

Summary

Analysis reveals a decline in End-of-Chapter (EOC) correct rates as students progress, suggesting challenges with material complexity, foundational knowledge, and fatigue. To improve outcomes, we propose a Midterm Summary and Review and setting an EOC bar for each chapter.

Recommendations

Midterm Review and Checkpoint

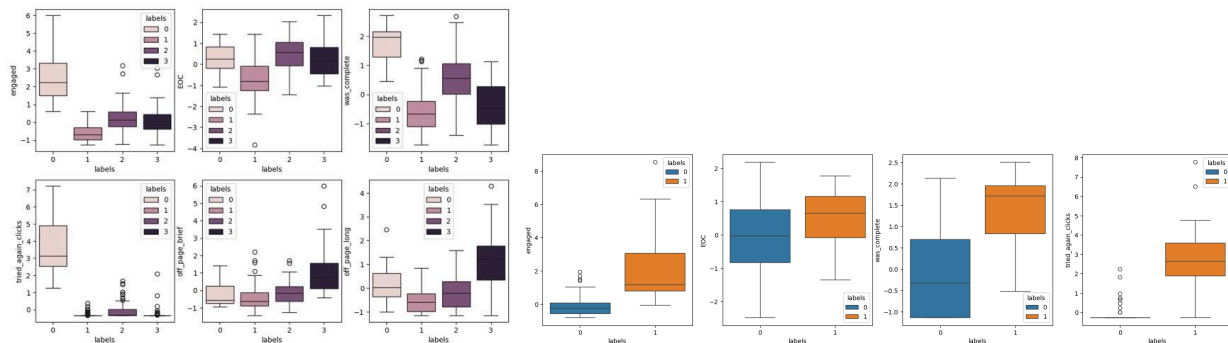
- Consolidate Learning: A midterm review will reinforce foundational knowledge, aiding in comprehension of advanced topics.
- Identify Weak Areas: Allows students to pinpoint and address difficulties, ensuring preparedness for subsequent chapters.

EOC Bar

- Benchmark Performance: Set EOC bars based on mean and median EOC scores to guide student mastery.
- Encourage Improvement: Motivate students to revisit material if they do not meet the bar, recognizing achievements upon exceeding SOC bars.

K-means Clustering to Observe Different Behaviors

From previous data processing, we chose to include columns 'engaged', 'was_complete', 'tried_again_clicks', 'off_page_brief', and 'off_page_long', as they had slightly stronger correlation with EOC, which is the response variable that we want to observe.



We clustered students into 4 clusters for all chapters and books (left figure), as well as examining some hard chapters we found previously (right figure) and clustered students into 2 clusters. In both figures, we found obvious trends in 'engaged', 'was_complete', 'tried_again_clicks' behaviors for clusters with lower and higher EOC.

	engaged	EOC	was_complete	tried_again_clicks
labels				
0	5.929435e+06	0.479923	0.220174	0.022491
1	2.836278e+07	0.579361	0.533665	1.555326

We can calculate the mean of each column for the two clusters, and see that cluster 0 has 0.1 lower EOC on average than cluster 1. We can also see that cluster 1 is 31% more likely to revisit after completing, retry 1.53 more times, and engage about 2.247×10^7 seconds more on average than cluster 0.

Though there might be other influencing factors that are not being observed, we can reasonably suggest that it would be helpful towards students' EOC by encouraging periodic reviews of completed contents, for example, keep track of contents the student missed, and have them revisit these contents at the end of each chapter, providing incentives or support for retry attempts, and reminding students for low engagement time.

Encourage Media Utilization:

One-tailed p-value (greater than): 0.06253321

I wonder if students are paying attention to it and will the study video will be helpful. The methodology here is doing hypothesis testing between two groups of students by the proportion of time spent watching videos, on End-of-Chapter (EOC) scores.

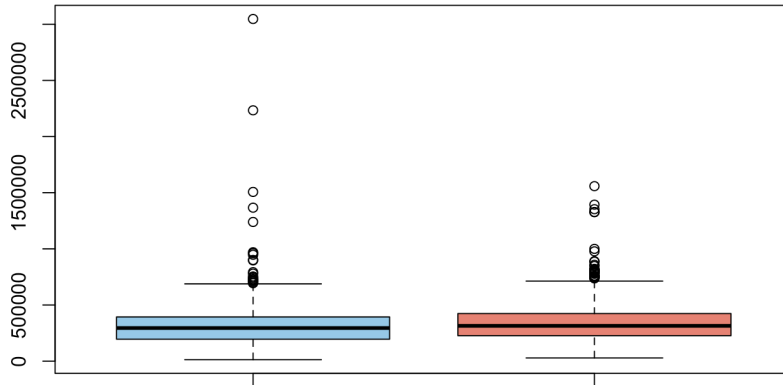
The high-score group is the student whose EOC is in the top 25% of all the students. Similarly, the low-score group is the students whose EOC is the last 25% of all the students.

With a one-tailed p-value of approximately 0.0625. This suggests a potential trend toward significance, implying that there may be a difference in the effect of video viewing on EOC scores between high-score and low-score students.

Enhance the platform with more instructional videos to aid in understanding complex concepts more effectively.

Time Management Guidance

Engagement Time Distribution for Low and High Confidence Groups



For the begin-chapter survey, I focus on the question in “Cost” asking if the students can put in the time needed to do well in the previous chapter, a scale from 1 to 5. I felt like this question could indeed provide information about guiding students for better time management for each chapter.

In this analysis, I divided students into two groups. Those who responded with ratings of 5 or 6 were classified as the low-cost group, while those who responded with ratings of 1 or 2 were classified as the high-cost group. The plot shows potential differences in engagement time between the two groups, with the low-performance group exhibiting lower mean engagement time compared to the high-performance group.

These two graphs show that students who are not confident and satisfied with their time management tend to have extremely long engagement times and higher off-page periods. Further time management guidance for each chapter is super useful.

Future Plan

In checkpoint_eoc, you can collect and add EOCs about different versions of the textbook so that we can study which version makes students more productive.

Explore patterns in the items and responses CSV files, focusing on identifying the types of questions that are the most challenging