Accelerate and Fill the Gaps: What i-Ready Diagnostic and Grade 6 Ratio Assessment Data Reveal About Below-Grade-Level Learners

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Abstract

Grade 6 ratio instruction produced grade-level mastery in students the fall diagnostic placed below grade level, but not in the students furthest behind. This paper compares i-Ready Diagnostic 1 results for 132 Grade 6 students with results from a 13-item Comparing Ratios assessment (6.RP.A.1, 6.RP.A.3) taken by 104 of them on October 22, 2026. Only 5 students (3.8%) placed on grade level on the diagnostic, yet 31 (29.8%) passed the grade 6 assessment, about 8 times the diagnostic's on-grade rate. Guessing alone would produce about 4 passing scores, and the class mean of 6.7 correct was well above the chance level of 4.3 ($t = 8.6$, $p < .001$). At least 26 passing students therefore placed below grade level in the fall. In contrast, 41 students (39.4%) scored within the range expected from guessing. Item analysis traces their errors to whole-number bias, a fraction-magnitude gap from grades 3 to 5. Consistent with research on learning acceleration, adaptive practice and high-dosage tutoring, the paper recommends keeping grade 6 instruction as the core for all students. It proposes the L.A.P. Program (Learning, Assessment and Practice), a two-room extended-hours model that adds data-driven teaching and blended edtech practice for students two or more grade levels behind.

Keywords: learning acceleration, remediation, i-Ready, ratio reasoning, whole-number bias, extended learning time, blended learning

1. Introduction

Three of every four students in this Grade 6 cohort began the year two or more grade levels behind in mathematics. On i-Ready Diagnostic 1, 99 of 132 students (75%) placed at Grade 4 or below, and 64 (48%) placed three or more levels below. That is the core

problem this paper addresses.

Schools facing this gap usually choose between two paths. Remediation reteaches earlier-grade content before moving on. Acceleration keeps students on grade-level content and fills gaps as they arise. The first path risks students never reaching grade-level work; the second risks leaving the students furthest behind without the foundation they need.

This paper uses the cohort's own data to ask which students benefited from grade 6 instruction, which did not, and what model would serve both groups. It draws on two assessments given in the same fall window and on published research on acceleration, adaptive edtech and extended learning time.

2. Literature Review

The evidence does not support pulling below-grade students out of grade 6 content. It does support adding targeted prerequisite work and extra time on top of that content.

Study	Finding	What it means here
TNTP and Zearn, Accelerate, Don't Remediate (2021)	50,000+ students in grades 3 to 5. Accelerated classrooms completed 27% more grade-level lessons and had half as many struggle problems as remediating classrooms (EdWeek). Not randomized.	Keep grade 6 instruction as the core; fill gaps "just in time" instead of replacing it.
Curriculum Associates, time and pass rate study	Students averaging 30 to 49 minutes a week of i-Ready Personalized Instruction, with 70%+ lesson pass rates, made significantly larger Diagnostic gains in grades K to 8. Vendor research.	Gap-filling edtech works when time is protected and pass rates are watched.

Study	Finding	What it means here
Guryan et al., high-dosage tutoring in Chicago (Northwestern IPR)	Daily 45 to 50 minute sessions, two students per tutor, produced up to 2.5 extra years of math learning in one year for grade 9 and 10 students. Cost $3,500 to $4,300 per student.	Daily, small-group, adult-supported extra time is the strongest lever for students far behind.
Reinhold et al., natural number bias (Frontiers in Education, 2020)	Low-achieving students who compare fractions by their whole-number parts are not processing fraction size at all.	Explains the Q2, Q8 and Q9 errors. These students need fraction magnitude work (number lines, benchmarks) before ratio comparison will stick.

Taken together: grade-level instruction should stay, because removing it lowers expectations and slows students down. For students two or more levels behind, it is not enough by itself. Those students need scheduled, scaffolded practice on the specific missing foundation.

