IES Institute of Education Sciences

STUDY SNAPSHOT
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Regional Educational Laboratory Central
At Marzano Research

What Grade 7 Foundational Knowledge and Skills Are Associated with Missouri Students' Algebra I Achievement in Grade 8?

To increase opportunities for students to take more advanced math courses in high school, many school districts enroll grade 8 students in Algebra I, a gateway course for advanced math.[1] But students who take Algebra I in grade 8 and skip other math courses, such as grade 8 general math, might miss opportunities to develop the foundational knowledge and skills required for success in advanced math courses.[2] This leaves educators to determine which students are ready for Algebra I in grade 8 and which are not. To inform strategies that address this challenge, this study examined whether student knowledge in five math domains in grade 7 (ratios and proportional relationships; the number system; expressions and equations; geometry; and statistics and probability) was associated with Algebra I achievement in grade 8.

Key findings

- *Scores in all five math domains in grade 7 were associated with Algebra I achievement in grade 8; the expressions and equations domain had the strongest association.* The score in each math domain in grade 7 was independently associated with Algebra I achievement in grade 8, above and beyond the associations of scores in the other four domains. The strongest association was for the expressions and equations domain. Getting an additional 3 items correct of that domain's 13 items while scores in the other four math domains stay the same is associated with scoring 2.8 points higher on the Algebra I End-of-Course Assessment in grade 8. That is more than a quarter of the point range of the basic achievement level and the proficient achievement level. These findings suggest that Missouri educators might consider adding math domain scores on the Missouri Assessment Program in grade 7, particularly the expressions and equations domain, to the factors they use to determine whether students are ready to take Algebra I in grade 8.
- *The association between the number system domain and Algebra I achievement was stronger for English learner students than for non–English learner students.* The association was about twice as strong for English learner students as for non-English learner students, suggesting that Missouri educators might want to pay particular attention to this domain when determining whether English learner students are ready to take Algebra I in grade 8. Getting an additional two items correct of that domain's eight items when scores in the other four math domains stay the same is associated with scoring 4.1 points higher on the Algebra I End-of-Course Assessment in grade 8 for English learner students but is associated with scoring 2.0 points higher for non–English learner students. These findings may be due in part to the fact that the number system domain contains a smaller proportion of contextual items, which require students to read and interpret situations before conducting math calculations. The sample used for this study was not ideal for investigating whether associations differ by English learner status because it included only a small number of English learner students (228). Further analyses, preferably with a larger sample of English learner students, are needed to support the generalizability of these findings.

1. Star, J. R., Caronongan, P., Foegen, A., Furgeson, J., Keating, B., Larson, M. R., … Zbiek, R. M. (2015). *Teaching strategies for improving algebra knowledge in middle and high school students* (NCEE 2015–4010). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance. https://eric.ed.gov/?id=ED555576.
2. Domina, T., McEachin, A., Penner, A., & Penner, E. (2015). Aiming high and falling short: California's eighth-grade Algebra-for-All effort. *Educational Evaluation and Policy Analysis, 37*(3), 275–295. https://eric.ed.gov/?id=EJ1072750.