



Analysis of Repeat Exam Item Performance as a Proposed Measure of Concept Retention

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Introduction

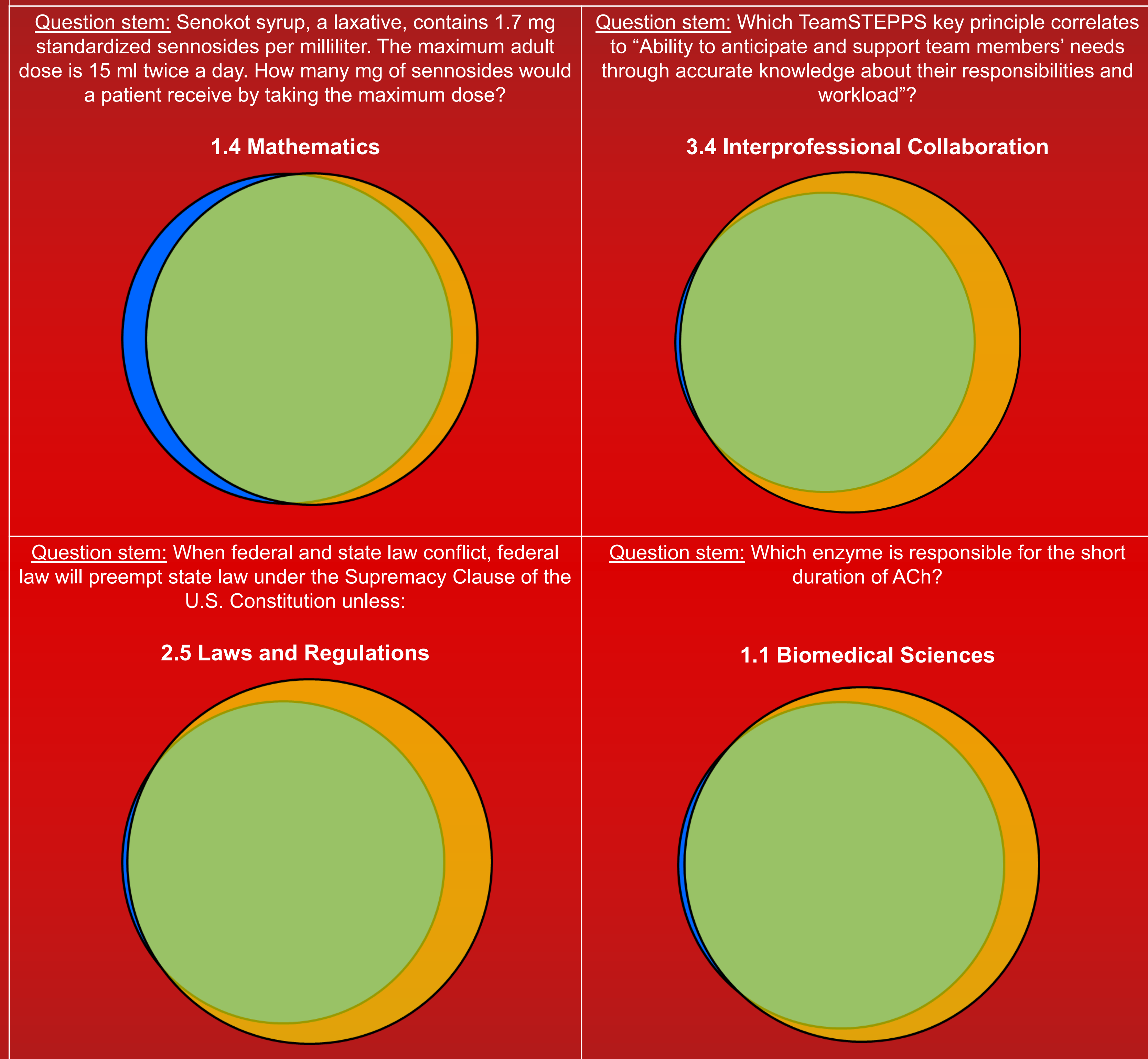
Previous research found repeated testing to be more effective than repeated studying.¹⁻³ Using data derived from an assessment model in which students were assessed in composite exams (8 in-semester exams to which all courses contribute assessment items) and then in final exams, this project proposes a method for analyzing performance on repeat items to evaluate the questions:

- “How can repeat item performance be analyzed to measure concept retention?” and
- “How can such analysis differentiate competencies associated with mastery?”

