

Personalized, Competency-Based Learning

Analysis and Reflections on Student Outcome Data in RSU2

By Geoff Zimmerman and Jillian Kuhlmann

“It’s very exciting to be leading the next phase of this work. Although we have been with the RSU for only a few months, the underlying philosophy that has been cultivated since 2011 is clearly evident in our schools. The dedication to students among teachers and administrators is inspiring and will sustain us as we continue on our path toward a system of teaching and learning that fulfills its promises to our learners, to our families, and to our communities.”

– Cheri Towle, Superintendent of Schools

– Mary Paine, Assistant Superintendent of Schools

In 2011 when administrators and district leaders in the communities served by RSU2 set out to create the kind of learning community they wanted to work, teach and learn in, they were driven by the knowledge that their high graduation rates weren’t matched by strong scores on state proficiency tests.

To change this, the district wanted to become a system of student-centered learning: to truly prepare students for college and life by providing personalized supports and resources, ensuring all students master each standard before moving on to the next and challenging them to grow beyond the standards and explore unique interests.

The district’s answer? Implementing personalized, competency-based learning. For RSU2 this means:

- students have explicit, measurable, transferable learning objectives
- assessment is flexible and meaningful
- students advance on mastery, not seat time
- students own their learning and get timely supports based on needs

Even today amidst turbulence in Maine regarding a recent repeal of their standards-based diploma requirement, RSU2 remains committed to the vision of personalized, competency-based learning. In the face of these challenges, the new district leadership is holding forums to listen and learn about what the community perceives as strengths and opportunities for its schools and its learners.

“It’s just so much fun to see the kiddos get excited about their learning,” said RSU2 kindergarten teacher Marie Roy. “And one might be excited because they finally learned the letter ‘M.’ Another might be excited because they wrote three sentences. And they can be excited at the same time in the same classroom.”

Perhaps some of the most dramatic change and impact from RSU2 is summarized in this reflection from one of their graduates.

Emily Levasseur was a sophomore at Monmouth Academy when the district began implementation of personalized, competency-based learning, and she had always been a strong student. She hoped to be the first in her family to attend college and she wondered what this new system would mean for someone who had done well in a traditional classroom setting. Levasseur recalls that she and some of her peers were concerned about the fairness of the system, questioning whether a grade was really “earned” if students were given multiple tries to achieve mastery.

“As I’ve gotten older, I’ve realized that was a selfish way of thinking. In some subjects, I might need more time, but that doesn’t mean that I’m not trying my hardest. It just means that I don’t understand the material yet,” Levasseur stressed. “Learning shouldn’t be competitive. You’re better off and you learn more when you have a supportive community.”

So, what would a visitor to RSU2 observe? What are the core components that have been built over time through the dedicated work of RSU2 teachers and central office staff, often carried out over the summer months with time supported by the district?

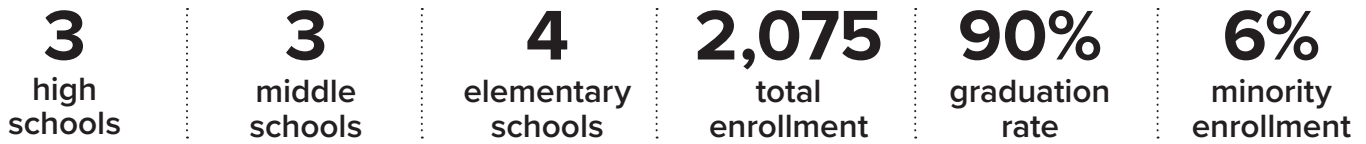
The teachers in RSU2’s schools vary in their depth of experience with personalized, competency-based learning but are motivated by a common philosophy, which includes:

- a culture of trust, cooperation and support among teachers and students
- opportunities for student voice to authentically shape student learning
- flexibility for teachers to build curriculum around learning targets
- a variety of choices available to students to demonstrate learning
- the ways that teachers encourage self-sufficiency and independence
- a commitment from principals to build relationships and shared understanding among students, teachers and parents

RSU2 began putting into place elements of its new approach in the 2011-12 school year, including a new proficiency-based system in Hall-Dale and Dresden. Implementation of measurement topics and learning targets were being refined and in place across all schools during the 2012-13 school year. Implementation was at full scale starting in the 2013-14 school year, when the competency system was fully in place and students were accountable to measurement topics and learning targets for graduation.

While there is much to celebrate in RSU2, everyone recognizes that there are opportunities to do better: supporting the development of work habits, navigating the balance between flexibility and pacing, the integrity of the standards-based grading, focusing on meaningful projects and not narrow targets and blurring the grade level lines. While there are persistent challenges, according to one teacher in the district, “This approach is hard and not perfect, but we wouldn’t go back to what we used to do.”

RSU2 Snapshot



Overview of RAND’s Analysis to Evaluate Student Outcomes in RSU2

When KnowledgeWorks sponsored RAND Education and Labor to conduct analyses of RSU2 student outcomes over the past decade, our hope was that we could add additional insights to the evidence base to better understand the extent to which personalized, competency-based learning prepares today’s students for an uncertain future. The goal was to provide analyses that would be useful to RSU2 and KnowledgeWorks as well as the broader field regarding the short- and long-term effects on student outcomes of implementing personalized, competency-based learning.

In short, we entered the project wanting to understand RSU2’s impact on a wide variety of student outcomes, including academic achievement, hope and well-being, attendance, graduation, and postsecondary success.

What we’ve learned is that answering the question of impact is more complex than ever. The ability to answer all our questions varied due to limitations in the available data. And when each community is unique, when metrics for student success via new approaches are tied to traditional learning environments, and when transparency and communication with all stakeholders is a process, the answers are more nuanced and complex than, “Yes, this works.”

