METAMETRICS RESEARCH BRIEF

# Audio-Supported Reading Feasibility Report

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## OBJECTIVE

The Lexile® Framework for Reading has established the optimal targeting of reader with text at 75-percent comprehension. This comprehension rate is based on the embedded sentence completion item type, also called the "native-Lexile" item type, because it anchors the Lexile scale in terms of difficulty and unit size. Through teacher evaluation the optimal match of text with reader was set at 75-percent comprehension within the Lexile Framework. The extra benefit a reader receives from scaffolding (e.g., picture support, font size, glossary of terms) is not factored into the match. However, the inclusion of scaffolds may necessitate a change to the level of text required to maintain a 75-percent comprehension rate. With an increase in text demand, a student will be exposed to more challenging vocabulary and more sophisticated sentence structures than when reading independently without the scaffold. This report will explore if there is a benefit to an audio-supported reading scaffold.

In previous studies, different reading methodologies (e.g., repeated reading, listening) were tested for reading fluency. Findings show that there are benefits to reading while listening. A study by Rasinski (1990) tested the effects of repeated reading and listening on the development of reading fluency. Rasinski found that both approaches resulted in significant benefits: improved reading speed and word recognition accuracy. In another study, researchers showed the positive effects of audio-supported reading for ESL students (Koskinen et al, 2000). Koskinen and her colleagues tested first-grade students for book-rich classroom environments and home re-reading. Reading while listening constituted one of the test conditions. The utilization of audio models proved advantageous for students learning to speak English.

**Key Hypotheses:** Readers will perform higher on reading comprehension items if they hear the words of the passage read as they read along. Text-to-speech engines will provide the same benefit as human readers.

## METHODS

**Participants**: 233 charter school students in Grades 1-5 participated in the study. The students were taught in a dual-language (English/Spanish) environment. The school instructs a culturally diverse, day-student population. Student performance, by grade, was the following:

| Grade | *N* | Lexile Measure Mean | Lexile Measure SD |
|---|---|---|---|
| 1 | 61 | 173L | 203 |
| 2 | 68 | 521L | 259 |
| 3 | 44 | 584L | 278 |
| 4 | 34 | 795L | 272 |
| 5 | 26 | 940L | 214 |

The sample in this study has been viewed as an advanced pilot study to help inform the feasibility of audio-supported reading as a reading scaffold.

**Procedure:**
The design of the study was for each student to answer "native-Lexile" reading items in each of four audio-supported reading conditions: Human Female, Computer Female, Human Male and Computer Male. Five forms were created for each grade. There were 40 items per form for Grades 1-2, and 50 items per form for Grades 3-5. Each form began with ten unscaffolded items common to all forms. These unscaffolded items provided connectivity for the Rasch model. In addition to the four audio-supported conditions, each item was also administered in its unscaffolded form for anchoring the item difficulty for analysis. The blocks of items for each condition were composed of six items for Grades 1-2 and eight items for Grades 3-5. Table 1 shows how the forms layout for each grade.

**Table 1. Design of forms used in study showing breakdown by audio support.**

| | Number of Items | Form A | Form B | Form C | Form D | Form E |
|---|---|---|---|---|---|---|
| **Common Block** | 10 | Same | Same | Same | Same | Same |
| **Block 1** | 6/8 | Text | Comp Female | Comp Male | Female | Male |
| **Block 2** | 6/8 | Male | Text | Comp Female | Comp Male | Female |
| **Block 3** | 6/8 | Female | Male | Text | Comp Female | Comp Male |
| **Block 4** | 6/8 | Comp Male | Female | Male | Text | Comp Female |
| **Block 5** | 6/8 | Comp Female | Comp Male | Female | Male | Text |

Subjects within each grade were randomly assigned to each of the five forms with items targeted to their grade level. Tests were administered by computer. Each student had a pair of headphones with which to listen to their items individually. The test was proctored by MetaMetrics. Due to limited computer availability, students were tested in groups (10-12 students at a time).

A subsample of the students took the *Scholastic Reading Inventory* (*SRI*) (Scholastic Inc.), which produced an alternate Lexile measure for comparison.

