

# Self-paced polling increases medical student engagement in recorded lectures and improves examination performance

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## Research Question

Do self-paced polling questions in recorded lectures increase preclinical medical students' engagement and academic performance?

## Background and relevance of the study

Engaging medical students in the curriculum may promote a deep approach to learning. However, class attendance is often low, and many students prefer recorded lectures. The shift to more online classes presents further challenges for student engagement. Self-paced polling with recorded lectures could increase student engagement in online education as well as address some students' preference for recorded lectures (ref 1).

## Design and Methods

Second-year medical students (n=165) took seven customized National Board of Medical Examiners (NBME) examinations in four courses. Unique to the fourth examination, students could participate in live or self-paced polling, with 148 audience response questions, in nine 50-minute lectures, on three separate days. Students could earn a maximum of 24 points out of 400 total course points as an incentive to participate in polling. With self-paced polling, students answered the same set of questions as that of the live class at their own pace while watching recorded lectures.

Active participation in polling for each day was defined as correctly answering at least one-third of the graded questions. Students who did not participate actively in at least one of the three days constituted Group 3 (Inactive). Students who participated actively in all three days of polling were subdivided into the Group 1 (Live,  $\geq 2$  days with live polling) and Group 2 (Self-paced,  $\leq 1$  day with live polling). Performance of the three groups was compared on seven NBME examinations. Students were also invited to answer a voluntary anonymous question: "How did the self-paced polling affect your experience with recorded lectures?" Their answers were analyzed according to a framework for engagement in three dimensions: emotional, behavioral, and cognitive.

## Results

Overall participation rate in audience response questions was 94.8%. A large proportion of students 127/165 (77.0%) used self-paced polling at some point in the course. The Inactive group consisted of 46 students who did not clear the threshold of 33% correct in at least one of the three lecture days. Of 119 Active students, 60 students primarily used Self-paced (0 or 1 live day) and 59 students primarily used Live (2 or 3 live days). See Figure 1. The Self-paced group outperformed the Inactive group on Exam 4 ( $p < .0001$ ), the only exam that featured incentivized, self-paced polling (ref 2). See Figure 2.