3. Research Questions and Methodology

The study is a descriptive comparison of two existing assessments, analyzed against a chance model. It asks three questions:

1. Did students who placed below grade level on i-Ready demonstrate grade 6 mastery after grade 6 ratio instruction?
2. Which students show no measurable evidence of benefit, and what explains their errors?
3. Would those students be better served by scaffolded edtech lessons in extended hours, in addition to or instead of grade-level instruction?

3.1 Data sources

Source	What it measures	Students	Date	Identifier
i-Ready Diagnostic 1, Math (All Math Students)	Overall and domain placement (K to grade 6), scale score, typical and stretch growth targets	132	Fall window 09/15/26 to 12/12/26; report pulled 10/22/26	Student name
Comparing Ratios Test 2	13 compare-the-ratios items (less than, equal, greater than), 4 points each, 52 points	104	Given 10/22/26 across 5 class periods	Last 4 digits of student ID

Standards on the assessment: CCSS and Michigan 6.RP.A.1 (ratio language) and 6.RP.A.3 (ratio reasoning). Passing = 60% or higher (8 of 13 correct). The closest i-Ready domain is Number and Operations, which covers ratios, fractions and division.

3.2 Analytic approach

- **Chance model.** Each item has three answer choices (less than, equal, greater than), so a student guessing at random has a 1 in 3 chance per item. The number correct for a guesser follows a binomial distribution (n = 13, p = 1/3): mean 4.3 correct, and a 3.5% chance of 8 or more.
- **Test against chance.** A one-sample t-test compares the class mean number correct to 4.3.
- **Bounding argument.** Because the two reports use different identifiers, students cannot be matched one to one. The minimum number of below-grade passers is the number of passers minus the number of on-grade students.
- **Domain alignment.** Pass rates are compared with i-Ready Number and Operations placements, the domain closest to ratio reasoning.
- **Item and distractor analysis.** Items are classed as congruent (the ratio with larger numbers is also the larger ratio) or incongruent (it is not). Wrong answers are checked for the pattern whole-number bias predicts.

4. Results

4.1 Diagnostic placement

The fall diagnostic shows a cohort far below grade level: 5 of 132 students (3.8%) placed on grade level, and 99 (75%) placed two or more levels below.

i-Ready overall placement	Students	Share
Mid 6 or above	1	1%
Early 6 (on grade level)	4	3%
Grade 5 (one level below)	28	21%
Grade 4 (two levels below)	35	27%
Grade 3 to K (three or more below)	64	48%

Scale scores ran from 366 to 514 (median 450.5). In Number and Operations, 7 students placed at grade 6, 42 at grade 5, and 82 at grade 4 or lower. Geometry and Measurement and Data were the weakest domains.

4.2 Assessment outcomes

The grade 6 ratio assessment shows far more grade-level success than the diagnostic predicts: 31 of 104 students (29.8%) passed, against 3.8% on grade level overall and 5.3% in Number and Operations.

Ratios Test 2 outcome	Correct of 13	Students	Share
Passed (A to D)	8 to 13	31	30%
Near passing	6 to 7	32	31%
Indistinguishable from guessing	0 to 5	41	39%

Class mean 51.8% (6.7 of 13 correct), median 46.2%, standard deviation 21.9 percentage points; 4 perfect scores. Scores were bimodal: a large cluster at 4 to 7 correct and a second, smaller cluster at 10 to 13.

4.3 Performance against chance

The class as a whole performed well above chance, but the lowest 39% scored exactly where guessing would place them (Figure 1).

