Weekly Low Stake Online Quizzes: a predictor of student learning and course outcomes?

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Introduction and Background

Background

- The progress and proficiency of students enrolled in large undergraduate courses are typically difficult to track and understand.
- Tracking student engagement and learning is particularly important in pre-requisite courses where concepts are scaffolded and required for success in subsequent courses
- Large online courses often utilize low-stakes online assignments to assess student learning in an ongoing basis
- A major challenge to instructional teams is to develop and utilize appropriate data analytics to identify students who might be struggling with core concepts prior to key tests or might struggle to complete the course in a timely manner
- Previous research has identified a relationship between student interactions with content and final course grades [1,2]
- Using Quercus-based learning analytics may provide the ability to track both student engagement and success

Research Question: Can data from weekly low-stakes assignments be used to identify student success in multiple physiology-based courses?

- If successful, this information could be used to develop intervention strategies for helping students who may be struggling academically
- To investigate this question, Quercus analytics data on student-quiz interaction was assessed

Acknowledgements and References

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- Chris Garside, Department of Cell and Systems Biology
- [1]Anderson, D., Huttenlocher,doi:10.1145/2566486.2568042
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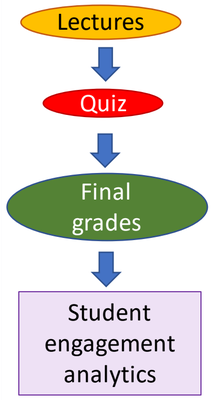
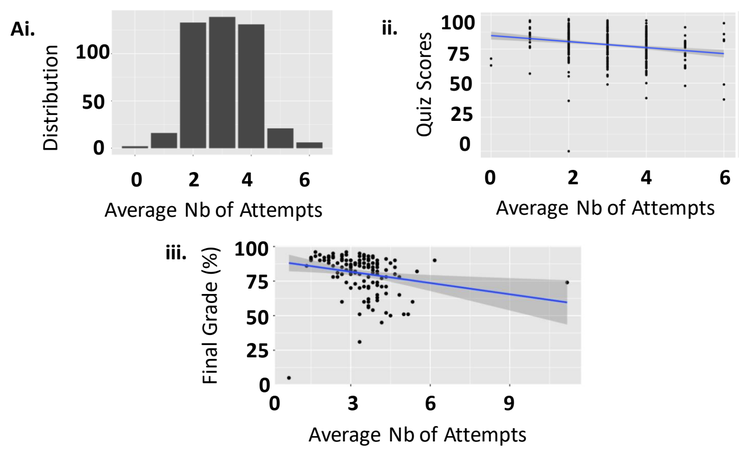
Methods



- Two large third year undergraduate courses at the University of Toronto (>300 students) were enrolled in this study: Neurobiology of Behaviour (HMB300), Neurobiology of the Synapse (CJH332)
- Weekly online Quercus quizzes were used to assess student comprehension of presented material (unlimited quiz attempts,)
- Each course offers at least 1 mid-term and 1 final exam as major assessments in this course (comparable weighting of material and final marks)
- Various weekly online quiz analytics from Quercus were used for analysis using R

Results

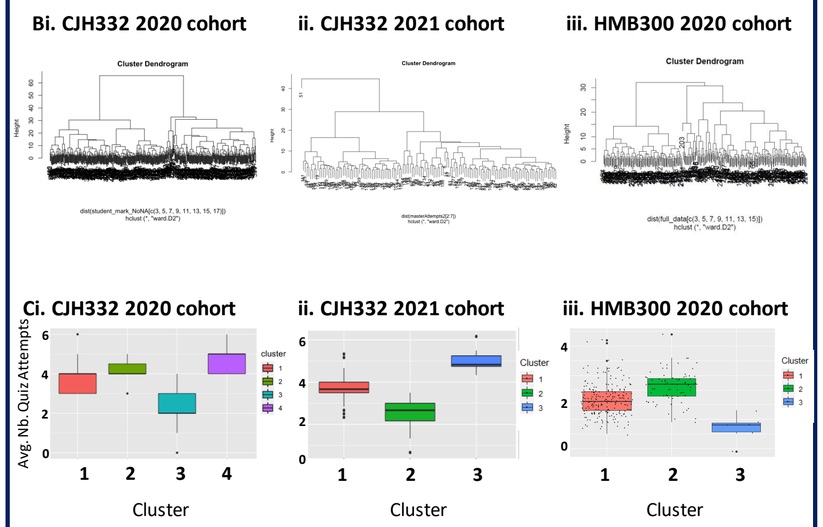
Course Data Descriptive Statistics Obtained from Quercus Analytics



A. Example of descriptive statistics that were Quercus Analytics data for CJH332 (2020 and 2021). i) Distribution of the average number of quiz attempts. ii) Scatter plot illustrating the correlational relationship between the number of attempts with quiz scores. iii) Scatter plot illustrating the correlational relationship between average number of quiz attempts and final grades. obtained from

Results

Students can be classified based on how they interact with weekly quizzes in multiple courses



B. Quercus analytics data on how students interact with weekly course quizzes allows students to be clustered into discrete groups across multiple courses (CJH332 2020 cohort, 2021 cohort, and HMB300). i) Cluster dendrogram demonstrating 4 discrete clusters in the CJH332 2020 cohort. ii) Cluster dendrogram identifying 3 discrete clusters of students in the CJH332 2021 cohort. iii) Cluster dendrogram identifying 3 discrete clusters of students in HMB300. **C**. Student clusters exhibit different average number of quiz attempts in (i) CJH332 (2020), (ii) CJH332 (2021), and (iii) HMB300.

Conclusions and Future Directions

Preliminary findings:

- Correlation between number of quiz attempts with midterm and final course grade
- Students can be classified into discrete groups based on their interactions with quizzes

Next steps:

- Assess student interactions with individual tests determining if overall final grades in a course correlate with specific clusters of students
- Identify and modify teaching topics which students found difficult
- Future directions include using this information to inform teaching specific topics which students found difficult
- Develop intervention strategies for "struggling students"