Research Findings

All BirdBrain Technologies products are the results of a careful design process, identified by Dr. Tom Lauwers in his Ph.D. thesis [1] . This methodology is centered on the participation of teachers and students at every stage of the design process, with a focus on aligning desired learning goals with the features and affordances of the eventual educational tool. The research process that led to the Owlet Math Tools collection exemplifies this process, and is detailed below.

BirdBrain pivots to create innovative & hands-on tools for elementary math education

2017: With National Science Foundation funding the BirdBrain team, Carnegie Mellon CREATE Lab researchers, 10 teachers, and 140+ students experimented with robotics-supported science & math activities in elementary school classrooms [2,3]. The feedback was that innovative hands-on activities for math were more needed than those for science. With additional NSF funding for a three year research plan [4], BirdBrain pivoted to creating new tools for elementary math education.

Math curricula is studied & teacher feedback is gathered

Fall 2018 & Early 2019: BirdBrain studied the four most common math elementary curricula [5], and held focus groups that presented ideas for electronic or app-connected manipulatives and robots. The two ideas that stood out to the math teachers in the focus groups - a sensor-enhanced tower for place value, and a grid of LEDs for arithmetic - were developed further.

Prototypes are piloted with teachers over 1 week

Spring & Fall 2019: The BirdBrain and CMU CREATE Lab teams worked with 10 teachers for 1-week pilots using prototype versions of Cube and Glow [6,7,8]. Teachers and students responded positively, while also providing numerous suggestions for improvement of both hardware and software.

Advanced prototypes are piloted with teachers over the school year

Early 2020: BirdBrain manufactured 150 Glow and 300 Cube prototypes for use in long-term pilots. Ten teachers were recruited and trained in January 2020, with a goal of starting the pilots in the spring. The pandemic altered the research plan significantly. In fall of 2020, six teachers began to use Cube and Glow extensively in their classrooms, and that continued in hybrid and remote settings throughout the 2020-21 school year. Teachers reported high student engagement, conceptual breakthroughs, and ease in using the technology to differentiate learning and to promote math talk.

Advanced prototypes are piloted with teachers over the school year

Spring & Fall 2022: Teacher and student materials are finalized, new software enhancements are completed, and the Owlet Math Tools collection is officially launched. Cube and Glow take flight to classrooms around the world!

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The summaries above are drawn from one or more research papers, but are not direct quotes from those papers.

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