



# The Inverted Classroom

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## Background

The inverted or flipped classroom is a teaching method that allows for classroom time to be centered on problem-based, active learning by providing lectures outside of the classroom. The lectures are presented to students through online tools such as video-lectures, PowerPoint presentations, and web-based tutorials similar to resources utilized in online courses. A key difference from online courses is that the inverted classroom includes face-to-face time with the instructor in class where the material covered outside of the classroom can be discussed and applied.

## Research

Research done on the flipped classroom shows promising results. While more research is still being conducted, the bulk of completed research studies shows that when students learn by the inverted classroom, they perform about the same, or better on various evaluations (Cook). The inverted classroom also increases the amount of active learning by students. This leads to a general enhancement of student's engagement, where students believed they were more actively involved in class discussions, paid attention to lessons in class, and tried to relate topics and discussions with their own experiences. The flipped classroom also leads to enhancement of behavioral, emotional, cognitive and agentic engagement (Osman).

Students are exposed to new material outside of class. This allows for the focus of class time to aim more towards problem solving and discussions. As a result, the flipped classroom allows the instructor to cover more material over the same time period (Cook).

In one study, the opinions of the students in the inverted classroom were also collected periodically throughout the semester. Initially, the students were not accepting of the new learning style and experiencing much frustration over this adaptation period. However, as the course progressed and the students had time to adjust, their opinion as a whole changed. Students were not comfortable communicating with teachers and students and seeking help during and outside of class (Osman). After the adjustment, most students preferred the inverted method in their science, technology, engineering, and mathematics (STEM) courses (Basile). The results of these studies support the inverted classroom as a highly effective teaching model in STEM courses at the college level.

## Figures

	Traditional	Inverted
Lectures	Live, in-class	Online Videos and PowerPoints
Problem Solving	Done outside of class as homework	Done in class along with discussion
New Material	Presented in-class	Present outside of class prior to problem-solving session

