Discrepancies in Chapter Difficulty and Outcome

Deciphering student engagement patterns in CourseKata

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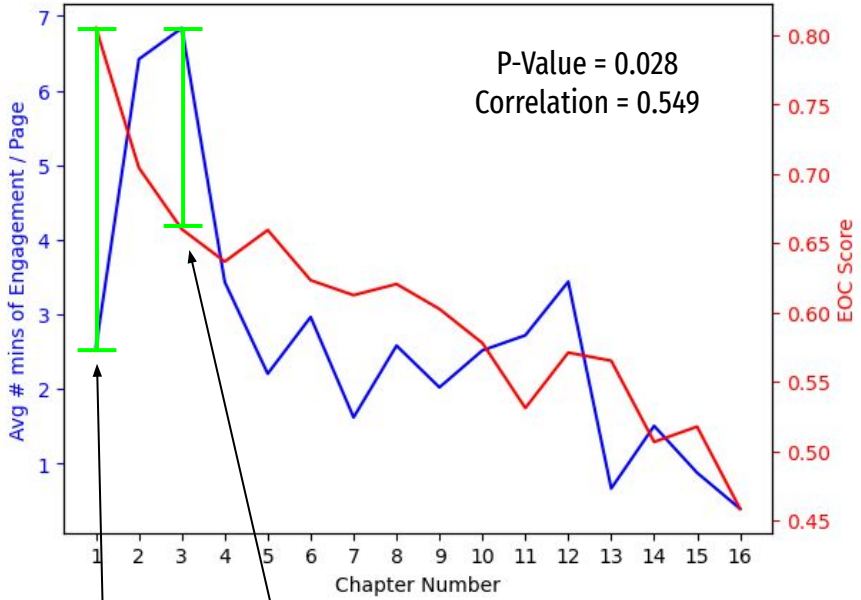
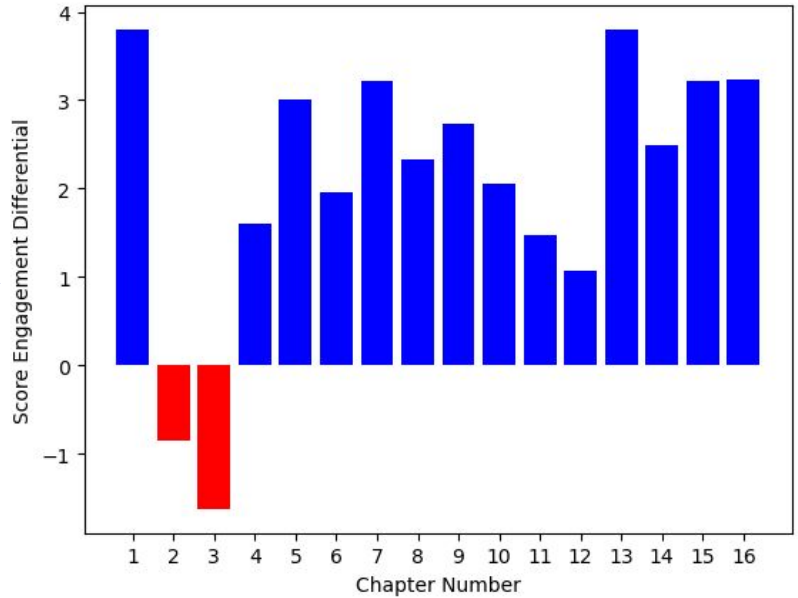
A Glimpse at Engagement & End Of Chapter Assessment Scores



EOC Score and Average Engagement for Each Chapter

Low engagement, yet higher EOC scores?

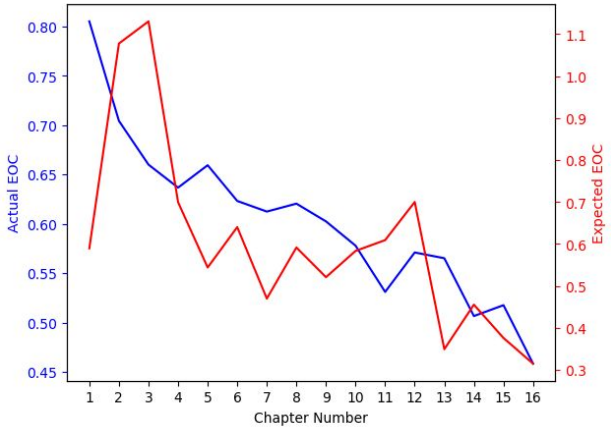
Disjointedly large amount of engagement yet low EOC scores?