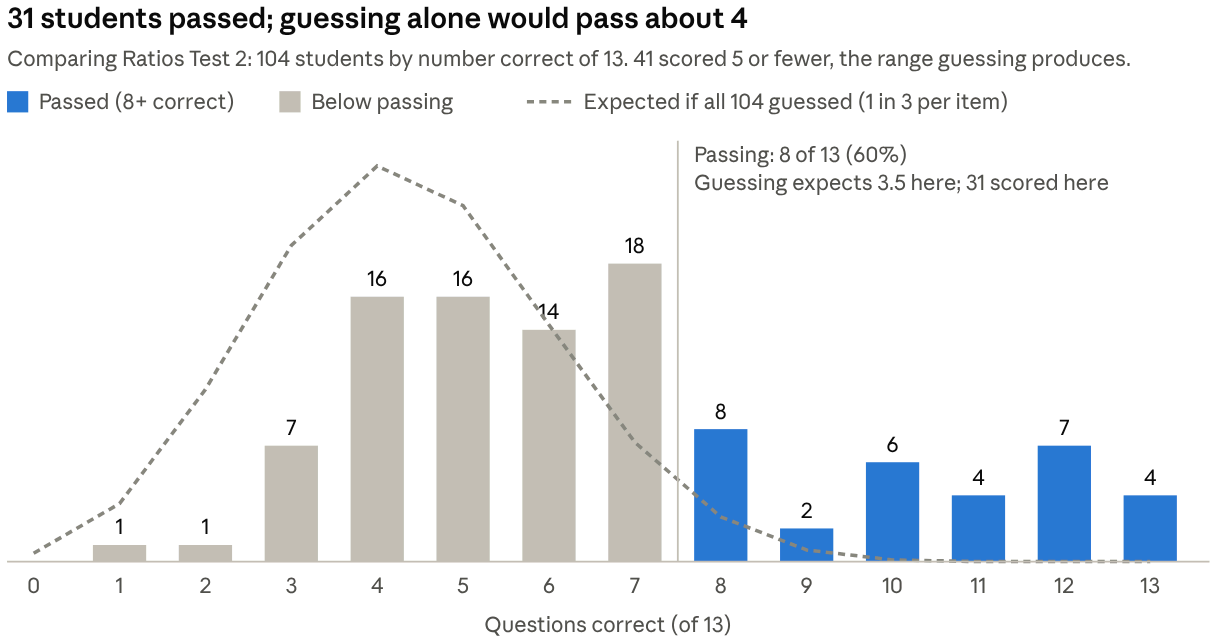


Figure 1. Distribution of scores vs. a pure-guessing model (binomial, n = 13, p = 1/3), Comparing Ratios Test 2, 104 students

- **Above chance overall.** The class averaged 6.7 correct against 4.3 expected from guessing ($t \approx 8.6$, $p < .001$). Grade 6 instruction moved the class as a group.
- **Passing is real evidence.** A guesser has a 3.5% chance of 8 or more correct. Guessing predicts about 4 passing students; 31 passed. Since i-Ready placed at most 5 students on grade level, at least 26 passers were below grade level.
- **The passing rate lines up with the near-grade group.** 30% passed. In Number and Operations, 37% of students placed at grade 5 or 6. That fits a pattern where passers come mostly from students within one grade level. This is an inference until IDs are matched to names.
- **The bottom 39% shows no measurable gain.** 41 students scored 5 or fewer. On the misconception items (Q2, Q8, Q9), wrong answers clustered on the ratio with bigger numbers. That means many low scorers were not guessing at random. They applied a whole-number rule that grade 6 instruction alone did not fix.

4.4 Item and distractor analysis

Students answered items 14 points less accurately (48% vs. 62%) when the ratio with the bigger numbers was not the larger ratio (Figure 2). That is the signature of whole-number bias.