Figure 1: A side by side comparison of the traditional and the flipped classroom

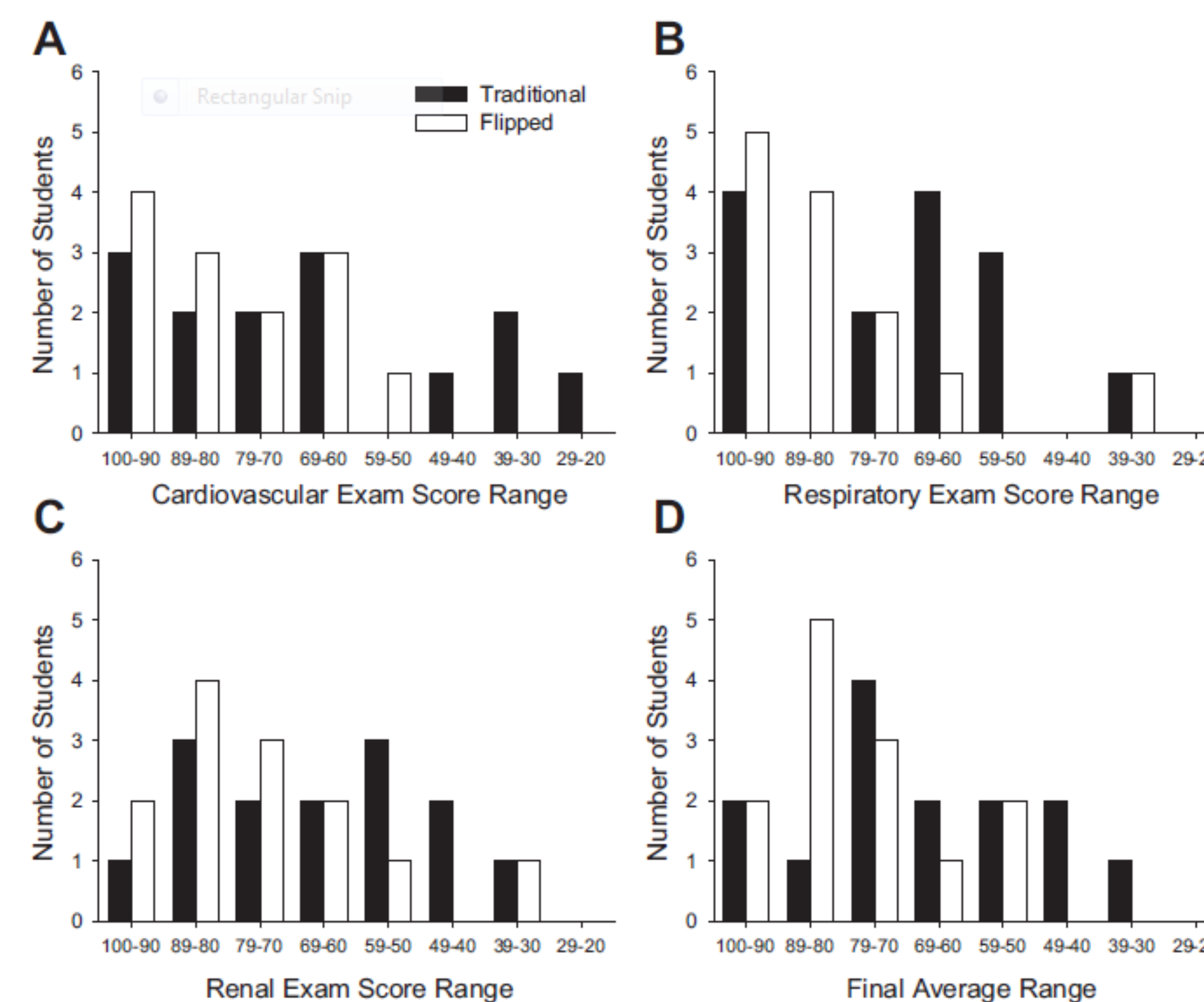


Figure 2: This is a direct comparison of student performance on exams in the two different teaching models. (Basile)

