EdInstruments

Considerations for Use of Middle Grades Mathematics Assessments[1]

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EdInstruments catalogs middle grades mathematics assessments for use in research and practice, as part of its larger library of instruments. These middle grades math instruments appear within Academic Knowledge and Skills > Math on the EdInstruments website. To guide potential users, this brief outlines middle grades mathematics content, discusses the importance of math assessments in middle grades, describes the middle grades math instruments search and selection process, and presents specific recommendations and considerations for using the instruments. While we do not endorse individual instruments, we provide examples of instruments for various uses. Users can navigate our website to explore additional options.

What should students learn in middle grades math?

The middle grades are a crucial time for students to build upon their foundational math knowledge from elementary school and be introduced to new content areas (Brahier, 2020; Senk & Thompson, 2020). According to the Common Core State Standards, fifth graders should focus on operations and algebraic thinking, numbers and operations in base ten, fractions, measurement and data, and geometry. Sixth and seventh graders should be exposed to more advanced topics such as ratios and proportional relationships, the number system, expressions and equations, and statistics and probability. Finally, eighth graders should continue to study functions and delve deeper into previously learned content areas. Overall, the middle grades provide an essential foundation for more advanced math courses in high school, such as algebra.

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Why conduct middle grades math assessments?

Math assessments in middle school provide valuable information on students' progress and understanding of math concepts. These assessments help educators identify areas of strength and weakness and tailor instruction to meet the needs of individual students (Bryk et al., 2015). They also serve as measures of how well students are meeting grade-level expectations and can provide an early warning for potential difficulties in high school math courses (Balfanz et al., 2007). Additionally, math assessments can provide accountability for both educators and students, as they can be used to track progress over time and inform instructional decisions (Carnoy & Loeb, 2002). In sum, conducting math assessments in middle school contributes to the data infrastructure for promoting student success in mathematics.

Middle grades math assessments on EdInstruments

The EdInstruments team collected middle grades math tests for EdInstruments by conducting database searches, reviewing publisher websites, and soliciting expert recommendations. For consistency, one researcher on our team undertook the entire coding process.

We used the following protocol during the instrument selection process:

- We included only formal assessments that could be administered by a researcher or in collaboration with schools/districts for the purpose of a large-scale program evaluation.
- We excluded tests designed solely to be used by teachers or clinicians for individual diagnostics.
- We excluded state summative tests (e.g., individual state tests, PARCC, Smarter Balanced, or ACT Aspire). The Iowa Assessments are a notable exception because they are based on the older Iowa Tests of Basic Skills and are administered specifically for research purposes.
- We excluded assessments soon to be discontinued (e.g., easyCBM).
- We included the newest edition when multiple editions of a test were available.

Table 1 presents the 17 measurements selected in this process. For each instrument listed in Table 1, the supplementary material spreadsheet presents detailed information, including external links, reliability, evidence of validity and fairness, technical references, time, and cost.

Table 1. EdInstruments: Middle Grades Mathematics Assessments

#	Name	Grades range
1	aimswebPlus	PK-12
2	FastBridge aMath	K-8
3	FastBridge CBMmath	K-12
4	Group Mathematics Assessment and Diagnostic Evaluation (GMADE)	K-12
5	HMH Math Inventory	K-12
6	i-Ready	K-12: diagnostic K-8: growth monitoring 2-8: standards mastery
7	Iowa Assessments (Forms E and F)	K-12
8	ISIP Math	PK-8
9	Kaufman Test of Educational Achievement 3rd edition (KTEA-3)	PK-12+
10	NWEA MAP Growth	K-12
11	Stanford Achievement Test Series 10th edition (SAT10)	K-12
12	Star Math	1-12
13	TerraNova3	K-12
14	Test of Mathematical Abilities 3rd edition (TOMA-3)	2-12
15	Wechsler Individual Achievement Test 4th edition (WIAT-4)	PK-12+
16	Wide Range Achievement Test 5th edition (WRAT5)	K-12+
17	Woodcock-Johnson IV	PK-12+

Assessing students with disabilities

Several middle grades mathematics assessments on EdInstruments may be used for assessing students with disabilities. First, for the identification of learning disabilities or difficulties, the Woodcock-Johnson IV, the Kaufman Test of Educational Achievement, 3rd Edition (KTEA-3), Wechsler Individual Achievement Test – 4th Edition (WIAT-4), and the Wide Range Achievement Test – 5th Edition (WRAT5) may be used. These individually administered include accessibility features for individuals with limited expressive abilities and may be used to make special education eligibility decisions and inform the development of Individualized Education Programs (IEPs) for students with disabilities. For making decisions to guide instruction, aimsweb may be used. Assessments of this type are intended to be used primarily used in general education classrooms and within the multi-tiered system of support (MTSS) framework in order to provide targeted instruction to support student achievement of grade-level expectations (Eagle et al., 2015; Utley & Obiakor, 2015).

Recommendations for using middle grades mathematics assessments in research

While researchers should consider the utility of each assessment for their specific research design and purpose, we recommend special consideration of the NWEA MAP Growth. This assessment is of high technical quality, commonly used in research, and well-known in practice. The newer Iowa Assessments (formerly the Iowa Tests of Basic Skills) share many of these benefits. If individually-administered assessments (1–on–1) are appropriate for the research design (and sufficient resources are available), additional high-quality options include the Woodcock-Johnson IV and the WIAT-4. Used in program evaluation research, the SAT10 and GMADE are high quality tests aligned to the NCTM 2000. For researchers looking for shorter assessments, there are tests that can be completed within a reasonably short time such as aimsweb (often used for program evaluation), WRAT5 (focused mainly on computation), and TOMA-3 (includes word problems and measures of mathematics attitudes).

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