

# Data-Driven Management of Quiz Questions: How Learning Analytics Help

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## Instructional Challenge

- In a case-based clinical analysis course (hybrid design) for MHS students in Speech-Language Pathology, weekly online quiz questions assess knowledge of current leading evidence and its application to clinical case studies.
- How can Learning Analytics (LA) data be used to evaluate the quality of quiz questions?
- What protocol can be developed to effectively monitor quiz question quality as new questions are added to the question bank?
- How efficient will an annual evaluation process be?

## Exploration Strategy

- Learned about Multiple Choice Question (MCQ) analysis (literature such as Muhaissen et al., 2019)
- Explored Quercus Analytics quiz data availability
- Reflected on LA data for quizzes from 2020
- Updated quiz questions for 2021 based on LA data
- Developed protocol for efficiently reviewing weekly quiz question performance

## Results: An evaluation protocol

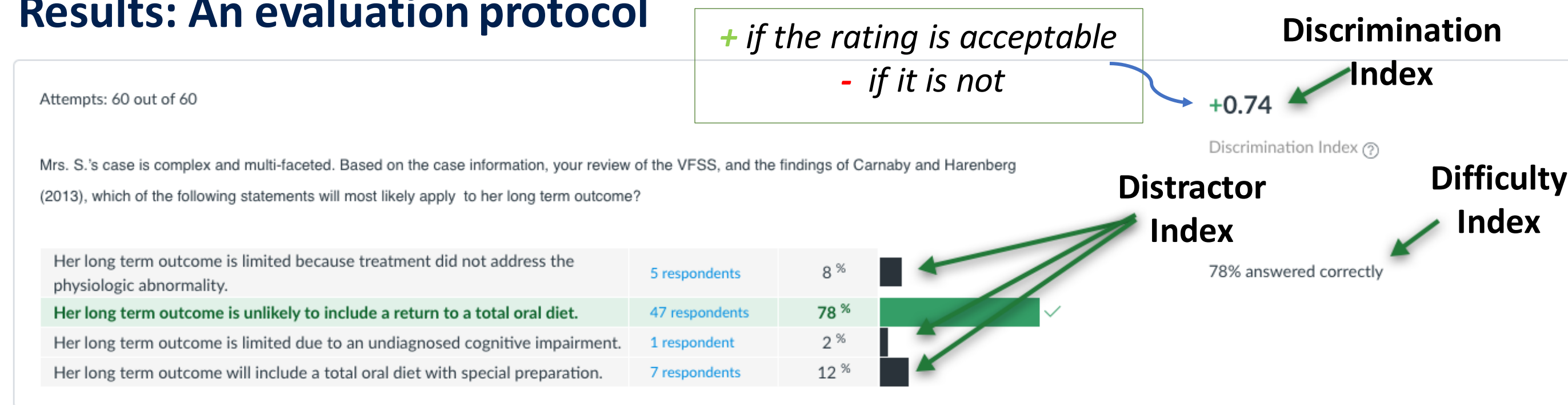
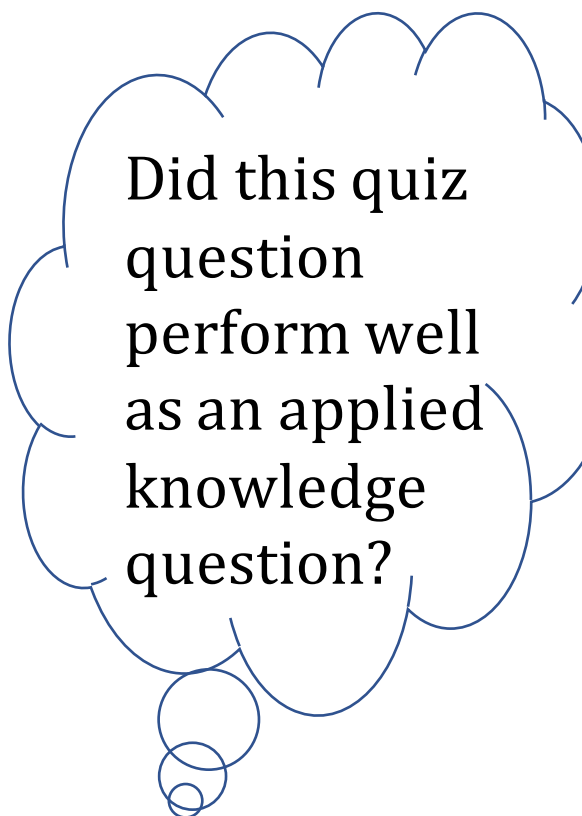


Figure 1. Example of Quercus Quiz Statistics – Quiz Summary – Question Breakdown, annotated

- Step 1** – How difficult is the quiz question? That is, what percentage of students answer the question correctly? Known as the **Difficulty Index**. Knowledge questions usually score higher than applied questions. Below 30% is “very difficult”; above 80% is “very easy”.
- Step 2** – Do most students who do well on the quiz answer the question correctly? Check the **Discrimination Index**. Below a score of .25, revise or discard the question. A score of .25 or better is acceptable (but consider revising), a score of .40 or better is excellent.
- Step 3** – Were the incorrect answers plausible (good distractors)? Consider the percentage of students who picked each distractor. Known as the **Distractor Index**: Look for a fairly even spread - 5% or more is fine. If below 5%, then the distractor is non-functional.
- Step 4** – (Optional) If a closer look is desired, retrieve Item Analysis Report (.csv file). Note: Terminology is highly technical and numeric presentation styles differ from dashboard (e.g. ratios used, not percentages).



## Discussion

- This method works well for a relatively small number of quiz questions.
- For a large question bank or a long test, may be best to start with the .csv file
- Many quick reference guides assume knowledge of MCQ analysis measures.
- Search education literature for concepts and guidelines (e.g., what scores indicate poor/acceptable/good/ excellent MCQs.)
- Are the indices meaningful for True/False questions?
- Indices flag potentially problematic questions – use your judgement about whether changes are needed.

## References

Muhaissen, S., Ratka, A., Akour, A. AlKhatib, H. (2019) Quantitative analysis of single best answer multiple choice in pharmaceuticals. Currents in Teaching and Learning 11, 251-257.