The Flipped Classroom: A Non-Traditional Approach to Teaching Osteopathic Manipulative Medicine

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ABSTRACT
As we advance further into the millennial generation, osteopathic medical schools are challenged to evolve their lectures into a format that encourages more critical thinking. One such evolution is the concept of a "flipped classroom" which reverses the traditional lecture-first, homework-second approach. By providing self-directed learning material for students to explore on their own prior to class time, a "flipped" classroom teaching format was well received by the student body and encouraged better retention of knowledge than the more traditional "podium delivered" lecture style. To test the effectiveness of each lecture style, two 2nd year osteopathic medical school classes delivering the same content were taught at distant sites of the same institution. One followed a traditional, lecture-based format while another adopted the "flipped" classroom approach. IRB approval (IRB08IRB076) was received allowing a two-phase information retention assessment and attitude Likert survey to be developed and presented on both campuses. Results of the data collected showed a 10.3% greater information retention among the flipped classroom students at 4 weeks post lecture compared to the traditional classroom. Additionally, survey results showed that students from the "flipped" classroom were more receptive to using a non-traditional approach to lecture delivery in the future. This study shows potential in improving the retention of material delivered to medical students. Further research is needed to explore longer-term retention rates.

OBJECTIVE
The objective of this study was to determine the difference in long-term information retention as well as general attitude towards a flipped classroom approach to delivering osteopathic manipulative medicine lectures versus a traditional lecture format.

INTRODUCTION
There is a long standing tradition in medical education that all knowledge must come from behind a lecturer. As advancements are made in medicine, the quantity of information students are responsible for has significantly increased. However, the teaching style has stayed passive and can be antiquated at times, unfit for the growing millennial population. To combat this evolving issue and better prepare students for success, the idea of a flipped classroom was proposed. By putting the passive learning ahead of the classroom work, students would be able to process material in their own learning style and at their own pace. The goal for the subsequent class time would be further adaptation and assimilation of the information with active student-centered learning activities. The objective of this study was to see if students who were presented material in a flipped versus traditional classroom style would have similar to increased information retention as well as a more positive overall attitude towards active learning.

METHODS
Western University of Health Sciences - College of Osteopathic Medicine of the Pacific operates on two campuses: Pomona, CA and Lebanon, OR. For this experiment, two groups were established. The control (traditional classroom) involved 163 2nd year students from Pomona, CA and the experimental (flipped classroom) group involved 92 2nd year students from Lebanon, OR (Fig 1).

At the end of the lecture/lab time for both campuses, students were asked to answer the same 6 multiple choice assessment questions regarding material from the lecture as well as 5 opinion based (Likert scale) questions (Phase 1). 7 similar assessment questions were asked 2 weeks and 2 months later (Phase 2). Answers were recorded via TurningPoint software using ResponseCard Classroom Clickers.

RESULTS
During Phase 1, the traditional lecture group scored an average of 4.1% higher on 5 of the 6 questions (Fig 2).

During Phase 2, the flipped lecture group scored an average of 18.4% higher on 5 of the 7 questions (Fig 3).

Furthermore, 86.7% of students from the flipped group "strongly agree" or "somewhat agree" they would like more flipped lectures in the future (Fig 4). In contrast, 23.5% of students from the traditional group agreed that they would be willing to do more preparation for more hands on time (Fig 5).

DISCUSSION
• The goal of this study was to test whether osteopathic students in a manipulative medicine class would retain more information from a different form of lecture delivery.
• The "flipped" classroom design enabled students to process and review the intended material on their own and then spend more time practicing specific techniques during the subsequent lecture time. This also gave the educators more time to revisit difficult concepts and answer more specific questions.
• Based on the data, this environment facilitated an overall improvement in long-term retention of the material.
• Students who experienced the traditional classroom appeared less receptive to the flipped classroom and the initial time investment.
• However, students who experienced the flipped classroom were very receptive to similar lectures in the future.
• Due to less time allocated to lecture delivery, Phase 2 was initiated 2 weeks later on the Pomona (traditional) campus than the Lebanon (flipped) campus. Therefore, it is unclear whether or not the improved outcomes for the flipped classroom are a result of the timing of data collection or the presentation of material.
• Due to our method of data collection, we were unable to obtain standard deviations to specific polled questions.
• Improved reliability in future studies will require statistical analysis as well as consistency in data collection.

CONCLUSION
This study revealed long-term information retention may be greater in a flipped classroom approach. Additionally, students who have participated in this style of lecture would like more lectures presented this way in the future.

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