**Measures:**
A Lexile measure is a measure of reader ability and text complexity. A student receives a Lexile reader measure when he or she completes a reading comprehension test (MetaMetrics, 2015). A book or text receives a Lexile text measure when it is evaluated by a proprietary software that examines the semantic and syntactic characteristics of a text (Stenner, Horabin, Smith, & Smith, 1988). Independent psychometric studies of the Lexile scale indicate that the Lexile measure is a valid and reliable measure of reader ability and text complexity (Mesmer, 2007; White & Clement, 2001)

For this study, it is important to note that the Lexile text complexity measures are used to fix the scale while the Lexile reader measures are allowed to float. The goal is to estimate the effects of audio-supported reading in the Lexile metric so two frames of reference were used. One frame of reference anchors person Lexile measures with the common Lexile items and the other anchors text Lexile measures with audio-supported items. The difference between the two measures describes the effect of audio-supported reading (in the Lexile metric).

## ANALYSES

- A FACETS model was used with person, item, and audio support as the three factors hypothesized to affect reading comprehension.
- FACETS measures were compared with independent Lexile measures for a subsample of 108 students who took the *SRI*.
- Anchoring for the FACETS scale was done using a mean match of Lexile theoretical item difficulties to FACETS empirical item difficulties from two independent item populations: common items and audio-supported items. The common items were unscaffolded reading items so the difficulty of those items is in the same frame of reference as traditional Lexile testing. The audio-supported items are in a different frame of reference since the items were administered with audio support.
- A comparison of the person measures from an independent Lexile test with the common anchored frame of reference will inform how well the study forms are measuring persons in the Lexile metric.
- If the study form is performing well as a reading test, a comparison of the mean measure of the student population with the common anchoring and the mean measure of the student population with audio-supported anchoring will determine the Lexile benefit of the audio supported reading scaffold.

## RESULTS & DISCUSSION

In Table 2, the difference between the mean measure of an independent *SRI* administration, row 1 (767L), and the mean measure from the study form anchored to common reading items, row 2 (764L), is 3L. The data shows that the study forms are measuring students as expected for a typical reading test when in the frame of reference of "normal" Lexile item difficulties.

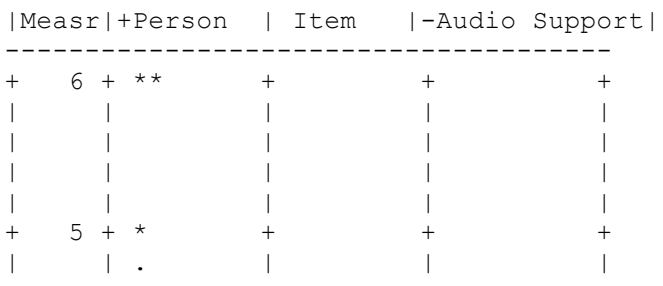
In Table 2, the difference in the means of the sample's reading ability from rows 2 and 3 is 200L (964L-764L). With an *n* of 108 and a standard deviation of 280L, a paired *t*-test reveals this difference to be highly significant. This difference shows the effect, on average, a student receives from the audio scaffold denominated as a Lexile measure.

