Improving Vocabulary Performance of Middle School Students with Disabilities and English Language Learners Using Evidence-Based Multimedia

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Background

- The large amount of vocabulary terms and concepts in STEM coursework creates academic challenges for students (Therrien, Taylor, Hosp, Kaldenberg, & Gorsch, 2011), especially students with disabilities (SWD) and English language learners (ELL).
- General education teachers experience difficulties implementing high quality instruction for SWD and ELL learning alongside general education peers (Brownell, Sindeil, Kiely, & Danielson, 2010; Mastropieri et al., 2005).
- Multimedia can serve as an easily-accessible tool to create instruction that supports SWD and ELL.
- Effective multimedia should reduce extraneous processing, manage essential processing, and foster generative processing (Mayer, 2008).
- CAPs (see feature) adhere to these principles and can help ensure students receive evidence-based instruction.
- Previous studies show that students who have access to CAPs significantly outperform students without CAPs (Kennedy, Deshler, & Lloyd, 2015), and students showed significant differences in performance when given CAP access (Kennedy; Thomas, Meyer, Alves, & Lloyd, 2014).
- Research Question: Are CAPs also effective for science learning in SWD and ELL?

Methodology

Participants included 43 SWD and 30 ELL (n=32 female) from 9 seventh grade science classes. CAP accessibility was alternated across units to determine the impact of the videos on vocabulary acquisition:

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<th>Group 1</th>
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<tr>
<td>CAPs</td>
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Measurements

Pre and posttests assessed vocabulary understanding for about 14 science terms per unit, student completed a multiple choice and short answer portion for each word, and both portions had high internal reliability (Cronbach's α = .962 and .988, respectively).

Number of views per CAP was recorded as well as students' perceived cognitive load for each word. This measurement system was created by the researchers in collaboration with participating science teachers, who follow state educational standards.

Content Acquisition Podcasts, or CAPs, are brief, multimedia-based instructional vignettes that deliver evidence-based practices for one vocabulary term or concept at a time. These videos can be made using technology that teachers already have, such as Microsoft PowerPoint, and can be viewed by students anywhere with online access: in school, at home, on a cell phone, etc.

Results

Average views per CAP was 2.85, and a univariate between-subjects ANOVA indicated posttest performance was significantly different for students with and without CAP access across all units (all Fs(1,70) > 29.1, p < .001).

However, further univariate (shown) and repeated measures analysis revealed that variance in posttest score was also significantly influenced by pretest score and GPA as covariates. Therefore, although CAPs help, their effect is influenced by extraneous individual student differences.

Discussion

- CAPs significantly improved science vocabulary performance for SWD and ELL.
- Participants scored significantly higher during the two units when they had access to CAPs compared to the two units when access was removed.
- Participants with CAP access scored significantly higher than peers taught without CAPs in all units.
- SWD and ELL made significant gains from pre to posttest, but SWD significantly outperformed ELL.

Key Results

- CAPs are effective for students and can be easily created by teachers. However, they are not the only solution needed to increase vocabulary performance.
- Middle school ELL may need additional support through increased intensity and quality of instruction to achieve higher vocabulary scores/understanding.
- Limitation: students were exposed to posttest questions in the CAPs, which helped performance.
- Future research could utilize standardized measures for pre and posttests with a larger sample size consisting of SWD and ELL students from different schools to increase content validity and generalizability.

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Limitation

This screenshot of a CAP shows how the word “photosynthesis” is broken down into three word parts that each carry meaning. The pictures are accompanied by timed audio narration.