Implementing a Spatial Reasoning Mathematics Program (SRMP) in Grades 3 through 4

Joanne Mulligan
Macquarie University
<joanne.mulligan@mq.edu.au>

Geoff Woolcott
Southern Cross University
<geoff.woolcott@scu.edu.au>

Michael Mitchelmore
Macquarie University
<mike.mitchelmore@y7mail.com>

Susan Busatto
Macquarie University
<susan.busatto@mq.edu.au>

Jennifer Lai
Macquarie University
<Jennifer.lai@mq.edu.au>

Brent Davis
University of Calgary
<abdavi@ucalgary.ca>

This presentation provides an overview of the development and trialling of a *Spatial Reasoning Mathematics Program* (SRMP) in one cohort of 30 students over an 18-month period in Grades 3 through 4. Integral to a larger study, *Connecting Spatial Reasoning with Mathematics Learning**, the SRMP embedded transformation skills in learning sequences comprising repeating and growing patterns, 2D and 3D relationships, structuring area and perimeter, directionality and perspective taking. There were significantly better gains by the experimental group on the *Pattern and Structure Assessment-2* (PASA-2) measure of awareness of pattern and structure, and on the PASA-Sp assessment of spatial ability at post-SRMP. There were no significant differences found between groups on the PATMaths4 test of mathematics achievement. Qualitative analyses indicated that students developed complex spatial concepts that supported their mathematical reasoning, well beyond curriculum expectations.

References

Mulligan, J., Woolcott, G., Mitchelmore, M., Busatto, S., Lai, J., & Davis, B. (2020). Evaluating the impact of a Spatial Reasoning Mathematics Program (SRMP) intervention in the primary school. *Mathematics Education Research Journal, 32*(2), 285-305. https://doi.org/10.1007/s13394-020-00324-z

Mulligan, J. T., Woolcott, G., Mitchelmore, M., & Davis, B. (2018). Connecting mathematics learning through spatial reasoning. *Mathematics Education Research Journal, 30*(1), 77-87.

*Australian Research Council Discovery Grant No. DP170101588 Connecting Spatial Reasoning with Mathematics Learning 2017-2021.

2021. In Y. H. Leong, B. Kaur, B. H. Choy, J. B. W. Yeo, & S. L. Chin (Eds.), *Excellence in Mathematics Education: Foundations and Pathways (Proceedings of the 43rd annual conference of the Mathematics Education Research Group of Australasia)*, p. 437. Singapore: MERGA.