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How Can So Many Students Be Invisible?

*Large Percentages of American Students Perform Above Grade Level*¹

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Introduction

America's K-12 education systems place students in grade levels by age and set performance expectations accordingly, using historical, average grade-level performance rather than any specific content students are expected to master.⁷ This should not surprise us. Nearly all aspects of America's schools are built upon age-based grade levels and corresponding grade-level expectations: standards, instruction, curriculum, and assessment, among others. Indeed, the Every Student Succeeds Act (ESSA), like the No Child Left Behind Act before it, has a strong grade-level framework running throughout its nearly 400 pages. The stated importance of "getting students to grade level" reinforces the implicit message that doing so is the primary purpose of schooling. This emphasis ignores an important question: How many students already perform one or more years *above* grade level on their first day of school?

The answer to this question has profound implications for American education policy and for the organization of schools. If a mere 2% of students perform above grade level, the present obsession with grade-level proficiency might make sense. But what if it were a far larger proportion? If one in every five students has surpassed that criterion before the school year even starts, policymakers would need to re-think the merits of an age-based, grade-level focus.

The purpose of this policy brief is to answer the following foundational question, which should be considered by policymakers and school administrators well before adopting curricula or assessments: How many students perform above grade level?

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⁷ Finn, C. (2016, June 15). Why Tom Loveless is wrong about NAEP achievement levels. Available: http://edexcellence.net/articles/why-tom-loveless-is-wrong-about-naep-achievement-levels?mc_cid=3fbbdf2a66&mc_eid=3a28f3f09f

Before investigating, we canvassed colleagues and friends for their estimates of the percentage of students performing above grade level. Our queries were generally met with bemused silence, followed by hesitant (and quite wide-ranging) estimates, and ended with comments such as, “That seems like a question we should be able to answer, but I just don’t know.”

Prior research in this area is limited. Two data points stand out: textbook and curriculum analyses suggest that intellectual rigor declined significantly over the last hundred years;⁸ the National Research Center on the Gifted and Talented found that teachers, using pre-testing strategies, could eliminate 40-50% of the existing curriculum for advanced elementary school students without causing achievement declines on out-of-level standardized tests.⁹ The authors noted, “Targeted students had mastered some material in all content areas prior to instruction; at a minimum, they demonstrated mastery of one-fourth of the curriculum for the year before it was taught” (p. 81). A few students in the same study had mastered three-quarters of the upcoming year’s curriculum. This research and related studies suggest that the regular classroom routinely under-challenges advanced students. This work does not, however, provide insight into the matter at hand: How many K-12 students perform above grade level?

Method

We examined five assessment data sets, focusing on those measures that had been criterion-referenced by grade level. We selected data from the Common Core-aligned but nonadaptive version of the Smarter Balanced assessment from Wisconsin; a computer-adaptive version of the Smarter Balanced assessment from California; the partially Common Core-aligned Florida Standards Assessment; multistate data from the Northwest Evaluation Association’s Measures of Academic Progress; and nationally representative data from the National Assessment of Educational Progress (NAEP).¹⁰

Source 1: Data from Smarter Balanced in Wisconsin

The Smarter Balanced assessment resulted from a 30-state collaboration that aimed to assess student learning within traditional academic areas based on the Common Core State Standards (CCSS). The assessment was designed to yield vertically scaled scores and other feedback that could inform instructional decisions. It was also designed to be computer-adaptive and thus to enable evaluation of a wide range of mastery. Not all states used the computer-adaptive version, as we explain below.

We chose data from Wisconsin’s Smarter Balanced assessment, where it also was known as the Badger Exam. Wisconsin administered the test for a single year (2014 – 2015), and utilized the fixed-form version rather than the computer-adaptive version. However, the single year of data collected

⁸ See, for example, Taylor, B. M., & Frye, B. J. (1988). Pretesting: Minimize time spent on skill work for intermediate readers. *The Reading Teacher*, 42, 100-103.

⁹ Reis, S., Westberg, K., Kulkiowich, J., Caillard, F., Hébert, T., Plucker, J. A., Purcell, J., Rogers, J., & Smist, J. (1993). *Why not let high ability students start school in January? The curriculum compacting study* (Research Monograph 93106). Storrs, CT: University of Connecticut, National Research Center on the Gifted and Talented.

¹⁰ The state level assessment data are population estimates and not samples; NAEP results reflect samples of items and students that are representative of the entire K-12 public and private school population.

could inform the question of grade-level student performance in English Language Arts (ELA) and mathematics for Grades 3-8. Wisconsin provided cut scores on ELA and mathematics at four levels: *below basic*, *basic*, *proficient*, and *advanced*.¹¹ The state set *proficient* to indicate performance that was on grade level.

