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Reviewing Systematic Reviews: Meta-Analysis of What Works Clearinghouse Computer-Assisted Interventions

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This presentation outlines our findings from applying the meta-analysis technique to intervention evaluation studies that have been reviewed by the What Works Clearinghouse (WWC) in the content area of Reading. More specifically, we applied the meta-analysis technique to answer the following questions:

* Does the evidence in WWC reports indicate that computer-assisted programs increase student reading achievement?
* Are computer-assisted reading programs more effective than non-computer reading programs in improving student reading achievement?

WWC is an U.S. Department of Education’s Institute of Education Sciences (IES) initiative created in 2002 to serve as a “central and trusted source of scientific evidence for what works in education.” To attain this mission, WWC has established a systemic framework in searching, selecting, assessing, classifying, and reporting research studies. A tenant of this WWC framework, for example, is to fully assess studies that report quantitative outcomes generated from one of the following research designs: randomized control trial, quasi-experimental design (with statistical controls for pretest and/or a comparison group matched on pretest), or regression discontinuity. For studies that were fully assessed, WWC reports provide detail information about these studies such as study characteristics, outcome characteristics, and outcome measures including effect sizes and standard deviations. The scope of our analysis covers the WWC reports published by the summer of 2011 in the content area of Reading.

Meta-analysis is a statistical technique that summarizes quantitative measures across similar studies. Key data needed for providing a ‘synthesized’ summary of the outcome measure is the reporting of the effect size, standard deviation, and sample size by the study of interest.

To address our first question, we synthesized the outcome measures of 73 studies that evaluated 22 computer-assisted interventions with a total sample size of over 30,000 participants in four topic areas – Adolescent literacy, Beginning Reading, Early Childhood Education, and English Language learners – first by a fixed effect model and on 3 of the topics, also by a random effect model. Synthesized outcomes calculated from both models across these various studies and interventions lead us to conclude that computer assisted Reading interventions are effective in improving reading achievement, particularly in the topic area of Beginning Reading (BR).

Within the Beginning Reading topic area, we applied the meta-analysis technique to compare the effectiveness of computer-assisted interventions with other reading interventions. We calculated summary outcomes synthesized from 33 studies that evaluated 11 computer-assisted interventions and compared that to outcomes derived from 47 studies that evaluated 15 other reading interventions. The number of participants in these studies was over 2,600 and about 7,600 respectively. The comparison was made in both a fixed and a random effects model (the later by regression technique). Results from the comparison lead us to conclude that in the Beginning Reading topic area which targets to improve reading skills of children ages 5-8, improvements from computer-assisted interventions appear to be smaller than that from other BR interventions.