



Understanding Engagement in MOOCs

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Introduction

- Engagement in MOOCs is usually measured by whether or not students accessed the materials and low engagement is used as an indicator of “at-risk” students [2,4].
- As reflected in the research on traditional school settings, school engagement has three components, including behavioral engagement, cognitive engagement, and emotional engagement [1].
- Accordingly, measuring engagement by task completion focuses only on one aspect of engagement and may overlook the multifaceted nature of engagement [1].

This study measured both behavioral engagement and cognitive engagement involved in lecture watching in MOOCs to see:

Q1: How cognitive engagement is different from behavioral engagement at the individual level?

Q2: Whether cognitive engagement adds information that is helpful in predicting academic achievement?

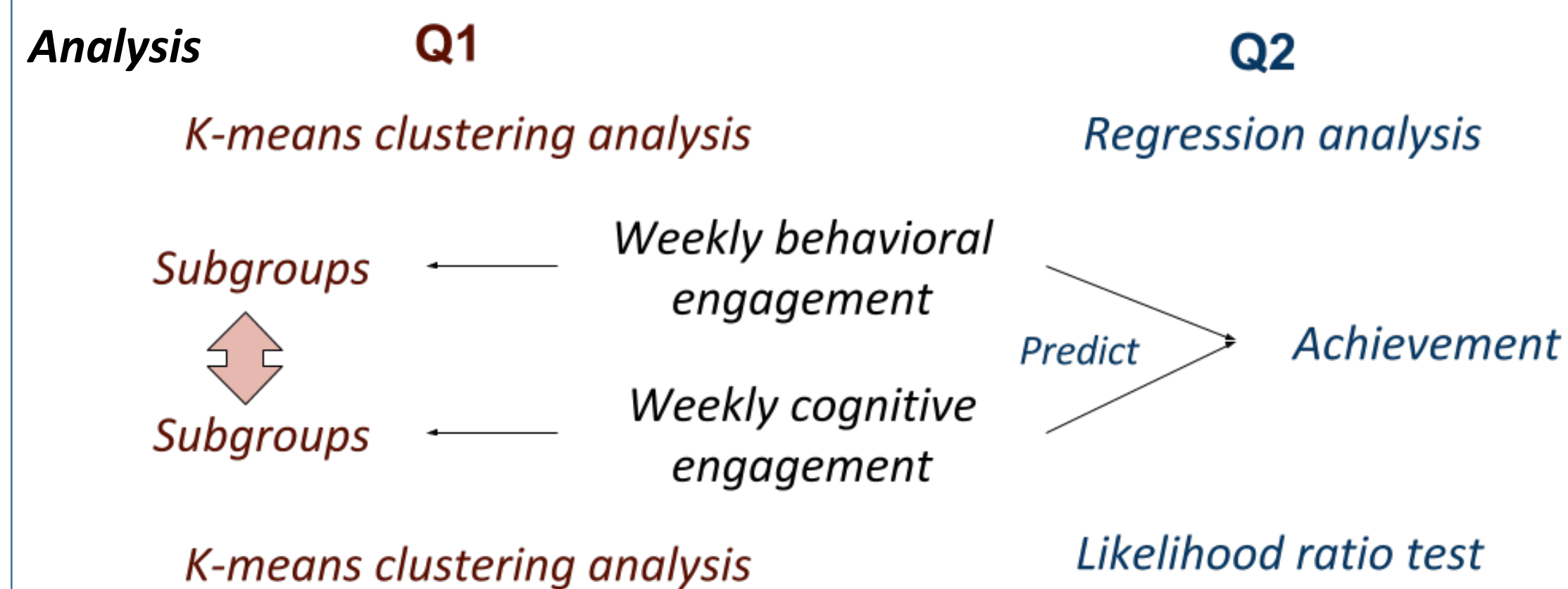
Methods

Dataset and participants

- One Coursera MOOC: “Pre-calculus”
- Ten-week course: learners watched videos, discussed in the forum, took quizzes, and engaged in other learning activities
- 50,676 students registered the course and 19,548 students accessed the course at least once after registration

