

1135-VH-1394      **Michael E Matthews\*** (michaelmatthews@unomaha.edu), 6001 Dodge St., UNO DSC 231, Omaha, NE 68182, **Michelle Friend** (mefriend@unomaha.edu), 6001 Dodge St., UNO RH 308J, Omaha, NE 68182, **Betty Love** (blove@unomaha.edu), 6001 Dodge Street, UNO DSC 224, Omaha, NE 68182, and **Victor Winter** (vwinter@unomaha.edu), 6001 Dodge St., UNO PKI 174C, Omaha, NE 68182. *Impact of functional programming on visual-spatial ability and functional reasoning of gifted elementary school students.* Preliminary report.

We report on a project in which elementary school students in a mid-sized Midwestern town were provided math/coding lessons for ten weeks. The curriculum used Bricklayer, an open-source, online educational ecosystem that provides an example-rich and problem-dense domain in which students learn to write in the functional programming language SML. When executed, Bricklayer programs can produce artifacts in electronic LEGO®, Minecraft, or 3D printing format. Bricklayer provides a low-threshold environment for elementary students to learn about and use algebraic structures like algebraic expressions, geometrical structures like coordinates or lines, and functional reasoning like repeatedly calling a function with parameters. 62 participants came from nine different schools in an urban setting. Participants were tested for mathematical gains using a pre- and post-test design. Participants took tests that measured their understanding of coordinate systems, their visual-spatial ability, and their understanding of functional concepts. Significant changes between pre- and post-test scores with moderate effect sizes were present in understanding of coordinate systems and visual spatial ability, with small growth reported in functional reasoning. (Received September 21, 2017)