Methods

In a quasi-experimental model, examinations administered to Pharmacy students were analyzed over one semester. The assessment software enabled administrators to identify question dyads, in which an exam item was repeated in both a composite exam and the final exam. For each dyad, response at first exposure was compared to response at repeat exposure. Retention rate for each dyad was calculated. Venn diagrams were constructed to visually represent correct responses on first exposure, second exposure, and both. Additional analysis explored the time between first and repeat exposures and the competency (ACPE sub-domain) each question measured. Competencies associated with multiple question dyads were grouped for a secondary analysis.

Figure 1: Select examples of dyad item analyses



Results

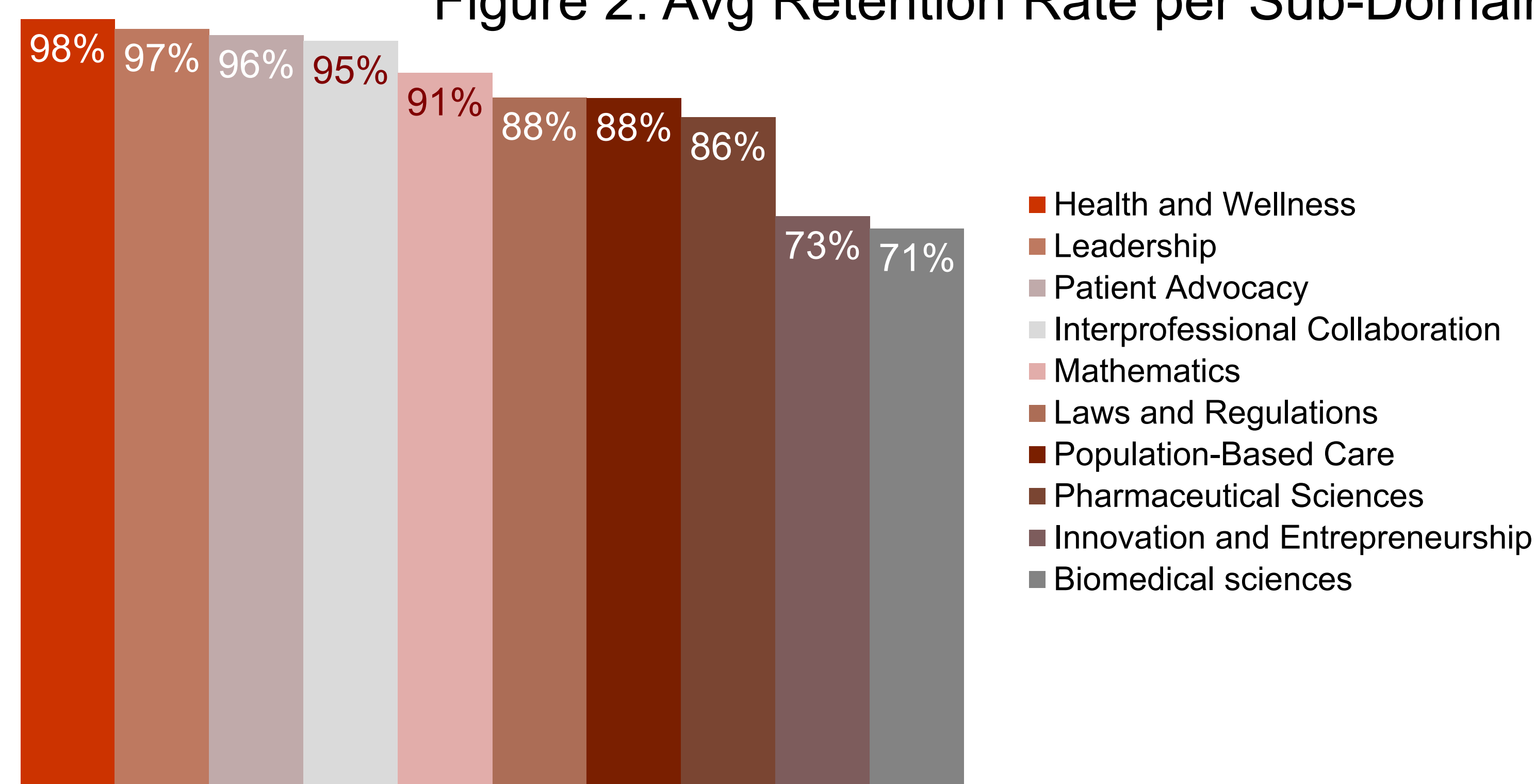
Only examinations given to first-year pharmacy students ($N=103$) contained a sufficient number of question dyads for analysis. A total of 62 question dyads were identified. For 66.2% of dyads, retention rates were $>80\%$. Figure 1. illustrates select examples of Venn diagrams representing question dyad performance. The duration of time between first exposure to an item and repeat exposure was not associated with retention rates.