Source 2: Data from Smarter Balanced in California

We included 2014 - 2015 California data from Smarter Balanced for two important reasons. First, California had implemented the computer-adaptive version of Smarter Balanced as opposed to the traditional, nonadaptive format with fixed grade-level forms used in Wisconsin. We thought this difference might yield informative comparison data between adaptive and non-adaptive versions of a single test. Second, California's vast size, high rate of test participation, and high level of student diversity, made it ideal for our study. Like Wisconsin, California set four levels of cut scores for ELA and mathematics at Grades 3-8 and 11.¹²

Source 3: Data from the Florida Standards Assessment

We also wanted to assess data from a large, diverse state that was not using the Common Core State Standards. Florida had adopted the CCSS in 2010, but modified them in February of 2014 to reflect some additions (e.g., calculus) and a new name: the Mathematics Florida Standards and the Language Arts Florida Standards. The Florida Standards Assessment (FSA) was first used in the spring of 2015 in a non-adaptive format. The state set grade-level proficiency cut scores for Grades 3-10 in English language arts and Grades 3-8 in mathematics.¹³

Source 4: Data from NWEA Measures of Academic Progress

The Measures of Academic Progress (MAP) is a computer-adaptive assessment created and supported by Northwest Evaluation Association (NWEA). Generally, the MAP is administered at least twice during the school year—once near the beginning and again at the end. The MAP is used in approximately 10% of all U.S. classrooms. The MAP pre/post administration helps account for summer loss.¹⁴ Because MAP has been aligned to the Smarter Balanced assessment, we were able to evaluate MAP scores using the Smarter Balanced criteria for grade-level proficiency.¹⁵

Unlike the state-level population data sets used from Wisconsin, California and Florida, the MAP data represented a much broader sample. Our MAP data set consisted of approximately 45,000 Grade 5 students from 33 U.S. states. Using these data we were able to determine how many students were above grade level and by what margin as of the beginning of the 2013 school year. We examined Grade 5 student data because these data provide a baseline estimate prior to the full implementation of Common Core - or the Smarter Balanced Assessment.

Source 5: Data from the National Assessment of Educational Progress (NAEP)

¹¹ <http://dpi.wi.gov/wisedash/about-data/badger>

¹² <http://www.cde.ca.gov/ta/tg/ca/sbelathresholdscre.asp>

¹³ <http://www.fldoe.org/core/fileparse.php/5663/urlt/FSACutScores.pdf>

¹⁴ cf. Rambo-Hernandez, K. E., & McCoach, D. B. (2015). High-achieving and average students' reading growth: Contrasting school and summer trajectories. *The Journal of Educational Research*, 108(2), 112-129.

¹⁵ Northwest Evaluation Association (2015). Linking the Smarter Balanced Assessments to NWEA MAP Assessments. Available at: <https://www.nwea.org/assessments/standards-alignment/>

NAEP offers the only nationally representative, longitudinal data on the academic achievement of U.S. students. Because NAEP data are only collected in Grades 4, 8, and 12, they may appear ill-suited to address our key question on above-grade-level performance. However, NAEP data can be mined to answer the closely related question, “How many Grade 4 students score better than Grade 8 students?” In assessing a four-year (or even eight-year) achievement gap, one might reasonably expect to find an extremely small number of profoundly advanced students; such individuals might not even be visible, and their educational needs therefore unknown. Our findings challenge this expectation.

NAEP provides scale scores at the 10th, 25th, 50th, 75th, and 90th percentiles for each grade level. Scale scores for both mathematics and reading range from zero to 500 and are aligned across grade levels. As a result, Grade 4 scores can be compared directly against those from Grades 8 and 12. Using the NAEP data explorer, we examined composite mathematics and reading scores from all Grades 4, 8, and 12 students – in both public and private schools – in the national NAEP data set for all years available (1990–2015).¹⁶

Results

Tables 1, 2, and 3 present the percentages of Wisconsin, California, and Florida students in a given grade level who scored at or above the proficiency threshold established for *one year above their current grade* in English Language Arts (ELA) or mathematics. Stated another way, all three tables present the percentage of students who are one or more years advanced in each content area. Additional technical details are included in the Appendix.

Wisconsin Smarter Balanced Assessment (Badger Exam)

Table 1.

