Examining Person and Item-Level Attributes Related to College Exam Performance MIDDLE TENNESSEE

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Introduction

- Large public universities serve students with a wide range of reading skills.
- Our study examined how accuracy on individual multiplechoice questions in introductory psychology classes was related to the readability of the items and the properties of the individuals in the class.
- The research question was how individual's skills and deficiencies interacted with item difficulty.



Methods

- The readability of over 200 test items was operationalized using Coh-Metrix as word count, syllable count, frequency of content words, and word familiarity.
- Students were evaluated based on their attendance, completion of online homework, and ACT reading scores.
- Questions were coded according to whether they were derived from the textbook only or lecture and textbookbased, and whether they were presented as concrete or conceptual.



Results

A crossed-random regression was used to predict accuracy on exam items using the Ime4 package in R.

- Person-level factors including class attendance, ACT reading, and homework completion made significant positive contributions to accuracy.
- Item-level factors including the number of syllables made a significant negative contribution to accuracy, whereas word familiarity and coverage in lectures made positive contributions.
- Significant interactions occurred between ACT reading and word count, online homework and word frequency, and online homework and multisyllabic words.

 Table 1. Crossed Random Effects Model for Exam Item Accuracy.

Fixed Effects	Est.	SE	z
Intercept (_{Y000})	0.520	0.170	3.062
Participant covariates			
Y001 Class Engagement (D2L)	0.096	0.042 *	2.271
Y002 ACT Reading	0.175	0.041 ***	4.229
Y003 Online Homework (lcurve)	0.159	0.032 ***	4.920
Item Covariates			
Y010 Question Type	0.222	0.144	1.542
Y020 Coverage (Lect/Book)	0.519	0.144 ***	3.603
Y030 Word Count	0.082	0.147	0.561
Y040 Syllables	-0.311	0.161	-1.930
Y050 Frequency	0.037	0.135	0.782
Y060 Familiarity	0.175	0.078 *	2.238
Item x Participant Interactions			
$_{\Upsilon101}\text{ACT}$ Reading x Word Count	0.006	0.004 ***	1.332
$_{\Upsilon102}\text{ACT}$ Reading. x Syllables	0.004	0.005	0.740
$_{\Upsilon103}\text{ACT}$ Reading x Frequency	-0.016	0.010	-1.544
$_{\Upsilon 104} Engagement. x$ Word Count	-0.016	0.011	-1.413
Y105 Engagement x Syllables	-0.016	0.011	-1.391
Y106 Engagement x Frequency	0.016	0.011	1.431
$_{\Upsilon_{107}}$ Homework x Word Count	-0.021	0.013	-1.637
$_{\Upsilon 108}$ Homework. x Syllables	-0.026	0.015	0.083
Y109 Homework x Frequency	-0.037	0.014 **	-2.711
* p < .05, ** p < .01, *** p < .001			

Discussion

- Student exam performance was largely determined by their reading comprehension skills and their engagement in class.
- Comprehension was found to be the most beneficial reading skill in aiding performance on test items, both overall and with respect to longer test items with more words.
- Attending class only aided students slightly while engagement in active learning homework had a much larger impact, both overall and with respect to difficult test items that contained multisyllabic words that were infrequent.
- Generally, findings indicate that participation in active learning exercises increases the ability to decode longer items in students with comprehension deficits.

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References

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