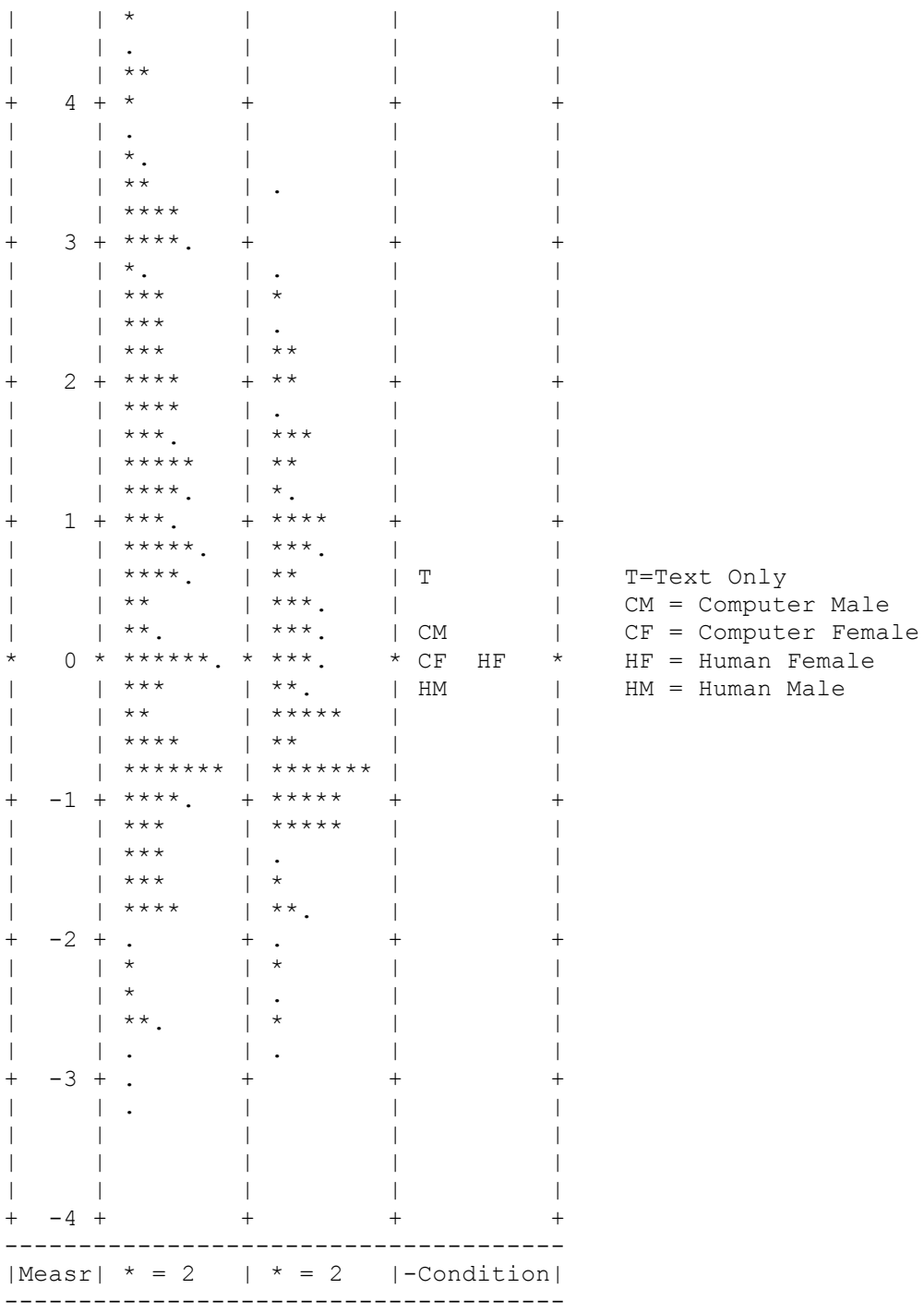
**Table 2. Comparison of FACETS person measures anchored in two ways with SRI-Interactive measures**

| | *n* | Mean | SD |
|---|---|---|---|
| SRI-Interactive | 108 | 767L | 258L |
| FACETS (Common anchored) | 108 | 764L | 280L |
| FACETS (Audio support anchored) | 108 | 964L | 280L |

The results in Table 2 described the effect across all audio supported conditions. Figure 1 reveals the effects of the individual conditions.

Figure 1. FACETS variable map






In the fourth column of Figure 1, the Text Only (T) condition for audio support was hardest; followed by Computer Male (CM), Computer Female (CF), and Human Female (HF) next but almost identical; and then the Human Male (HM) providing the most support because that condition made the items the easiest.

This study needs replication with a larger data collection to fully embrace the results. The results suggest that audio support is a significant scaffold using either human voice or a text-to-speech engine. The study only tangentially examines the listening construct, where "pure" listening items (i.e., no text) should be included to match the unscaffolded reading condition. Other item types might show different results than the native-Lexile item type, which was originally designed for reading. Also, this dual-language population was primarily English-first speakers, and exploring the effects of audio support on English as a second language (ESL) readers is a question to answer with future research. Other future research should involve building a Lexile scale

for listening with no text support. This research again will have implications for ESL readers and English as a foreign language (EFL) readers.

## REFERENCES

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