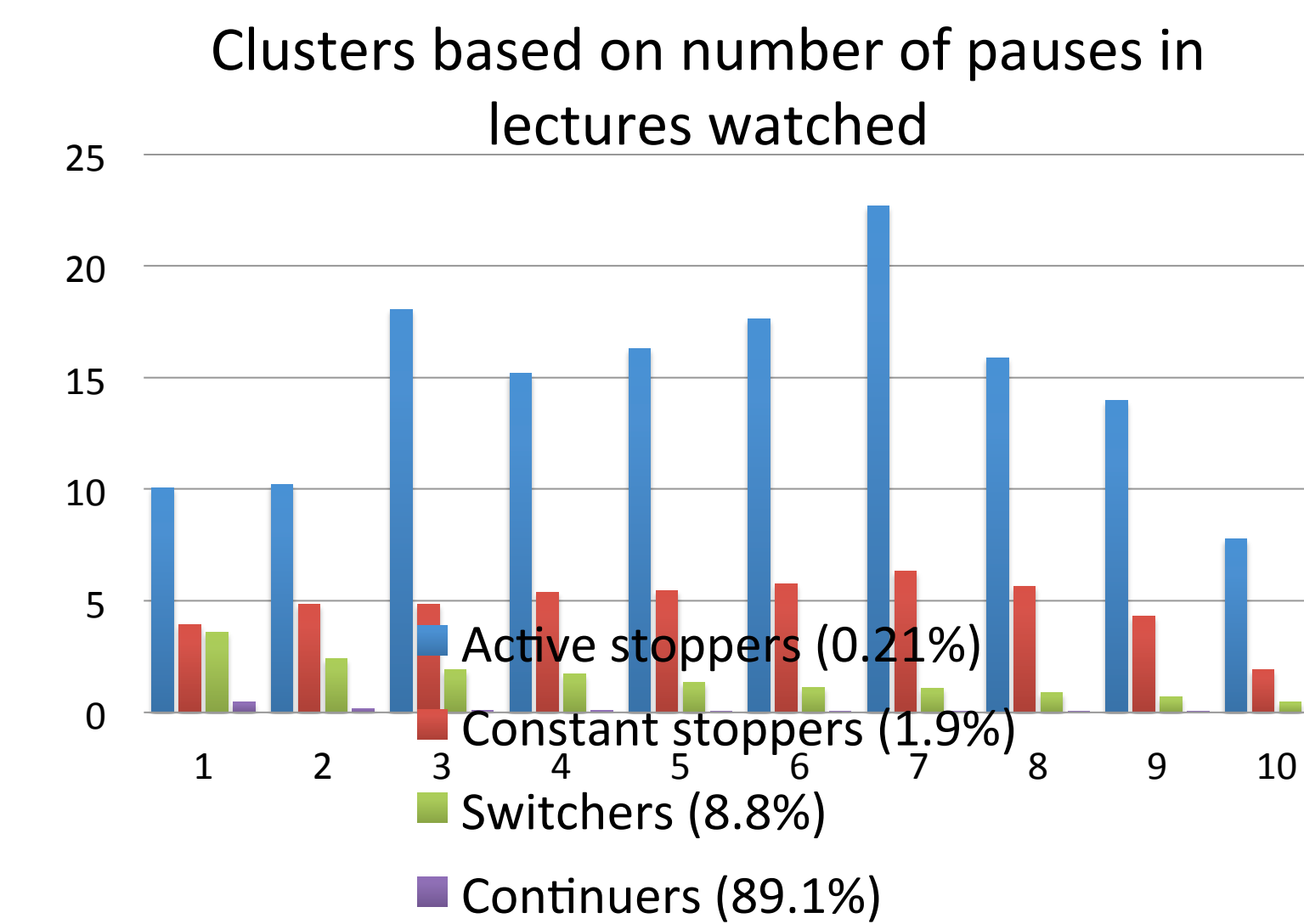
