Learning Style Segmentation for Personalized Education

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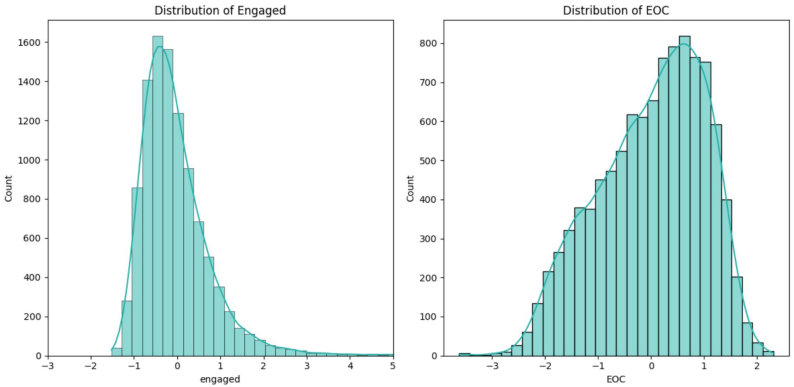
How do students interact with CourseKata?

Primary Objective: Can we segment students into learning categories to give them tailored academic experiences?

Motivation: We hypothesize not all students will learn at the same rates from the same content. Since self-reported metrics (from the pulse questions) are subject to bias, we aim to augment them with objective measurements of CourseKata usage. This combined approach will help us more accurately determine how students are learning, allowing us to personalize their educational experience

We segment students in three ways:

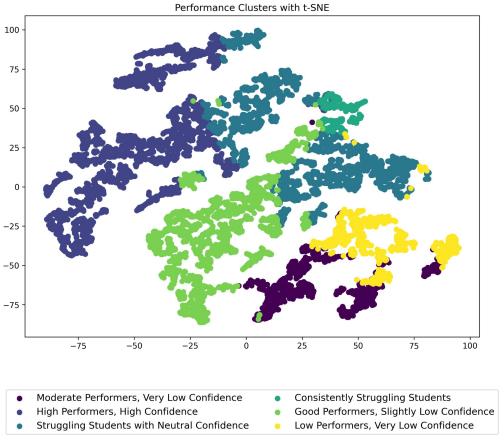
- Performance: are they doing well?
  - EOC, n_attempts, Confidence
- Engagement: are they interacting with content?
  - Access_count, Proportion_video, Proportion_ time, Engaged, Tried_again_clicks, Intrinsic Value
- Effort: if they're not doing well, are they trying to?
  - EOC, n_attempts, Access_count, Proportion_video, Proportion_ time, Cost



Engagement and test scores vary approximately normally.

Method: We cluster students using K-Means to find groups of students who have similar learning styles based on the chosen features. We select an optimal k-value using the elbow method to get suitable separation while ensuring that we maintain interpretable, well-defined clusters.

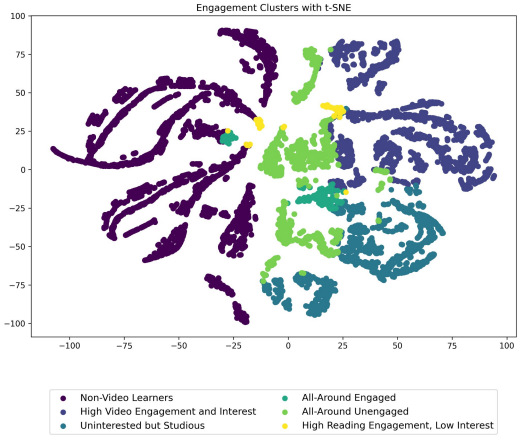
Performance



Cluster 5 Centroid:

EOC	−1.311939
n_attempt	−0.070962
Expectancy	−1.656065

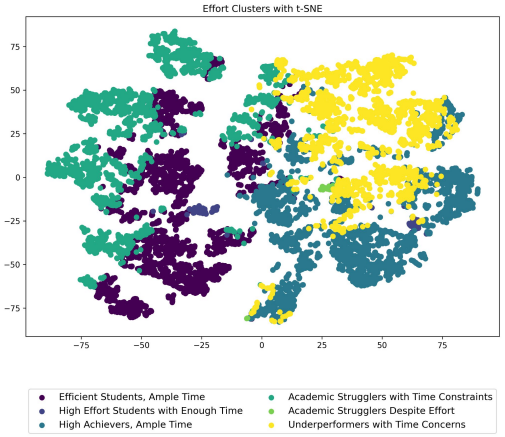
Engagement



Cluster 1 Centroid:

engaged	0.107859
tried_again_clicks	−0.115473
access_count_avg	0.821892
proportion_video_avg	1.131204
proportion_time_avg	1.116599
Intrinsic Value	0.715830

Effort

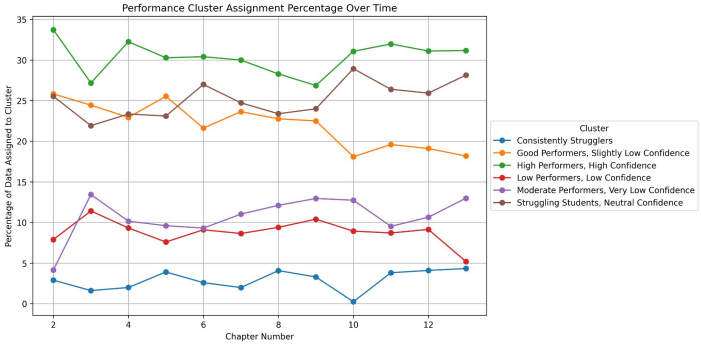


Cluster 3 Centroid:

EOC	−1.063229
n_attempt	−0.062295
engaged	−0.368880
tried_again_clicks	−0.176714
access_count_avg	−0.828893
proportion_video_avg	−0.913200
proportion_time_avg	−0.905033
Cost	0.521487

Recommendations for CourseKata

Observation: Cluster composition doesn't change much over time, suggesting that the average student has a consistent learning style throughout the book.

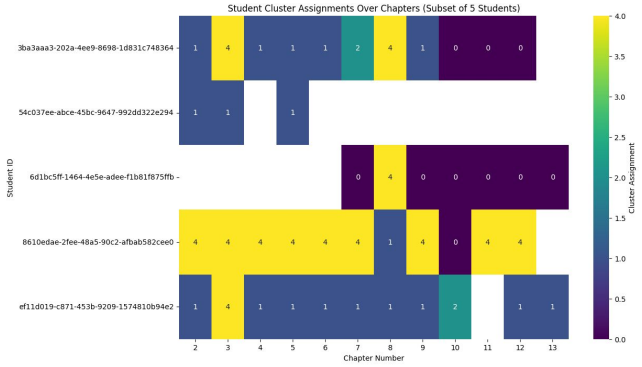


1. **Cluster students after chapter 3**

   Students' self reported metrics do not always align with their observed performance (through quiz scores or time commitment). Our clusters allow us to identify nuanced (and often unexpected) student user segments.

2. **Give personalized advice based on their cluster**

   For successful students, we identify how we can continue to challenge and improve education. For, struggling students, we successfully determine root causes (lack of effort, lack of time, gaps in learning) and can redirect learning appropriately.



3. **Monitor progress to ensure effective learning**

   Continuous monitoring of student progress can identify when they are hitting roadblocks or excelling. This feedback lets CourseKata know what personalized advice is/isn't working.