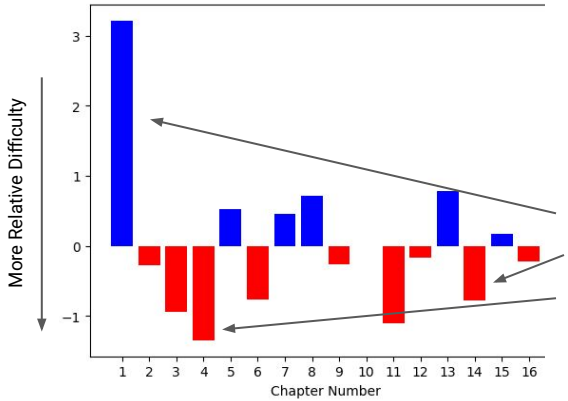
Difference Between Engagement and EOC Score for Each Chapter

Low EOC Scores ≠ Difficulty

Determining the Difficulty of Chapters



Expected = Avg. Engagement Mins. Per Page + Mean of Score Engagement Differential



Relative Difficulty Metric

Relative difference Between Expected and Actual EOC. Determines the difficulty of chapters relative to all other chapters.

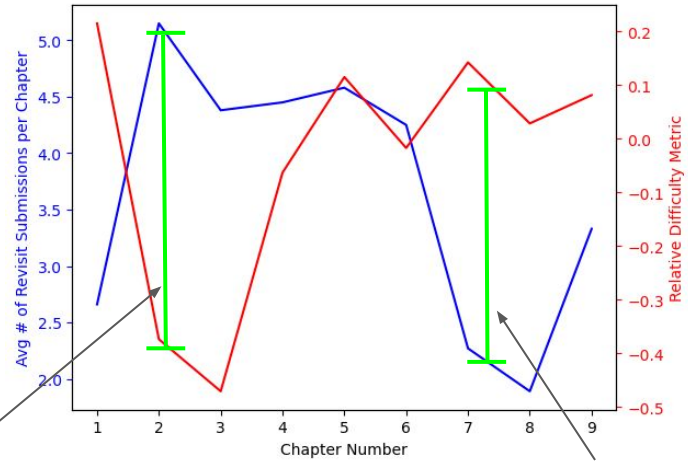
Relatively Easy Chapter

Relatively Difficult Chapter

Disproportionately difficult chapters (chapters 2 and 3). **Definite consideration for a simplification or reorganization of course materials for these chapters.**

Supporting the Validity of the Relative Difficulty Metric

Revisit Submission: When a student completes the end of chapter assessment, yet still revists the chapter and submits question submissions. **More revisits suggest the student requires additional enrichment in chapter due to difficulty / lack of understanding.**



Relatively high difficulty, high # of average revisits to this chapter

Relatively low difficulty, low # of average revisits to this chapter.

Observation:

Harder difficulties (lower RDM) seemingly correlate with more average revisits to the chapter's questions after student completion.

The Dynamic Difficulty Model Solution

Table 1: Calculation of Pre-Assessment and Post-Assessment Scores

Group	Pre-Assessment	Post-Assessment	Change (Post-Pre)
Experimental	60.4 ± 7.1	72.8 ± 7.3	12.4 ± 5.3
Control	59.3 ± 6.5	64.7 ± 7.4	5.4 ± 3.1

Das, Amit & Malaviya, Sanjeev & Singh, Manpreet. (2023). The Impact of AI-Driven Personalization on Learners' Performance. International Journal of Computer Sciences and Engineering. 11. 15-22. 10.26438/ijcse/v11i8.1522.

Experimental Group: Significant Improvement with Cohen's d = 2.70 (large effect)
Control Group: Modest Improvement with Cohen's d = 0.44 (medium effect)

Statistical Analysis:
- Indicates significant performance boost in the experimental group

Correlation Insight:
- Strong positive correlation (r = 0.63) between engagement and performance

Suggestions:
- Personalized AI learning models can be successfully utilized to provide increased student performance and offset module difficulty, bringing the relative difficulty metrics closer to 0.
- The relative difficulty metric can be parameterized in an AI model to adjust difficulty of student interaction with module to ensure a more linear learning curve.