EDataSci

ESSA Evidence for intelligent tutoring to improve nonfiction reading comprehension.

About EDataSci

EDataSci is a research firm in education and other sciences. Senior Director Jeff McLeod holds a doctorate in quantitative methods in education and psychology. He is certified by WWC as a research reviewer under version 4.1 standards. He has over 20 years of experience as a senior psychometrician in high stakes testing programs and has consulted on a variety of outcome studies in education, psychology, and health sciences. LinkedIn page www.linkedin.com/in/jeff-mcleod-EDataSci

ESSA Tier 1 Evidence for intelligent tutoring to improve nonfiction reading comprehension.

Instructional interventions for K-12 children should be founded on a body of experimental evidence. The Department of Education instituted the What Works Clearinghouse which provides standards for the quality of evidence for interventions.

Two studies appear in the What Works Clearinghouse as evidence-based practices for strengthening reading comprehension using an intelligent tutoring instructional platform (Meyer, Wijekumar, and Lin, 2011; Wijekumar, Meyer, and Lei, 2012). These outcomes directly support the intelligent tutoring of structure strategy (ITSS) that the authors used, but they provide general support for ASU Prep Digital Academy's online learning curriculum because the programs at ASU Prep Digital Academy share specific and essential commonalities with the ITSS program.

Both papers describe well-executed, large-scale studies that meet ESSA Tier I evidence for effectiveness of online instruction in Reading. This is the highest level of evidence under ESSA standards.

The intelligent tutoring approach used a web-based delivery method that offers consistency of interactions with students to (1) model strategy, (2) offer practice tasks, (3) implement assessments, and (4) provide detailed feedback for individualized, self-paced learning. The larger study (Wijekumar et. al, 2012) used a Multi-Site Cluster Randomized Trial (CRT) with 131 teacher classrooms involving 4,856 fourth and fifth grade students in Pennsylvania. Classrooms were randomly assigned to treatment and control conditions using the same reading curriculum. The experimental condition supplemented the curriculum with the web-based intelligent tutor for 45 minutes per week over 6 months.

Results showed:

- Among the 1,485 fourth grade students there was an average increase of 19 percentile points in reading comprehension (main idea identification) after 6 months usage of the web-based learning platform compared to the control group which did not use the supplemental web-based intelligent tutor.

- The second study (Meyer et al., 2011) found an average increase of 25 percentile points in reading comprehension for the highly personalized use of the learning platform compared to regular use of the intelligent tutor.

The study authors had spent several years developing the intelligent tutor and the web-based platform, and the success of the approach is evident. ASU Prep Digital aligns closely to the individualized-learning approach. These studies exhibit both *general* relevance to ASU Prep Digital (web-based instruction using individualized learning) and *specific* relevance to the following concrete practices that are essential to ASU Prep Digital's online learning method.
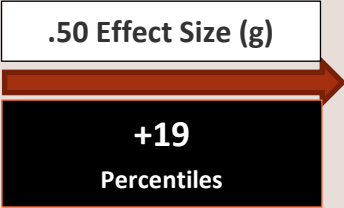
Intervention Relevance to ASU Prep Digital Academy

Feature	Tier 1 Study	ASU Prep Digital Academy
Web-based online instruction	X	X
Interactive instruction	X	X
Practice tasks	X	X
Assessment	X	X
Automated feedback	X	X
Self-paced personalization	X	X

Features of ASU Prep Digital Academy are those incorporated into the online Exact Path instructional design, the MACS Intelligent Tutor, and the Guided Inquiry Learning Curriculum at ASU Prep Digital.

The second study (Meyer, Wijekumar, and Lin, 2011) differed from the first in that both treatment and control used the intelligent tutoring of structure strategy (ITSS), but the treatment group augmented the approach with the kinds of highly individualized practices found at ASU Prep Digital, such as adaptive matching of remediation and

enrichment lessons to students' aptitudes, and timely personalized feedback. This second study also meets ESSA Tier 1 requirements.

Tier 1 Evidence for Web Based Intelligent Tutor Approach

ESSA Criteria for Tier I Evidence	Intelligent Tutoring and Individualized Instruction
Well-designed and implemented experimental study that meets WWC standards without reservations.	Randomly assigned 4,856 children within 4th and 5th Grade classrooms to intelligent tutoring versus a control condition. No attrition threat, psychometrically sound outcome measures, no confounding factors. Outcomes were rigorous scores of recall for the main ideas from text as rated by experts.
Statistically significant positive effect on a relevant outcome.	1 statistically significant positive outcome. Intelligent Tutoring of Structure Strategy .50 Effect Size (g) +19 Percentiles
No strong negative findings from experimental or quasi-experimental studies.	

Wijekumar, K. K., Meyer, B.J.F., and Lei, P. W. (2012). Large-scale randomized controlled trial with 4th graders using intelligent tutoring of the structure strategy to improve nonfiction reading comprehension. *Educational Technology Research and Development*, *60* (6). https://doi.org/10.1007/s11423-012-9263-4.

Meyer, B. J. F., Wijekumar, K. K., and Lin, Y. (2011). Individualizing a web-based structure strategy intervention for fifth graders' comprehension of nonfiction. *Journal of Educational Psychology*, *103* (1), 140–68**.**