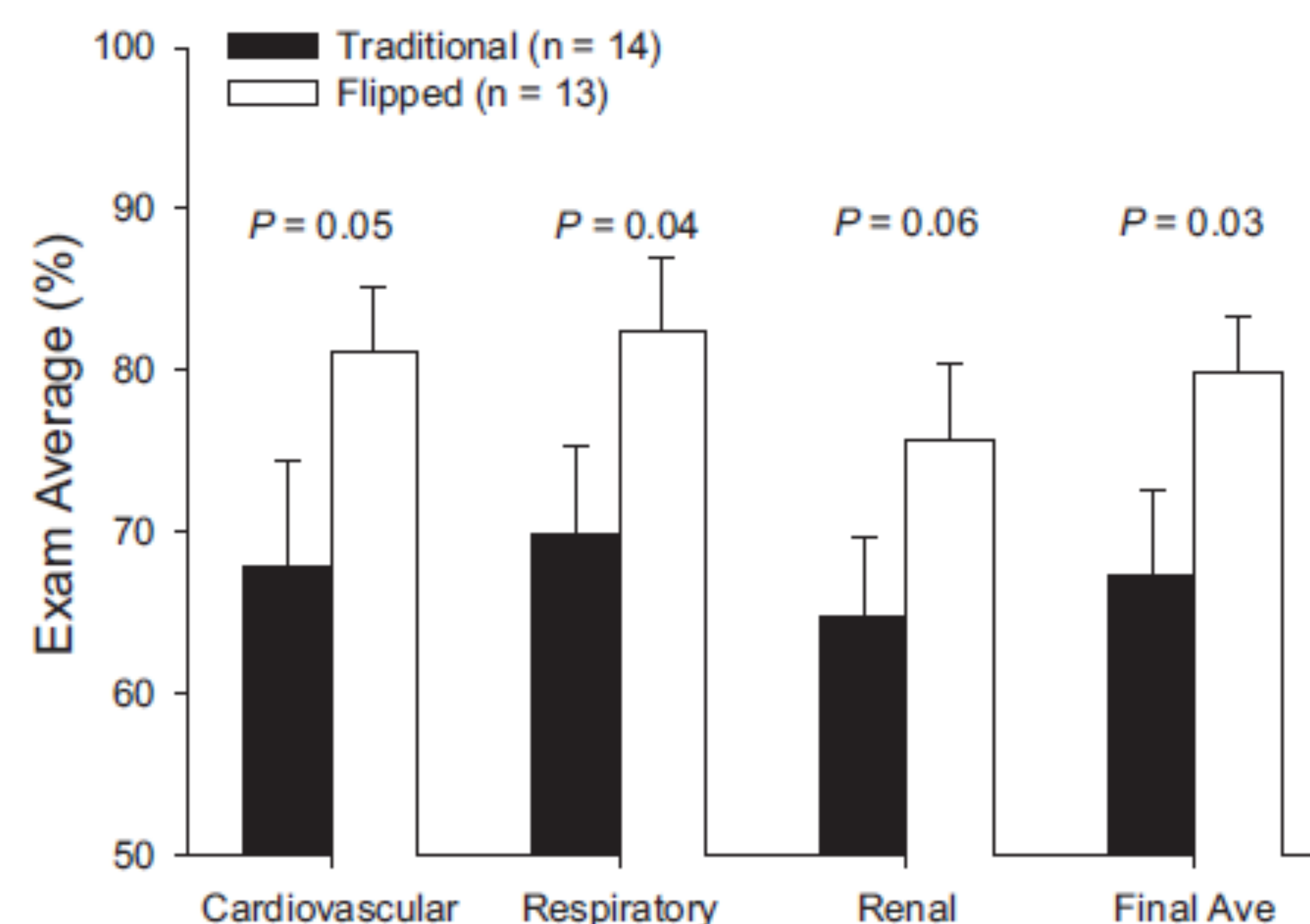


Figure 3: This displays the overall exam averages in traditional versus flipped classrooms. (Basile)

## Acknowledgements

- Basile, David P. Sturek, Michael. and Tune, Johnathan D. (Sept. 2013.) Flipped classroom model improves graduate student performance in cardiovascular, respiratory, and renal physiology, How we teach *Adv Physiol Educ*, 37, 316–320. <http://advan.physiology.org/content/ajpadvan/37/4/316.full.pdf>
- Cook, Kathleen E., Mason, Gregory S., and Shuman, Teodora Rutar. (4 Nov. 2013). Comparing the effectiveness of an inverted classroom to a traditional classroom in an upper-division engineering course, *IEEE Transactions on Education*, 56 (4), 430-435. <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6481483&tag=1>
- Osman, Dr Rozinah Jamaludin Siti Zuraidah M.D.,(2014). The Use of A Flipped Classroom to Enhance Engagement and Promote Active learning. *Journal of Education and Practice*. 5 (2)124-131.<http://iiste.org/Journals/index.php/JEP/article/view/10648/10875>

## For Teachers

Initially, utilizing the flipped classroom requires much effort on the teacher's end. The teachers must make numerous presentation: PowerPoint shows or videos lectures for example, for which the students will base their learning off of. However, once the videos are made, they can be re-used for upcoming years. Teachers, if needed, can modify the PowerPoints and videos, or add/ subtract videos from the original set of videos. During class time, where the instructors are leading discussion and problem solving, the instructors are able to develop better professional relationships with the students and have more opportunity to aid the students' understanding of the course material.

## For Instructional Staff

During class time, where students are asking questions and discussing problem sets, the teaching assistants serve as facilitators to guide individual and group learning. The teaching assistants can help assure that the students have learned the material the correct way and are interpreting the problem sets correctly. Also, if the teaching assistants find that the students are having particular trouble with a certain topic, he/she could relay that information to the head instructor. The head instructor could then review that specific lesson to assure its clarity. Also, the teaching assistants can direct students to a particular lecture or part of a lecture to clarify understanding on a certain topic.

## For Students

The inverted classroom allows students to view the course material at the own pace. While students are required to stay on schedule with the course, they can learn the material at their own pace. For example, they can pause, rewind, re-watch, or stop the PowerPoint or video whenever they would like. This allows the students to assure a full understanding of a topic before moving onto the next. Also, students feel more involved in class and therefore more inclined to pay attention. Students try to relate topics and discussions in class to their own experiences. In doing such, the students will increase their learning, motivation, and communication skills. On the contrary, initially students have reported much frustration in adapting to this new method of learning. During class time, some students do not feel comfortable asking questions or contributing to the discussion. This can impede students progress and effect the class dynamic.

## Contact Information

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