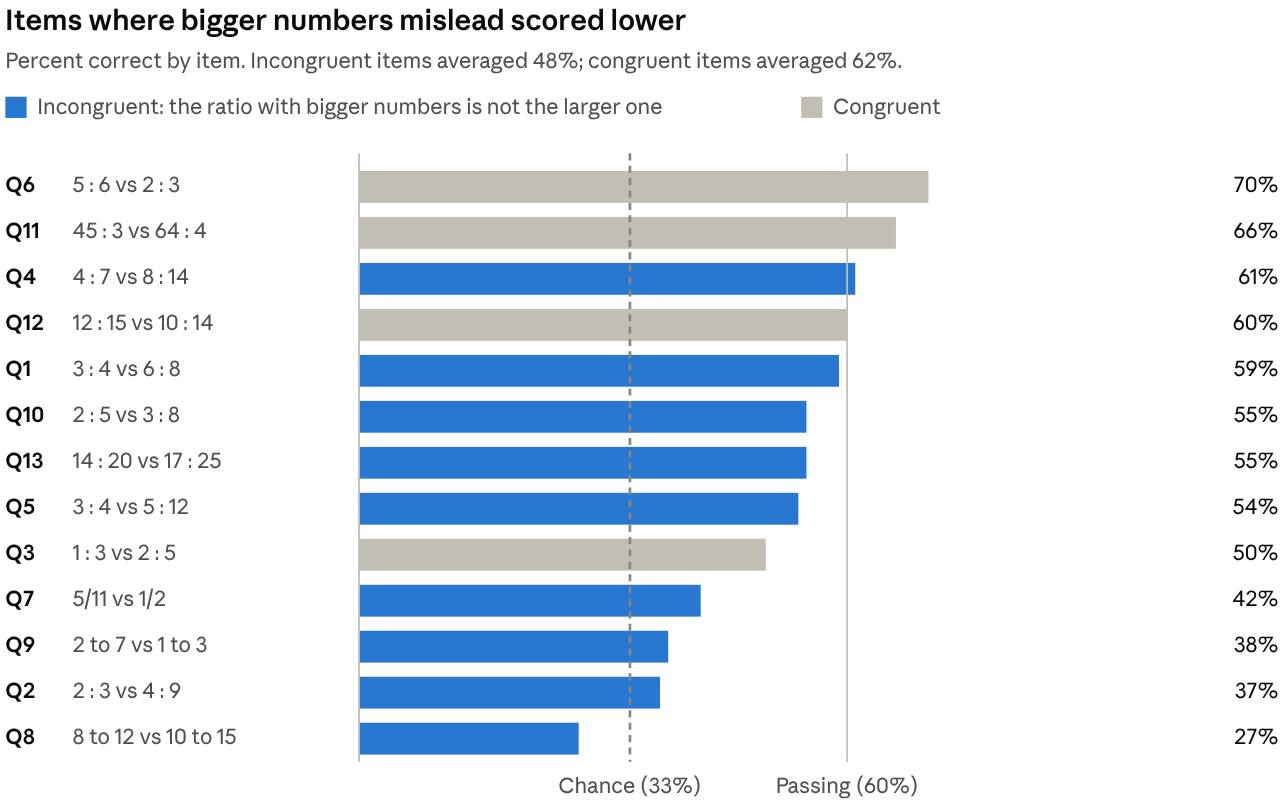


Figure 2. Question-by-question results, Comparing Ratios Test 2, 104 students

The wrong answers confirm it. On Q8 (8 to 12 vs 10 to 15, which are equal), 45 students chose "less than" and only 28 chose "equal." On Q2 (2 : 3 vs 4 : 9), 57 chose "less than" because 4 and 9 look bigger. On Q9 (2 to 7 vs 1 to 3), 59 chose "greater than." Equivalent ratios built by doubling (Q1, Q4) were solved at about 60%, but the non-doubling equivalence in Q8 dropped to 27%, below chance. Students below chance were not guessing; they were applying a consistent but wrong rule.

5. Discussion

The data answer the central question in two parts. Grade 6 instruction did benefit many below-grade students. For the students furthest behind, it was not enough on its own.

Grade-level instruction worked for the near-grade group. The pass rate (29.8%) is nearly 8 times the diagnostic's on-grade rate (3.8%), and at least 26 passing students began the year below grade level. This matches the acceleration research: students held to grade-level work, with support, can perform above where a placement test puts them. A fall diagnostic measures accumulated knowledge across many domains; a unit test measures one skill just taught. Some students closed that skill gap in weeks.