Percentage of Wisconsin Students Scoring One or More Years Above Grade Level¹⁷

Grade	ELA % scoring 1+ years above	Mathematics % scoring 1+ years above
3	32%	38%
4	36%	25%
5	41%	30%
6	37%	33%
7	44%	34%
8	45%	26%

¹⁶ The Grade 12 NAEP Mathematics test was re-scaled following the 2000 test period, so we were unable to include Grade 12 mathematics scores from the years after 2000.

¹⁷ Because Wisconsin did not administer the Badger Exam at the high school level, the state did not determine cut scores for high school grades. However, other Consortium states (e.g., California, Washington) adopted the same cut scores as Wisconsin for the lower grades, while also developing cut scores for students in Grade 11. Using these scores, we also were able to estimate the percentage of Wisconsin 8th grade students who scored at the comparable Grade 11 proficiency levels that had been adopted elsewhere. Similar methods were used to determine Grade 8 grade level proficiency in California.

At the end of the 2014–2015 school year, between 25% and 45% of Wisconsin students scored at or above the next grade level in the spring of their current grade. Remarkably, more than one-third of eighth graders in Wisconsin scored at or above the Grade 11 proficiency level.

California Smarter Balanced Assessment

Table 2.

Percentage of California Students Scoring One or More Years Above Grade Level

Grade	ELA % scoring 1+ years above	Mathematics % scoring 1+ years above
3	21%	19%
4	27%	18%
5	33%	11%
6	33%	27%
7	36%	27%
8	37%	34%

Between 11% and 37% of California students scored at or above the next grade level in the spring of their current grade level. The percentages tend to be higher for students in the older grades.

Florida Standards Assessment

Table 3.

Percentage of Florida Students Scoring One or More Years Above Grade Level

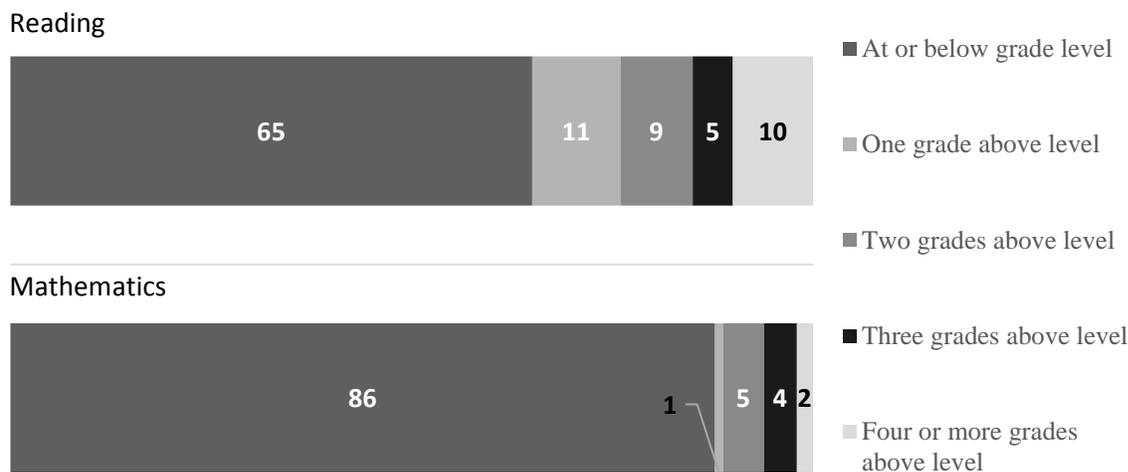
Grade	ELA % scoring 1+ years above	Mathematics % scoring 1+ years above
3	30%	36%
4	33%	40%
5	40%	44%
6	35%	40%
7	42%	38%
8	42%	N/A
9	37%	N/A

Between 30% and 44% of Florida students scored at or above the next grade level in the spring of their current grade levels. These numbers are higher than those gathered from both Wisconsin and California. Although not presented here, these percentages are similar to those we found using the previous year’s (2014) Florida achievement test (FCAT 2.0).

NWEA MAP Reading

We used the Grade 5 Fall 2013 MAP data to estimate how many students were at least one year above grade level, by determining how many students at the *beginning* of Grade 5 were already achieving at *end-of-year* Grade 5 proficiency levels on MAP reading. We were also able to determine how many of these above-grade-level students achieved MAP test scores equivalent to year-end scores for sixth, seventh, and eighth graders. Figure 1 presents these findings graphically.

