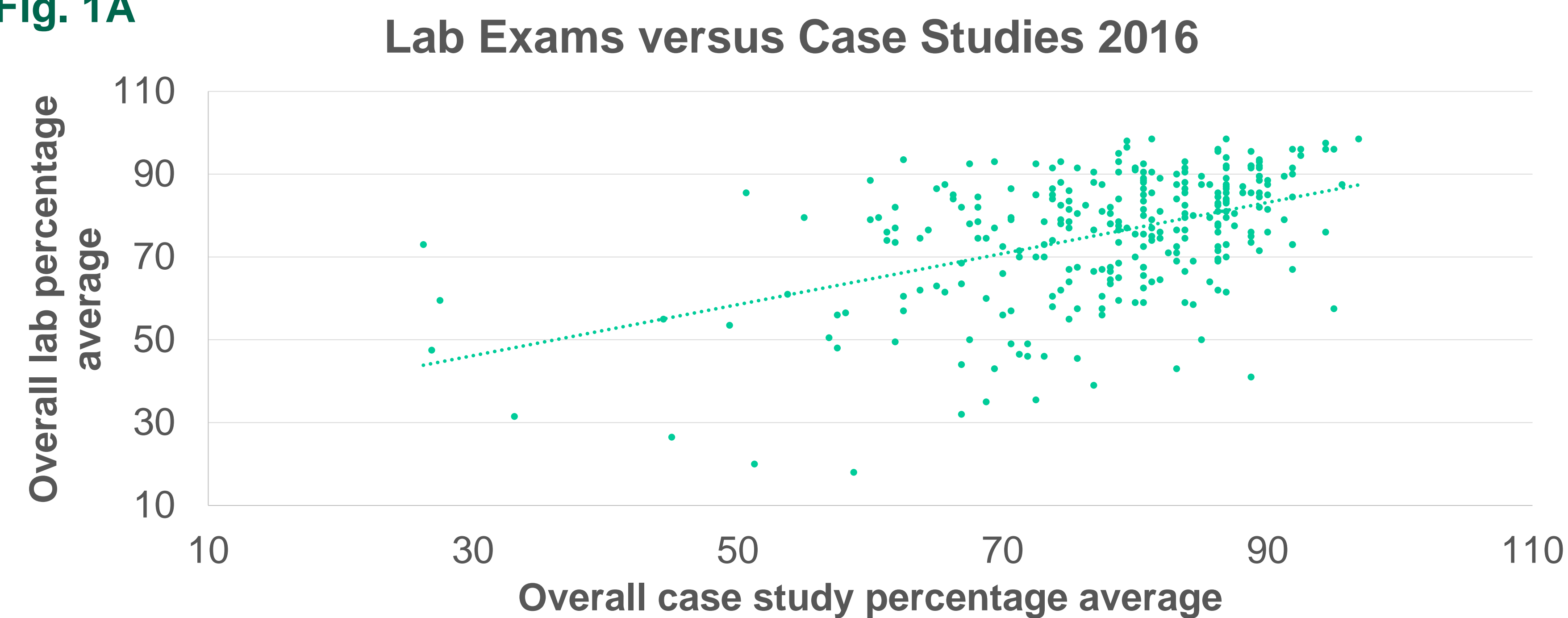
Fig. 1B
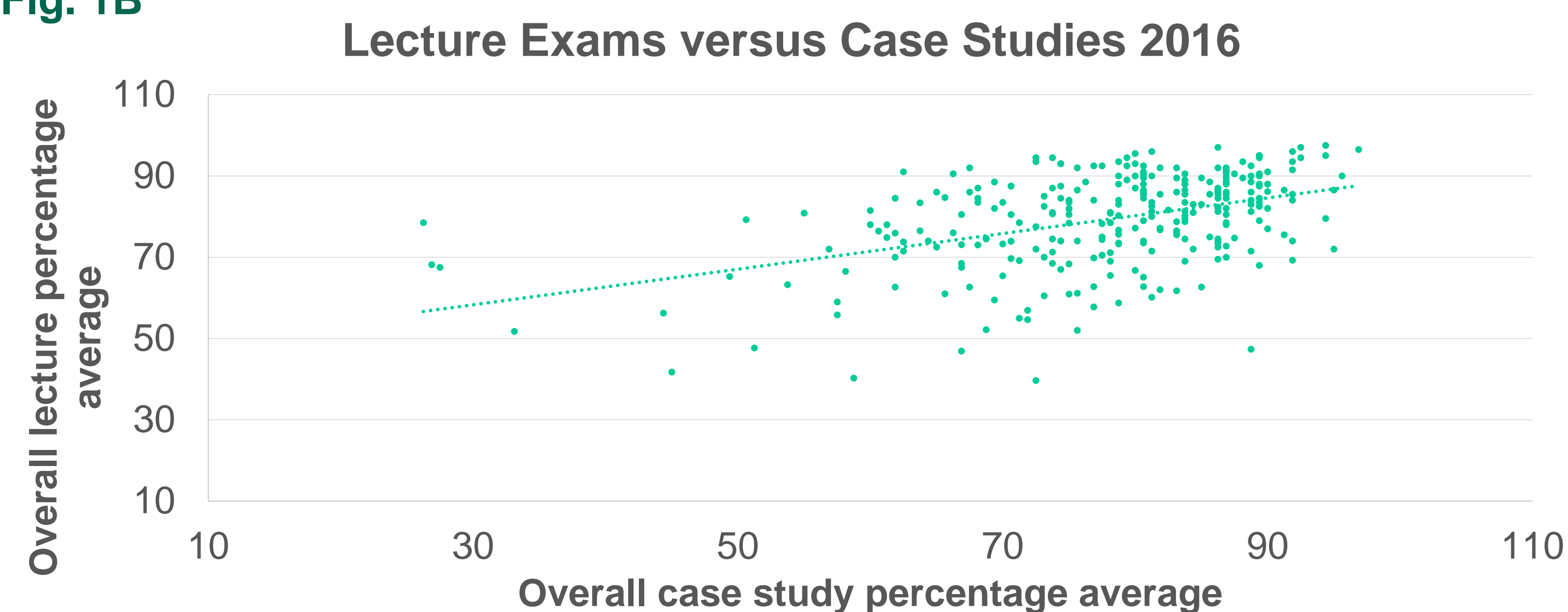