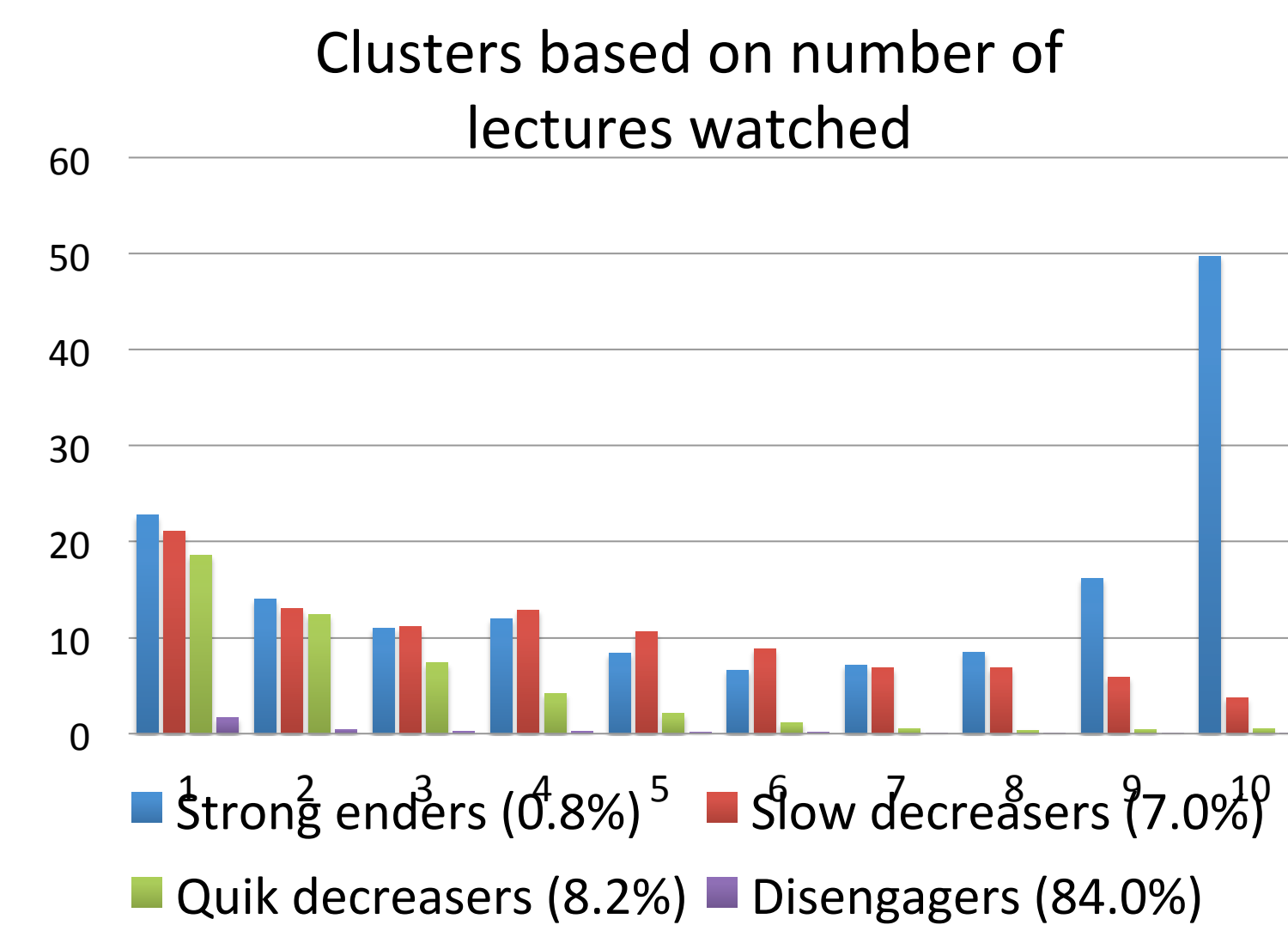
Measurement and Analysis