Figure 1. Grade 5 Student Proficiency Level on Fall 2015
Measures of Academic Progress



At the beginning of their Grade 5 year, approximately 35% of students had scores commensurate with end-of-year Grade 5 proficiency reading levels (Figure 1). Further, approximately 10% of all Grade 5 students in our data demonstrated Grade 8 level end-of-year proficiency. These students were four school years ahead of grade level in reading, essentially reading at almost high-school level. These results are consistent with what we found in the California Smarter Balanced data and are slightly lower than results from Wisconsin and Florida.

NWEA MAP Mathematics

Nearly 14% of all Grade 5 students at the beginning of the school year were already earning MAP scores consistent with end-of-Grade-5 proficiency (Figure 1). About 2.4% of all Grade 5 students were achieving at levels equal to, or above, the end-of-Grade-8 (or high school level, four school years ahead of grade level) in mathematics. These estimates are smaller than those from the Wisconsin, California, and Florida data.

NAEP Reading

Figure 2 shows NAEP reading scores for Grade 4 students scoring at the 75th and 90th percentiles, Grade 8 students scoring at the 25th and 50th percentiles, and Grade 12 students scoring at the 10th and 25th percentiles. In reading, the top 25% of Grade 4 students have outscored the bottom 25% of Grade 8 students in every year that NAEP testing occurred over the last 26 years, except for 2002, when the groups had the same score.

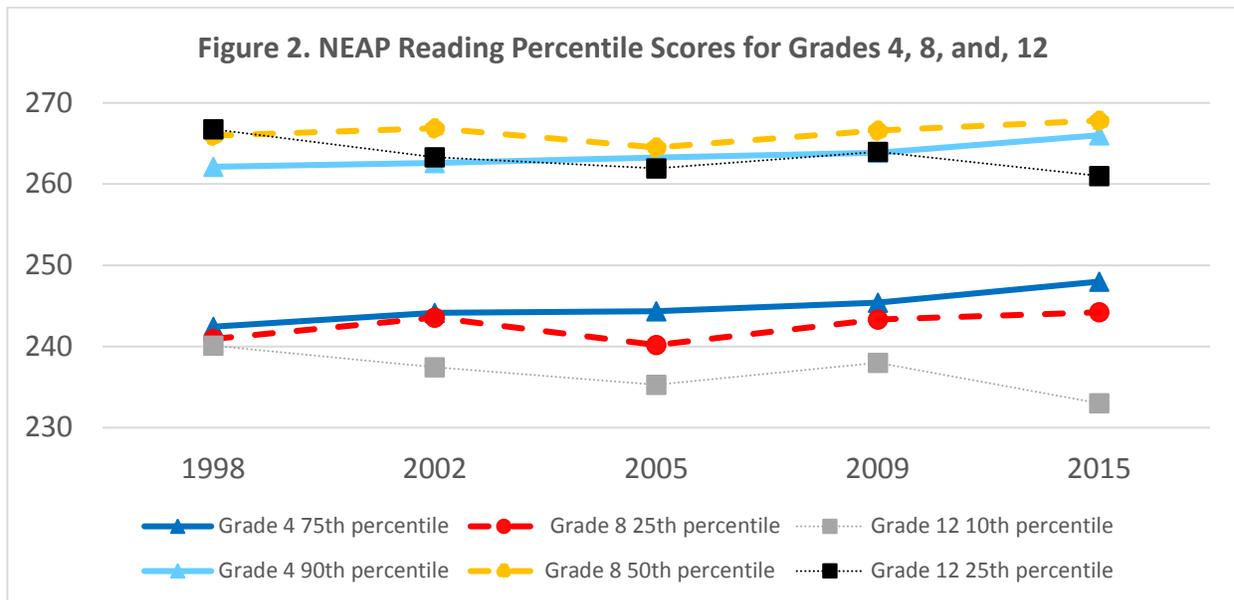
The top 10% of Grade 4 reading scorers never outscored the 50th percentile of Grade 8 students, but came within the standard error of measurement in 1992 and 1994 and were only 1 point lower in 2007. This means that nearly 10% of Grade 4 students outscored the bottom half of Grade 8 students in reading.

The top 50% of Grade 8 reading scorers have surpassed the bottom 25% of Grade 12 reading scorers every year since 2002. Even more impressive, the top 10% of Grade 4 reading scorers have also outscored the bottom 25% of Grade 12 reading scorers in every testing session since 2002 despite being on average eight years younger.