Figure 1. Group allocation

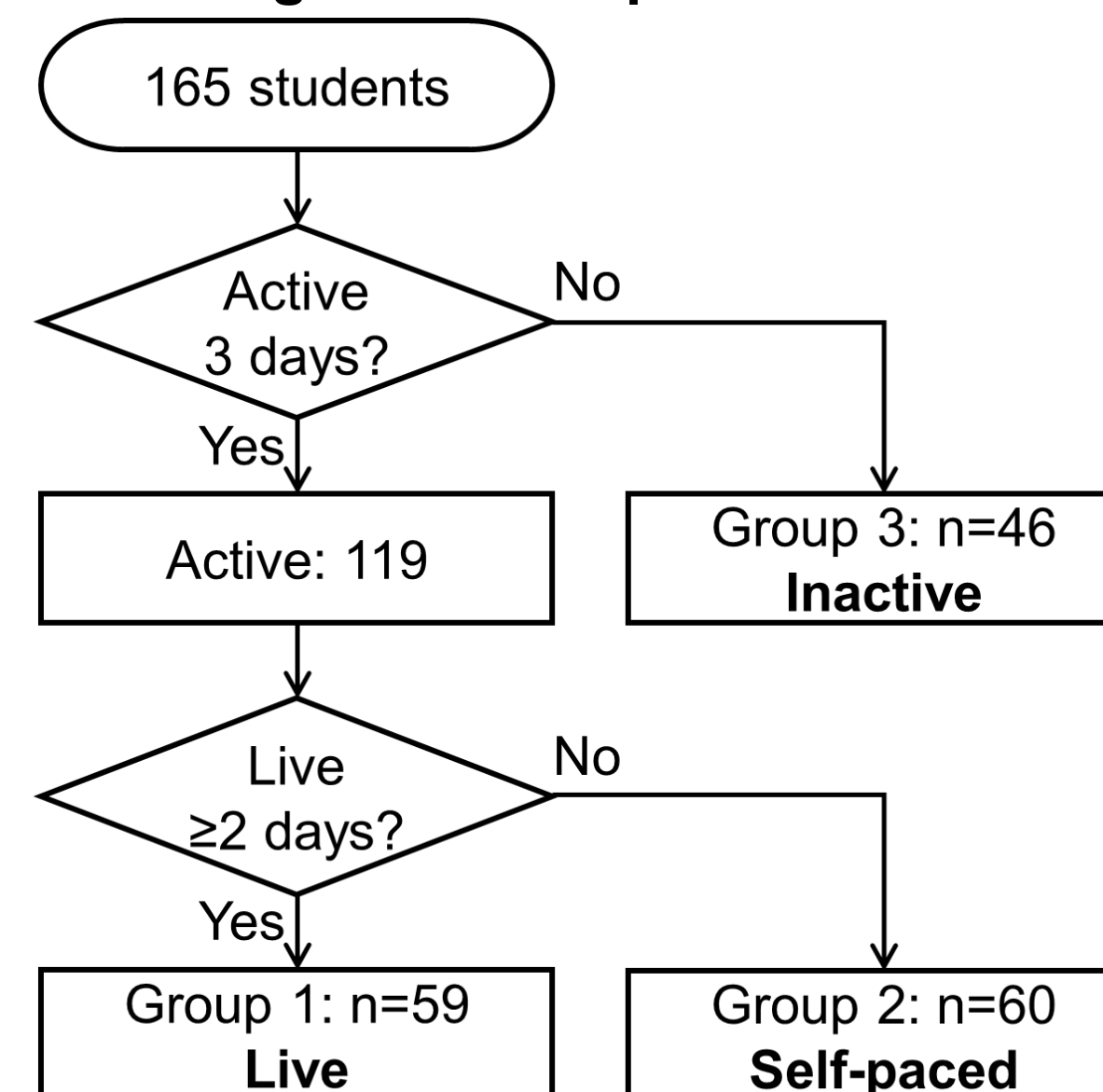
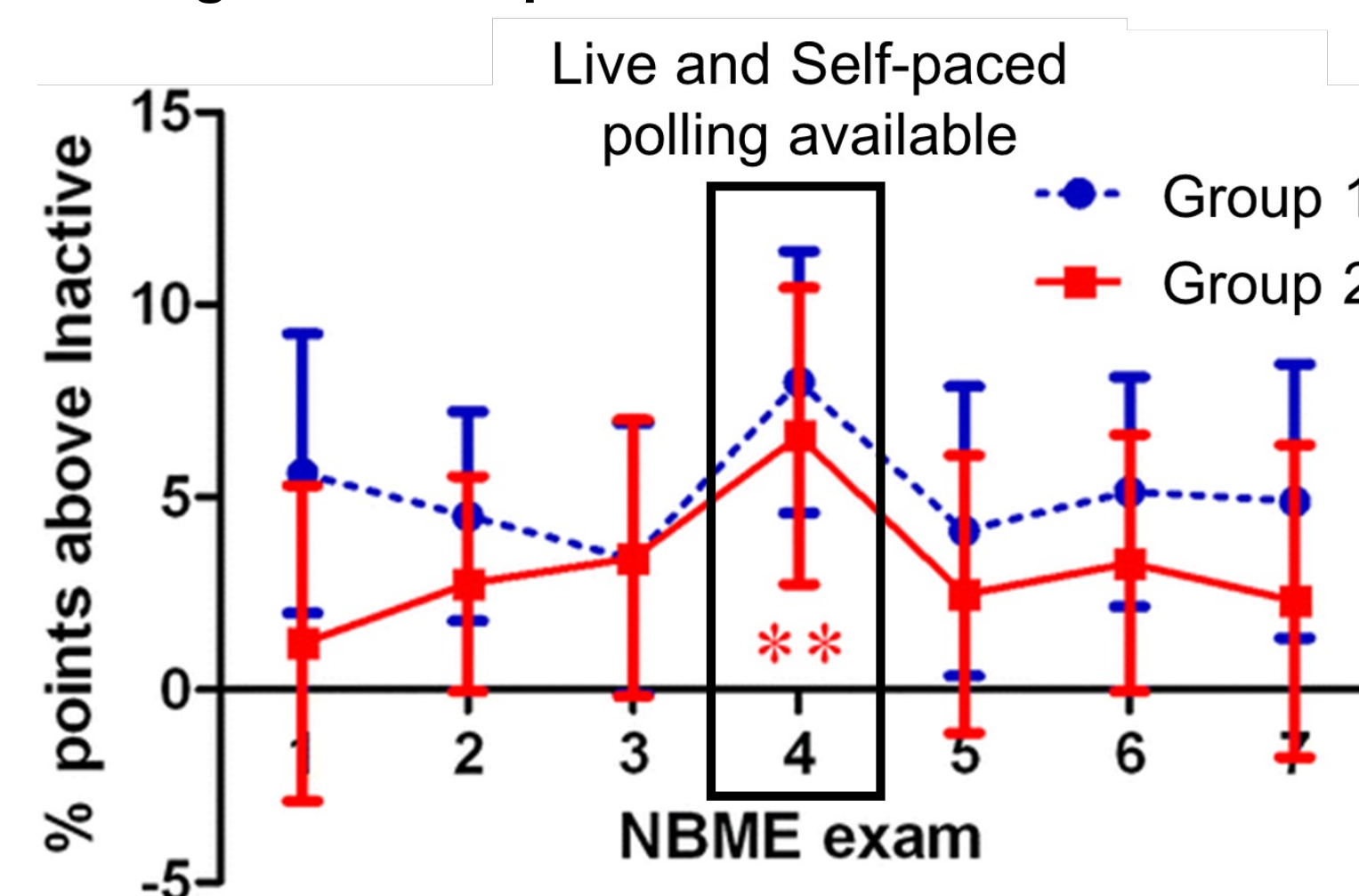