- Weekly behavioral engagement:** the number of lectures students watched in a given week
- Weekly cognitive engagement:** the number of pauses in lectures watched in a given week
- Total quiz score:** the sum of scores a student got on each quiz he/she attempted in a given week
- Average quiz score:** the average score on quizzes attempted in a given week



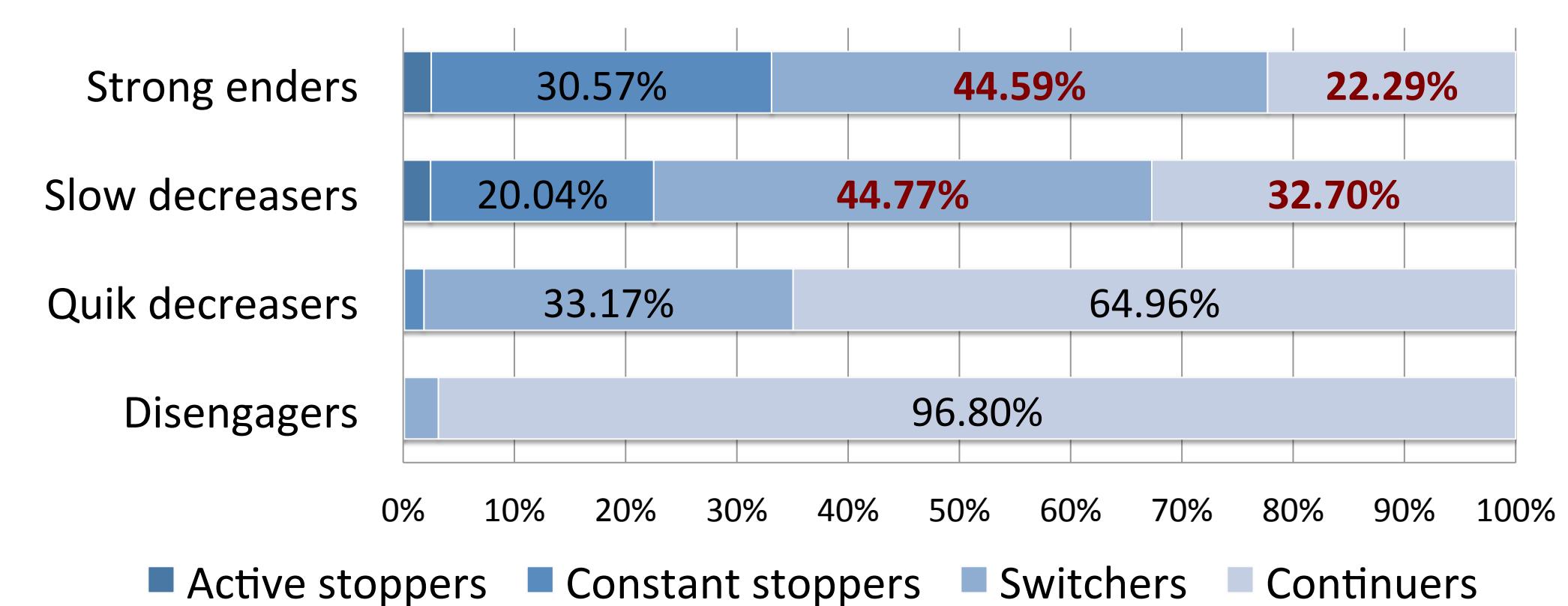
Results

1. Clusters based on different engagement



- Clusters with higher level of behavioral engagement had a larger proportion of individuals who were also cognitively engaged.
- However, being behaviorally engaged does not necessarily mean being cognitively engaged.**

Distribution of cognitive engagement clusters



2. Cognitive engagement and achievement

- The number of pauses in lectures watched is predictive of both total and average quiz score after controlling for the number of lectures watched.
- In addition, for both total and average quiz score, the models with the number of pauses in lectures watched fit significantly better than the models that only have number of lectures watched as the predictor.
- Overall, the results show that our measurement of cognitive engagement is positively associated with achievement, and can make a unique contribution in predicting achievement.

Table 1. Regression of engagement on academic achievement with individual fixed effect

	Total score		Average score	
Number of lectures	0.71***	0.69***	0.04***	0.02***
	(0.004)	(0.005)	(0.001)	(0.001)
Number of pauses per lecture		0.33***		0.23***
		(0.019)		(0.005)
N	79174	79174	79174	79174
R ²	0.281	0.284	0.017	0.054

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Conclusion

- Using only behavioral engagement may lead to an incomplete or even incorrect understanding about student participation.
 - Our study shows that behavioral and cognitive engagement in MOOCs have different patterns at the individual level.
 - Some students had relatively high behavioral engagement while decreasing in or maintaining low cognitive engagement.
 - If we only measure behavioral engagement, we might not be able to identify some “at-risk” students who visited most of materials but were not truly engaged in the content.
- Cognitive engagement is found to have its unique contribution in predicting academic achievement, which can give instructors extra information about student engagement and performance.

References

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