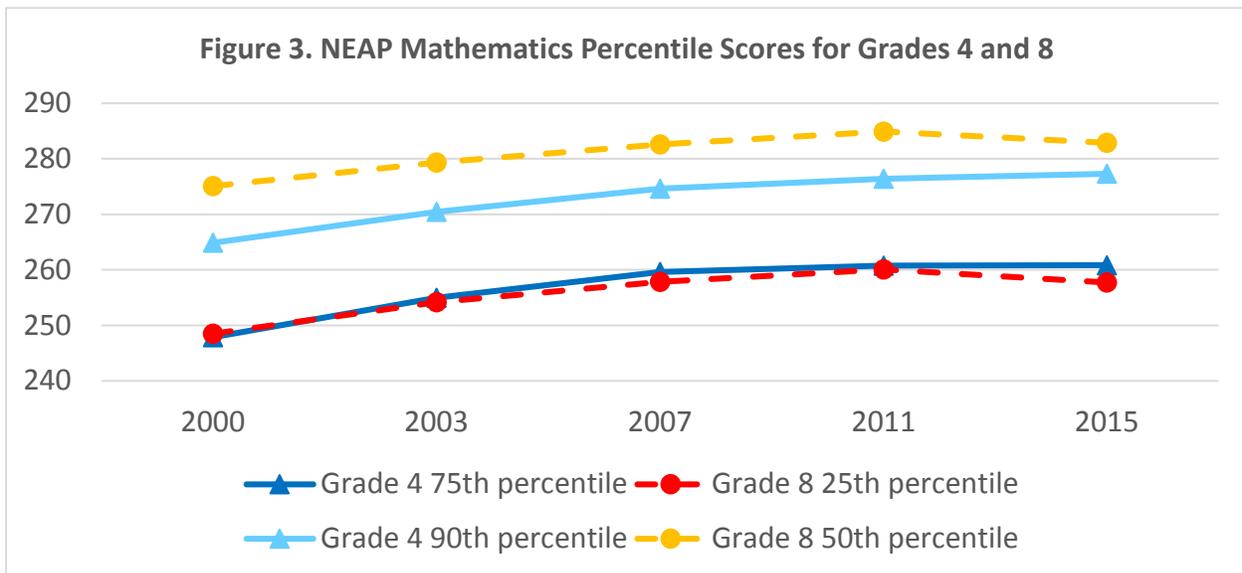
NAEP Mathematics

Figure 3 shows NAEP mathematics scores for Grade 4 students scoring at the 75th and 90th percentiles and Grade 8 students scoring at the 25th and 50th percentiles (the Grade 12 mathematics test was administered inconsistently in the selected years). In mathematics, the top 25% of Grade 4 students scored slightly worse than the bottom 25% of Grade 8 students between 1990 and 2002, but they began outscoring their older peers around 2003 and have equaled or outscored them in every subsequent test administration since that time.

The top 10% of Grade 4 mathematics scorers have never exceeded the 50th percentile score of Grade 8 students, but they have closed the 11-point gap evident in 1990 by more than half (to only 5 points) as of 2015. In other words, 10% of Grade 4 students are not outscoring half of Grade 8 students, but it is likely that more than 5% of Grade 4 students are.



Note. Roughly every other testing cycle is omitted to simplify the figure.



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Conclusions

Conclusion 1: Very large percentages of students are performing above grade level.

Five different data sets from five distinct assessment administrations provide consistent evidence that many students perform above grade level. Based on the Wisconsin and California Smarter Balanced, Florida FSA, and multistate MAP data, we estimate that 20-40% of elementary and middle school students perform at least one grade level above their current grade in reading, with 11-30% scoring at least one grade level above in math.

It is not surprising that the mathematics percentages, although quite high, are not as large as the reading/language arts numbers. Due to inconsistent or absent policies regarding acceleration, high-performing Grade 5 or 6 students are rarely given access to algebra, geometry, statistics, or calculus courses. The lack of acceleration in math thus provides a structural barrier to moving too far “above grade level.” Achievement in reading does not face similar barriers.

Conclusion 2: Large percentages of students are performing *well* above grade level.

Using MAP data, we estimate that 8-10% of Grade 4 students perform at the Grade 8 level in reading/English/language arts, with 2-5% scoring at similar levels in math. Relying specifically on the MAP data, one out of every ten fifth graders is performing at the high school level in reading, and nearly one child in 40 at this age is performing at the high school level in mathematics. Because of the MAP test’s computer-adaptive format and high measurement ceiling, these results cannot be explained away by the correction that commonly applies to pencil-and-paper grade-level achievement tests. On the latter tests, a fifth-grader with a ninth-grade-level equivalent score amounts to a ninth-grader’s completing a fifth-grade test. By contrast, a MAP test score equivalent to ninth-grade performance is in fact based on ninth-grade content knowledge and skills.