- For 29(46.8%) dyads, the retention rates were greater than 90%.
- For 12 (19.4%) retention rates were between 80%-89%.
- For 8 (12.9%) retention rates were between 70%-79%
- For 13 (21.0%) retention rates were less than 70%. Most of these occurred in Human Physiology within the 1.1. sub-domain. In a secondary analysis, items were grouped by ACPE sub-domain. Sub-domains associated with multiple items (34 dyads) were included. Retention rates by sub-domain are reflected in Figure 2.

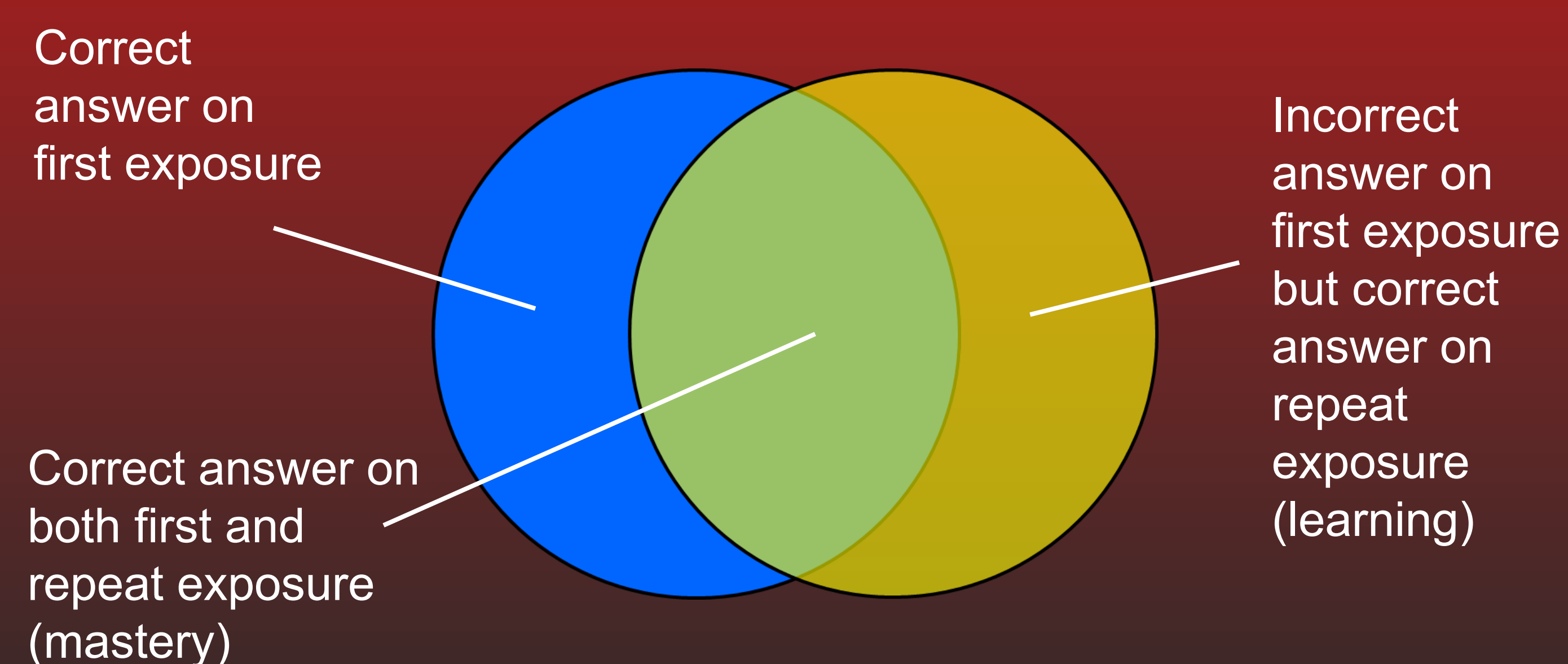
Conclusions

This analysis introduces a proposed a method of measuring concept retention. Analysis of performance on repeat items may differentiate competencies associated with learning and mastery. Identification of items (or sub-domains) with lower retention rates can inform instructors as to content areas in need of greater emphasis, especially as students progress to the 2nd and 3rd years of the curriculum. Analysis of repeat item performance may also help inform decisions about the design of remediation activities.

Figure 2: Avg Retention Rate per Sub-Domain



Venn Diagram Legend



References

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