

AnimalWatch-VI Suite: A comprehensive program to increase access to math for students with visual impairments

RFA Topic: Technology for Special Education Goal: Development & Innovation

Project Summary

Purpose. We will develop a technology-enhanced instructional program for algebra readiness mathematics that will be accessible to middle school students with visual impairments (VI). The intervention will be developed and refined through user testing with students with VI and teachers. Evidence of feasibility of classroom use, and promise to improve VI students' math problem solving will be documented.

Settings. The research will be conducted in middle and high schools serving students with VI in Arizona, Nevada, Alabama, Nevada, New Mexico, Hawaii, Massachusetts and Texas.

Participants. Students with mild, moderate or severe visual impairments, including educational blindness, who are studying algebra readiness mathematics will participate, as well as teachers of students with visual impairments who will implement the intervention in classroom settings.

Intervention to be developed. The program will include 14 web-delivered instructional modules covering computation, fractions and variables and expressions. Each module will include 18 word problems about environmental science and instructional scaffolding accessible via self-voicing software, accompanied by braille and tactile graphics. Access will also be facilitated by tools to set color, contrast and text size on the computer screen. Professional development training materials for teachers will be included.

Comparison condition. The existing practice condition for math learning for each participating student will be documented (e.g., braille; large print; standard print viewed with magnifier, etc.) and will serve as the comparison or baseline condition.

Primary research method. Methods will include usability testing, a feasibility study, and a pilot study utilizing an alternating treatment design comparing math problem solving under existing practice and intervention conditions to assess the promise of the intervention.

Primary measures and key outcomes. Students' math problem solving proficiency will be evaluated through study-specific measures, including proportion of math problems completed in a unit, and proportion of incorrect answer attempts. Video recordings will be used to develop measures of strategic effectiveness of students using accessible graphics during math problem solving under intervention and existing practice conditions. Teachers will provide reports regarding students' ability to access instruction under existing versus intervention conditions.

Data analytic strategy. User feedback will be used to refine the intervention in Years 1 and 1; in Year 3, quantitative metrics of students' math problem solving under existing practice and intervention conditions will be used to assess promise of the intervention, along with teacher and student ratings of the perceived effectiveness of the instructional package.