Conclusion 3: These percentages represent staggeringly large numbers of students.

Converting these percentages to numbers of children provides a sobering picture of the number of students who are not well served under the current grade-based educational paradigm. In Wisconsin alone, some 20,000 students per grade level are performing more than a year ahead of grade-level expectations. Overall, somewhere between 278,000 and 330,000 public-school Wisconsin students across grades K-12 are performing more than a full grade above where they are placed in school. In the much larger state of California, across grades K-12 somewhere between 1.4 million and 2 million students are currently performing more than a full grade level above where they are placed in school.

NAEP data provide evidence that, in 2013 alone, more than 400,000 Grade 4 students performed above the level of the lowest quarter of Grade 12 students in reading. Roughly 14.5 million Grade 4 students have scored at this level in reading in the years since 2002. Looking at NAEP mathematics scores, in 2015 alone more than a million Grade 4 students would have outscored the same number of Grade 8 students. In other words, in a single recent year, there were more students in the U.S. already working four years above grade level than the entire population of Rhode Island.

Implications

Implication 1: Federal and state education policies focusing on grade-level proficiency are irrelevant for a huge number of American students.

Bringing students to grade-level proficiency has been a focus of U.S. education policy and practice for well over a decade, but little attention has been devoted to addressing the learning needs of those students who already have achieved this proficiency target before setting foot in the classroom. This may be because—as our informal experience suggests—it has widely been supposed that there are only a very few such learners. The present work demonstrates that this supposition is flawed. This begs the question of just what these students are learning from grade-level content in classes organized by age. The U.S. likely wastes tens of billions of dollars each year in efforts to teach students content they already know.

Implication 2: The U.S. K-12 context, which is organized primarily around age-based grade levels, needs serious rethinking.

Clearly, either something is wrong with how grade-level performance is determined, or the K-12 educational system should be providing a different educational environment to meet the learning needs of many American students. Our findings suggest that a great many students could benefit from whole-grade or single-subject acceleration. Indeed, this is consistent with the literature, which has documented uniformly positive benefits when academic acceleration is implemented thoughtfully.¹⁸ Academic acceleration is particularly beneficial for students pursuing professional

¹⁸ Steenbergen-Hu, S. & Moon, S. M. (2011). The effects of acceleration on high-ability learners: A meta-analysis. *Gifted Child Quarterly*, 55(1), 39-53. doi: 10.1177/0016986210383155; Assouline, S. G., Colangelo, N., Lupkowski-Shopluk, A., Forstadt, L., & Lipscomb, J. (2009). *Iowa Acceleration Scale manual: A guide for whole-grade acceleration K-8*. Scottsdale, AZ: Great Potential Press.

careers that require substantial academic preparation and credentialing, a point that has been recognized for more than 80 years.¹⁹

We are aware that one likely response to these findings is to point to instructional and curricular differentiation as an obvious intervention. In instructional differentiation, the teacher provides varied learning alternatives within the same overall classroom and curricula that are designed in response to differences in student readiness. However, research suggests that instructional differentiation is difficult to accomplish and thus is rarely implemented well, likely due to the enormous distribution of student ability in elementary school classrooms (e.g., up to 11 grade levels of reading performance in Grade 4 and 5 classrooms). Although a good idea in theory, the nature of our age-based, grade-level-focused system prevents differentiation from being implemented consistently or effectively.²⁰ Acceleration, whether at the whole-grade or single-subject level, minimizes the difficulty in offering differentiated learning experiences, because students within a given classroom are selected to be far more homogeneous in ability and prior knowledge than they are in the traditional system.

Implication 3: States should require each district and school to report its percentages of above-grade-level performers and to disaggregate students’ average growth by starting scores.

Research suggests that currently these students’ learning needs are not being met through alternative placements or by within-grade differentiation.²¹ Rather, these students are under-challenged by the curriculum and instruction they are being provided. Millions of American K-12 students are performing above grade level and are not being appropriately challenged, putting their intellectual development and the country’s future prosperity at risk.

One initial step that every state, district, and school should take to address this problem is to report the absolute numbers and the percentages of students who are performing above grade level. Transparency creates a climate of accountability. What is tested gets taught; what we report, receives attention. The first step toward meeting these high-performing learners’ educational needs is to routinely report their presence and their numbers. In addition to above-grade-level performance, states, districts, and schools should use assessments that measure growth and report typical growth for students at various initial performance levels (e.g., bottom 10%, top 10%).