Lecture Exams versus Case Studies 2016

Figure 1. Linear Regression Analysis 2016
Regression analysis comparing averaged case study scores and overall examination scores. Each student is represented once in each figure. A. Averaged case study scores and laboratory examination scores. B. Averaged case study scored and lecture examination scores.

|	2015 Lecture*	2015 Lab*	2016 Lecture*	2016 Lab*	
P-Values	< 0.0001	< 0.0001	< 0.0001	< 0.0001	
R Squares	0.126507	0.187847	0.194887	0.214869	
Observations	244	244	285	285	

Table 1. *Results from Regression Analysis from 2016 and 2015*
Significant years with p-values smaller than 0.01 were indicated with *. The observations included averaged case studies in relation to averaged lecture and laboratory examinations for each student.

Case Study

Purpose:
- Promote application and integration across disciplines
- Gain broad and detailed appreciation for subject
- Used to explain, describe or explore events or phenomena in medicine
- Help understand and explain causal links and pathways
- Case study lends itself to answering **how and why questions**
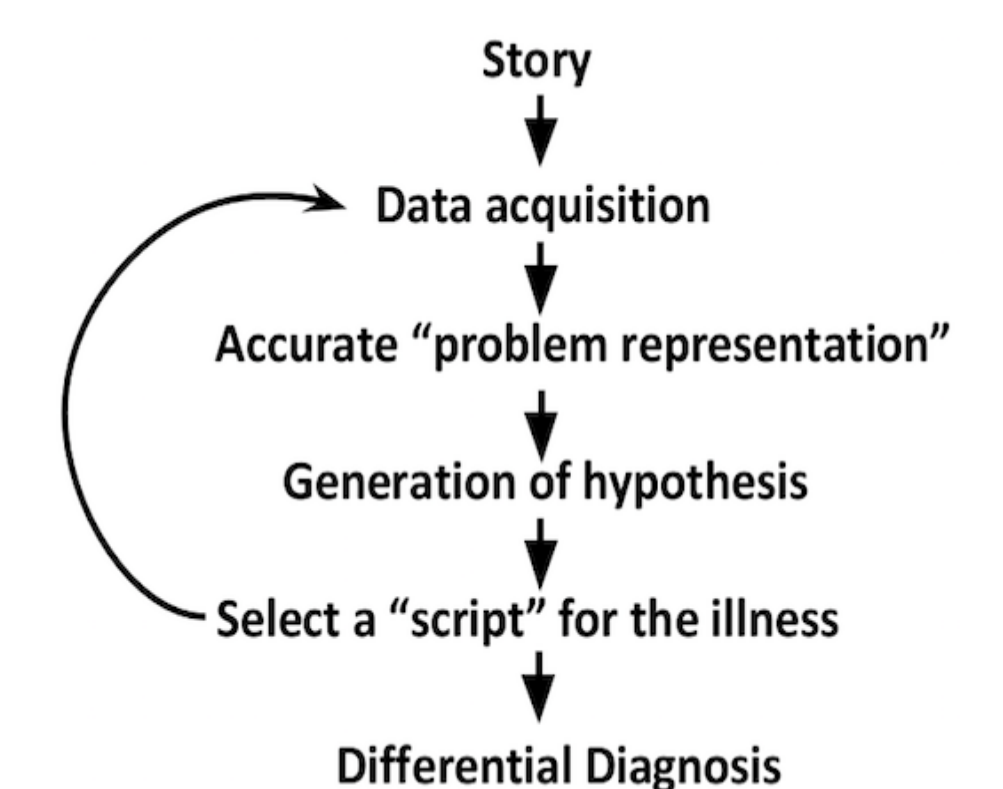
Conclusions

In 2015 and 2016, results indicate that there is a positive relationship between the case studies and student outcomes. Students who scored high in their case study assessments accomplished higher results at the end of the semester. The usage of case based learning together with the 5-step approach might represent an assessment tool that promotes students' application and integration of knowledge as well as critical thinking.

Future Directions

Teaching human anatomy in an undergraduate cadaveric laboratory is difficult, expensive, and a time consuming undertaking. Our goal is to continue developing effective tools and implementation practices to supplement cadaveric learning. Those case studies provide a step towards application of knowledge and critical thinking that can be used in professional school. The unique 5-step approach is applicable to other classes as well outside of the classroom. Our hope is to build upon what we learned from the information gathered from current data and take the next step to identify best practices for undergraduate cadaveric instruction.