Figure 2. Comparison of NBME Exam Scores



The students' comments were overwhelmingly positive. They expressed emotional engagement as enjoyment as well as liking the self-paced option and having polling questions to answer. The most common comments reflecting behavioral engagement related to having control over their schedule, keeping up with tasks, and paying attention. Comments highlighting cognitive engagement included improved understanding, retention, or reinforcement, ability to pause and reflect, and opportunity to check understanding. See Table 1.

Table 1. Qualitative framework analysis of student engagement

Themes	Illustrative examples
Emotional (59)	LOVED THIS. It felt like I was attending live.
Behavioral (34)	<ul style="list-style-type: none"> <li>I thought it was greatly beneficial and gave me more control over my schedule.</li> <li>It was very helpful and motivated me to keep up with lectures</li> <li>It ensured that I paid attention during my viewing of recorded lectures.</li> </ul>
Cognitive (39)	<ul style="list-style-type: none"> <li>The questions made them [recorded lectures] so much more active and helped me retain more information.</li> <li>It was nice to be able to pause the video and truly think about the question.</li> <li>It helped me gauge what I needed to study more.</li> </ul>
Nonspecific (27)	[The questions] kept me engaged, while I watched on my own!

## Conclusion and Significance

Self-paced polling questions in recorded lectures enhanced students' emotional, behavioral, and/or cognitive engagement with course material and improved examination performance. Medical educators can include self-paced polling to enhance student engagement and academic performance. Future studies should replicate and extend findings with a focus on the impact of self-polling on deep and strategic approaches to learning and long-term retention.

## References

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