Final Thoughts

¹⁹ Unzicker, S. P. (1932). A study of acceleration in the junior high school. *The School Review*, 40, 346–356.

²⁰ Hertberg-Davis, H. (2009). Myth 7: Differentiation in the regular classroom is equivalent to gifted programs and is sufficient: Classroom teachers have the time, the skill, and the will to differentiate adequately. *The Gifted Child Quarterly*, 53, 251-253.

Firmender, J. M., Reis, S. M., & Sweeny, S. M. (2013). Reading comprehension and fluency levels ranges across diverse classrooms: The need for differentiated reading instruction and content. *Gifted Child Quarterly*, 57, 3-14.

²¹ See Plucker, J. A., & Callahan, C. M. (2014). Research on giftedness and gifted education: Status of the field and considerations for the future. *Exceptional Children*, 80, 390-406. doi: 10.1177/0014402914527244.

Currently, the evidence suggests that between 15% and 45% of students enter the late-elementary classroom each fall already performing at least one year ahead of expectations. Our initial question – How many students are learning above grade level? – needs to be extended. The more important questions may be:

1. How should we reorganize our schools, now that we know that large numbers of these students exist?
2. How can we best meet these students' learning needs, if they already have mastered much of the year's content before the year has even started? And lastly,
3. How can schools balance the potential for excellence against the need to achieve basic proficiency, when the variation in student achievement within classrooms and schools is so vast?

The current K-12 education system essentially ignores the learning needs of a huge percentage of its students. Knowing this, 20 years from now we may look back and wonder why we kept using age-based grade levels to organize K-12 education for so long.

Acknowledgements

Many individuals and organizations played a role in the creation of this report. Laura Overdeck at the Overdeck Family Foundation was the person who first asked the compelling question about the number of above grade-level students. John Cronin, the senior director of research at NWEA, provided helpful constructive criticism, as did Ashley Berner, the deputy director at the Johns Hopkins Institute for Education Policy (IEP). Eric Zilbert of the California Department of Education provided essential access to needed data, as did Catherine Altmaier from the Florida Department of Education. The authors appreciate the support of IEP director David Steiner, Center for Talented Youth executive director Elaine Hansen and the CTY team, and Brian Carter and his colleagues at the Overdeck Family Foundation. All comments and opinions expressed in this report are the sole responsibilities of the authors.

Technical Appendix

Limitations

Our estimation methods are based on these data being normally distributed, and although there is some evidence that this is the case, there may be additional complexities in the data that we did not recognize. We were not able to conduct identical analyses in all data sets, due to their differing aims, scope, and administration frequency, but this may in fact constitute a strength of this work; any limitations of our analytic approach would not affect all analyses in the same way, thereby diluting the influence of any confounds we may have neglected to address. One other important caveat is that, especially for older students at the Grade 8, Grade 11, and especially Grade 12 levels, there may be little incentive to put forth their best efforts on a test like the NAEP that does not influence their course grades. This could bias our results in the direction of showing more young students performing relatively better than they really are. Conversely, student attrition (i.e., dropping out of school) also occurs increasingly as students age, and this means that the elementary grade levels tested likely include a more representative sample of the overall population than higher grades do. This might be expected to bias our findings in the direction of showing fewer young students achieving well above grade level, due to the attrition of students with marginal academic ability from the higher grade levels and a corresponding increase in the average performance of those who remain in school. Finally, this work is at heart an observational study based on measures that are not extremely fine-grained in terms of their ability to suggest causes.

Wisconsin Smarter Balanced Assessment (Badger Exam)

Using the Wisconsin WISEDash data explorer,²² the published cut scores, and the Wisconsin Smarter Balanced (Badger Exam) technical manual,²³ we were able to evaluate what proportion of students at a given grade level in a given content area scored at the proficient level for the next higher grade level. In addition to the published cut scores, we drew upon state average scores for Wisconsin from each grade level (3-8) in each of the two content areas, as reported on the publicly accessible WISEDash data access portal.

Table 4 lists the cut scores developed for each grade level and content area. Table 5 presents the average scale score obtained in Wisconsin for each grade level and content area. The Badger Exam technical manual reports low skewness and kurtosis levels (-.2 to 0.8 for skewness and -.9 to zero for kurtosis), which suggests the data closely approximate a normal distribution. Having verified a roughly normal distribution, we can compute the percentage and number of test-takers at each grade level who scored at or above the proficiency level for the following grade level.

