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*Spatial Reasoning and Communication: Core Mathematics Curriculum*

Many areas of human reasoning, particularly of applications of mathematics in engineering and science, as well as core problems in mathematics depend on solving problems embedded in space. Human reasoning to solve these problems (including setting up the computer programs that are part of the solutions), as well as communication across disciplines working on shared problems, depends on spatial reasoning. Studies show that many students emerge from our high schools weak and uncertain in spatial reasoning. In Engineering there are programs for first year students to develop spatial reasoning – programs which have demonstrated improved performance and improved retention, further demonstrating that spatial reasoning is learnable at all ages. There are reasons to provide programs to develop spatial reasoning for first year mathematics students, and for graduating mathematics teachers. I am currently developing such modules for use at York University. For the 21st century, we must either provide such supports in first year, or ensure students enter with strength in spatial reasoning and continue to develop their spatial reasoning.