The furthest-behind students show a foundation problem, not a ratio problem. The 41 students at chance level, and the below-chance result on Q8, point to a specific missing concept: understanding fractions as sizes. Ratio comparison depends on that concept. More grade 6 instruction alone is unlikely to fix it, because the error comes from earlier grades.

Implication. The choice is not between grade-level instruction and gap-filling. The near-grade group needs to stay on grade level. The far-behind group needs grade-level instruction plus added time on fraction foundations, with adaptive practice and frequent checks. That is the design of the L.A.P. Program below.

6. Proposed Intervention: The L.A.P. Program (Learning, Assessment and Practice)

Keep grade 6 instruction for every student during the school day. Add L.A.P., an extended-hours program in two rooms, for students two or more levels behind. It pairs teacher-led learning with protected, adaptive practice time, the combination the research supports.

	L.A. Room: Learning and Assessment	P Room: Practice
Led by	Certified math teacher	Paraprofessional
Feel	Collegiate: seminar tables, a full whiteboard wall, college pennants, a posted syllabus, "office hours" language	Homey: lamps, rugs, couches and beanbags, study nooks, quiet background music, as if studying in the comfort of home

	L.A. Room: Learning and Assessment	P Room: Practice
Obsession	Data monitoring. Every student has a live data profile: i-Ready placement and growth toward typical and stretch targets, summative scores by standard, misconception patterns (such as whole-number bias), and minutes and pass rates sent over from the P Room. Grouping changes weekly based on the data.	The best edtech strategy for each need, with each platform used for what it does best
What happens	Mini-lessons on the missing foundation (fraction size on number lines, benchmarks, equivalent fractions), then the grade 6 ratio skill it unlocks; whiteboard problem work in rows	**i-Ready for rigor:** Personalized Instruction (My Path) at the student's placement, 70%+ pass rate goal. **Zearn for scaffolding:** guided lessons with built-in visual models when a student is stuck on a concept. **IXL for repetition:** targeted skill practice until the skill is automatic. **Khan Academy for exit tickets:** a short check at the end of each P Room block.
Assessment	The teacher designs their own summative assessments in Google Forms (Locked mode on Chromebooks), aligned to the standards taught, and uses the results to reteach and regroup	Para tracks i-Ready minutes and pass rates, Zearn lesson completion, IXL SmartScore and Khan exit-ticket results; sends a daily data sheet to the L.A. Room and flags any student under 70%
Time per session	45 minutes	45 minutes

Who attends (decided once IDs are matched to i-Ready names):

1. **Core only:** passed Test 2 (31 students). Optional L.A.P. seats as peer tutors.
2. **L.A.P. 2 days a week:** 6 to 7 correct on Test 2 or i-Ready Grade 5 (about 32 students).
3. **L.A.P. 4 days a week:** 5 or fewer correct on Test 2 or i-Ready Grade 4 and below (about 41 students).

Each session: students start in the L.A. Room for teaching and a quick check, then move to the P Room. That rotation gives each tier 3 student 180 minutes a week of edtech practice, enough to protect the 30 to 49 minute i-Ready benchmark while leaving time for Zearn, IXL and Khan, plus daily small-group teaching. Zearn was the platform in the TNTP acceleration study above.

Success targets for i-Ready Diagnostic 2: every L.A.P. student meets typical growth (14 to 15 points); half reach stretch growth (26 to 35 points). On a Comparing Ratios retest, half of tier 3 students pass.

Standards: 6.RP.A.1, 6.RP.A.3 (grade 6 core); 3.NF.A.3, 4.NF.A.2, 5.NF.B.3 (fraction foundations in the L.A. Room); Math Practices MP2 and MP3; literacy through read-aloud word problems and partner explanation (CCSS and Michigan SL.6.1, RST.6-8.4).