²²<http://wisedash.dpi.wi.gov/Dashboard/portalHome.jsp>

²³<http://dpi.wi.gov/sites/default/files/imce/assessment/pdf/Badger%20WI%20Tech%20Manual%20Final%20Version.pdf>

Table 4.

Badger Exam Grade-level Cut Scores in English Language Arts and Mathematics

Grade	Proficient–ELA	Proficient–Mathematics
3	2432	2436
4	2473	2485
5	2502	2528
6	2531	2552
7	2552	2567
8	2567	2586
11 ^a	2583	2628

^a Cut scores for grade 11 are based on those determined by California.

Table 5.

Badger Exam Average Student Scale Scores and Standard Deviations for English Language Arts and Mathematics

Grade	M for ELA	SD for ELA	M for Mathematics	SD for Mathematics
3	2433	83	2463	74
4	2468	91	2475	80
5	2511	91	2504	90
6	2519	96	2525	98
7	2553	98	2544	105
8	2570	97	2560	106

We calculated Z-scores to determine where the proficiency score of the following grade levels fell above the average performance of the preceding grade level. For example, we determined how many third graders scored at the fourth-grade level in ELA using the following formula:

$$z = \frac{(4th\ grade\ cut\ score - 3rd\ grade\ average\ score)}{3rd\ grade\ standard\ deviation}$$

Taking 1.0 minus the probability resulting from the calculated Z-score yielded the percentage of test takers who scored at or above the cut score affiliated with the following grade level.

California Smarter Balanced Assessment

We followed much of the same process for the California Smarter Balanced assessment data as for Wisconsin. Tables 6 and 7 present California grade-level cut scores as well as student average scores and standard deviations based on the 2014 - 2015 administration.

Table 6.

California Smarter Balanced Grade-level Cut Scores in English Language Arts and Mathematics

Grade	Proficient–ELA	Proficient–Mathematics
3	2432	2436
4	2473	2485
5	2502	2528

6	2531	2552
7	2552	2567
8	2567	2586
11	2583	2628

Table 7.

California Smarter Balanced Student Scale Scores and Standard Deviations for English Language Arts and Mathematics

Grade	M for ELA	SD for ELA	M for Mathematics	SD for Mathematics
3	2403	88	2416	80
4	2446	93	2454	81
5	2488	95	2481	90
6	2512	92	2505	102
7	2532	96	2519	109
8	2553	95	2534	117
11	2593	109	2561	125

Florida Standards Assessment

The same technical process was used for FSA data as was used for Wisconsin and California Smarter Balanced data. Tables 8 and 9 present Florida grade-level cut scores as well as student average scores and standard deviations based on the 2015 administration.

Table 8.

Florida Grade-level Cut Scores in English Language Arts and Mathematics

Grade	Proficient–ELA	Proficient–Mathematics
3	300	297
4	311	310
5	321	320
6	326	325
7	333	330
8	337	337
9	343	N/A
10	350	N/A

Table 9.

Florida (FSA) Student Scale Scores and Standard Deviations for English Language Arts and Mathematics

Grade	M for ELA	SD for ELA	M for Mathematics	SD for Mathematics
3	300	21	300	21
4	312	20	314	23
5	321	22	322	23
6	324	23	324	24

7	332	23	330	23
8	338	23	333	22
9	343	23	N/A	N/A
10	349	23	N/A	N/A

NWEA Measures of Academic Progress

Some states set differing score levels to indicate proficiency on Smarter Balanced (which we used to establish grade-level expectations). To provide an aggregate estimate of the percentage of students achieving above grade level, we used the median proficiency score across all states (for reading and mathematics) as the threshold for above-grade-level achievement. We also included all 33 states' MAP scores, regardless of whether the state had participated in Smarter Balanced, PARCC, or had opted out of Common Core standards. Because states who opted out of Common Core standards have alternative standards in place, our estimates of the percentage of students achieving above grade level is likely to be conservative.

Extrapolation to Population Estimates - NAEP

To estimate the total number of students enrolled in each grade level for each year, we used two National Center for Education Statistics (NCES) Tables ([203.10](#)-public school and [208.20](#)-private school) to find either actual or projected student enrollment. Table 208.20 provided only total enrollments for private school. Thus, we used the grade-level proportion of public school students enrolled in Grades 4, 8, or 12 for each year to estimate the proportion of students in private school for that same year at each grade level (e.g., if 7.5% of public school students were in Grade 4, we multiplied 7.5% by the number of students enrolled in private school that same year to estimate how many of them were enrolled in Grade 4). We based [City](#) and [State](#) population estimates on the most recent U.S. Census figures.