



# KIBO Research Basis

KIBO™ is based on over 15 years of research conducted by KinderLab co-founder **Dr. Marina Bers**. At her DevTech Research Group at Tufts University, Bers and her team developed both the theoretical foundation and the robotic prototypes that, with the support of the National Science Foundation, became KIBO. Her research shows specific, powerful and positive learning outcomes for young learners (ages 4–7) when working with KIBO. Below is a synopsis of key research from the DevTech Research Group. For a full listing of the supporting research, visit [www.kinderlabrobotics.com/research-articles](http://www.kinderlabrobotics.com/research-articles).

## Improved Sequencing Ability in Early Childhood

PreK-Gr2 students' performance on standard assessments of sequencing ability improved from 20-35% after an 8-week robotics and coding curriculum with KIBO.

- Kazakoff, E.R. & Bers, M.U. (2014). Put your robot in, Put your robot out: Sequencing through programming robots in early childhood. *Journal of Educational Computing Research*, 50(4).
- Kazakoff, E., Sullivan, A., & Bers, M.U. (2013). The effect of a classroom-based intensive robotics and programming workshop on sequencing ability in early childhood. *Early Childhood Education Journal*, 41(4), 245-255. doi:10.1007/s10643-012-0554-5.

## Mastery of Foundational Programming and Robotics Skills

As early as Pre-K, children master KIBO's robot parts as well as the basic syntax of KIBO's blocks. Older children can explore more complex CS concepts with KIBO.

- Elkin, M., Sullivan, A., & Bers, M.U. (2016). Programming with the KIBO Robotics Kit in Preschool Classrooms. *Computers in the Schools*, 33:3, 169-186.
- Sullivan, A., & Bers, M.U. (2015). Robotics in the early childhood classroom: Learning outcomes from an 8-week robotics curriculum in pre-kindergarten through second grade. *International Journal of Technology and Design Education*. Online First.

## STEAM Success: Integration of Robotics Across Curricula

The ease of building and decorating KIBO allows teachers to implement KIBO successfully to support diverse STEAM curricula.

- Sullivan, A., Strawhacker, A., & Bers, M.U. (2017). Dancing, drawing, and dramatic robots: Integrating robotics and the arts to teach foundational STEAM concepts to young children. In Khine, M.S. (Eds.) *Robotics in STEM Education: Redesigning the Learning Experience*. Springer.
- Sullivan, A., & Bers, M.U. (2017). Dancing robots: Integrating art, music, and robotics in Singapore's early childhood centers. *International Journal of Technology and Design Education*. Online First. doi:10.1007/s10798-017-9397-0.

## Positive Impact on Underrepresented Groups in STEM Fields

KIBO curricula, when implemented in a developmentally appropriate way, can significantly increase girls' desire to be an engineer when they grow up and may also counteract many masculine stereotypes or opinions they are beginning to form about STEM.

- Sullivan, A. & Bers, M. U. (2016). Girls, boys, and bots: Gender differences in young children's performance on robotics and programming tasks. *Journal of Information Technology Education: Innovations in Practice*, 15, 145-165.
- Sullivan (2016). *Breaking the STEM Stereotype: Investigating the Use of Robotics to Change Young Children's Gender Stereotypes About Technology and Engineering* (PhD dissertation).