7. Limitations and Future Research

The biggest limit is that the two reports can't be linked student by student yet. Every per-student claim above is a bound or an inference until they are.

- **No shared identifier.** Test 2 uses ID digits; i-Ready uses names. Next step: export a PowerSchool roster (name and student ID), fill the placement column above, and rerun this analysis by placement level.
- **Different groups.** 104 students tested; 132 took the Diagnostic. The 28 untested students may differ.
- **One test, one skill.** Test 2 covers comparing ratios only, with 3 answer choices, so guessing inflates low scores. Diagnostic 1 is a broad fall measure, not a post-test.
- **No comparison group.** This shows where students ended up after instruction, not how much instruction caused it. Diagnostic 2 in winter, compared against each student's typical growth target, is the right measure of growth.
- **Research limits.** The TNTP study was not randomized, the i-Ready study is vendor research, and the tutoring study involved high school students.

8. Conclusion

This cohort's data show that grade 6 instruction can lift students who start below grade level to grade 6 mastery: 31 of 104 students passed a grade 6 ratio assessment when the diagnostic placed only 5 of 132 on grade level. The same data show a clear group, about 4 in 10, for whom grade-level instruction alone produced no measurable gain, and whose

errors trace to fraction concepts from earlier grades. The recommended response keeps every student in grade-level instruction and adds the L.A.P. Program: data-driven teaching in the L.A. Room and blended edtech practice in the P Room, during extended hours. Matching student IDs to i-Ready names, then measuring growth on Diagnostic 2, will test whether this model closes the gap.

References

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- Northwestern Institute for Policy Research, Study: High-Dosage Tutoring (2021)
- Reinhold, Obersteiner, Hoch, Hofer and Reiss, The Interplay Between the Natural Number Bias and Fraction Magnitude Processing in Low-Achieving Students, Frontiers in Education 5:29 (2020)

Appendix A. Students who reached grade 6 proficiency

At least 26 of these 31 passing students placed below grade level on i-Ready, because only 5 students placed on grade level. 21 of them scored 77% or higher. Which ones were pulled up can't be named yet: the test report lists ID digits and i-Ready lists names. Fill the last column from a PowerSchool roster (ID to name), then look up each name on the i-Ready Diagnostic report. Any passing student at Grade 5 or below was pulled up toward grade level on this skill; a student at Grade 4 or below is the strongest case.

Student ID (last 4)	Correct	Score	Grade	i-Ready placement (fill in)
0266	13 of 13	100%	A	
2124	13 of 13	100%	A	

Student ID (last 4)	Correct	Score	Grade	i-Ready placement (fill in)
3407	13 of 13	100%	A	
4186	13 of 13	100%	A	
0249	12 of 13	92%	A	
2038	12 of 13	92%	A	
3672	12 of 13	92%	A	
4083	12 of 13	92%	A	
4092	12 of 13	92%	A	
4111	12 of 13	92%	A	
4166	12 of 13	92%	A	
0202	11 of 13	85%	B	
1428	11 of 13	85%	B	
3970	11 of 13	85%	B	
4145	11 of 13	85%	B	
0807	10 of 13	77%	C	
1828	10 of 13	77%	C	
1837	10 of 13	77%	C	
2523	10 of 13	77%	C	
3794	10 of 13	77%	C	
4044	10 of 13	77%	C	
4204	9 of 13	69%	D	
4230	9 of 13	69%	D	
0187	8 of 13	62%	D	
1821	8 of 13	62%	D	
3154	8 of 13	62%	D	
3206	8 of 13	62%	D	

Student ID (last 4)	Correct	Score	Grade	i-Ready placement (fill in)
3852	8 of 13	62%	D	
3880	8 of 13	62%	D	
7267	8 of 13	62%	D	
7372	8 of 13	62%	D	

32 more students got 6 or 7 correct (46% to 54%). They are one or two questions from passing and are the best candidates for a short reteach on Q2, Q7, Q8 and Q9.