Using administrative student data provided by the district, public data sources and assessment data for RSU2, and comparison students provided by a national testing company, RAND analyzed student outcomes within RSU2’s ten schools over the past decade, seeking insights regarding the short and long-term changes in student outcomes that could be associated with implementing personalized, competency-based education. The data series extends prior to RSU2’s implementation to enable observation of any change in trends when the program was initiated.

The key findings addressed questions related to yearly growth of RSU2 students on the Northwest Evaluation Association’s (NWEA) MAP assessment as compared to similar students that are matched on individual and school-level characteristics (a virtual comparison group, or VCG). MAP is a computerized adaptive test which helps teachers, parents, and administrators improve learning for all students and make informed decisions to promote a child’s academic growth.

Because MAP is a national assessment, results can be compared to a national norm (without trying to identify similar students) instead of to just students in Maine. The study also looked at student ranking on state assessments, and changes over time in SAT assessments scores and high school graduation rates. The most complete dataset was from the MAP assessment.

Descriptive and exploratory analyses were also conducted on other variables, although data was much more limited. The study also had several methodological limitations and does not support causal conclusions.

Additionally, the RAND analysis did not investigate the details of RSU2’s implementation, the policy context in which it was implemented, or other co-occurring changes in the district. See the appendix for the full list of questions and limitations of RAND’s study.

Key Findings

MAP ASSESSMENT ANALYSIS

RAND conducted analyses with MAP data to show how RSU2 students performed relative to their matched counterparts from fall-to-spring of each academic year from 2008-09 through 2017-18. All estimates are negative, and most are statistically significant. However, anomalous patterns in scores between fall and spring induced RAND to also investigate fall-to-fall growth, which portrayed a more neutral series of positive and negative estimates. As opposed to consistently negative effects in the fall-to-spring analyses, these fall-to-fall results show a mix of positive and negative effects, most of which are not statistically significant. District leaders were not sure what to attribute the lower spring scores to, though it seems greater attention and emphasis was placed on the fall tests by students. Despite that uncertainty, these results speak to a reflection point for RSU2. The district has been focused on implementing a new proficiency-based system with measurement topics and learning targets, but less so on formative assessment practices. Formal data review cycles were a missing piece to implementation, and one that would have helped with these results

MAP ASSESSMENT ANALYSIS

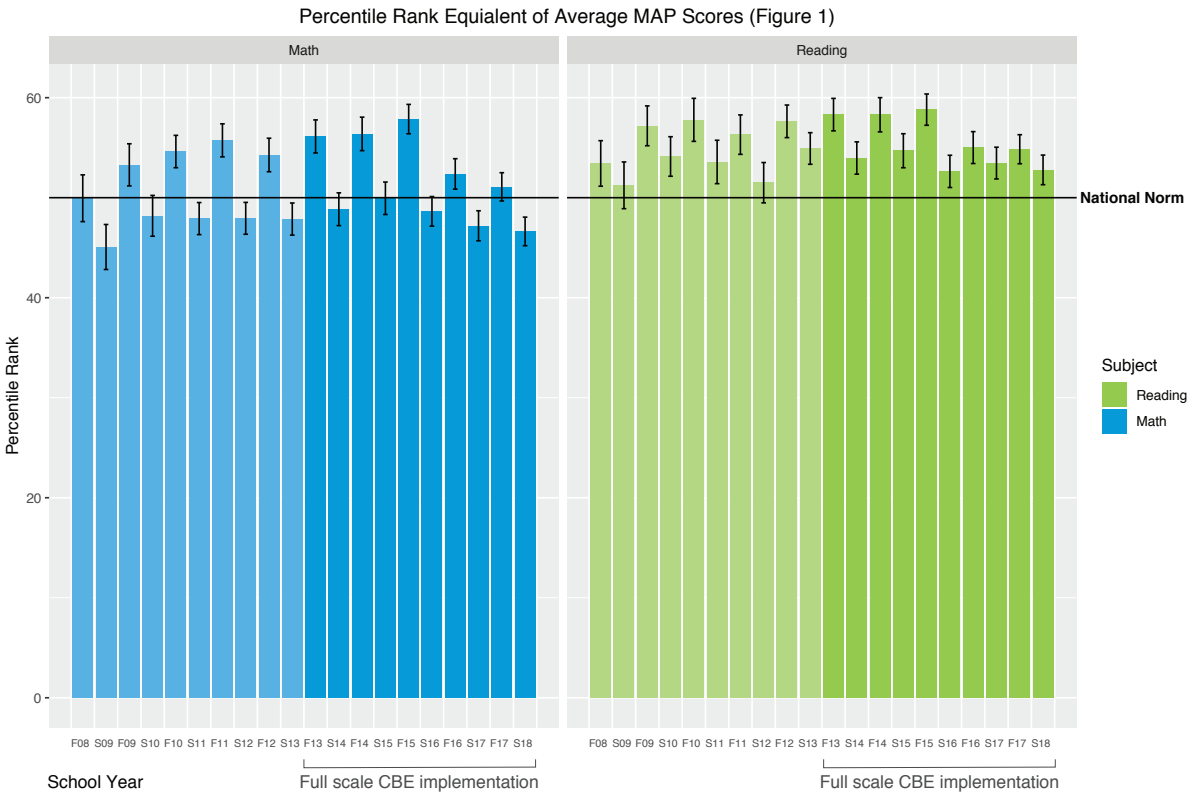
- Fall-to-fall matched comparison analyses show a mix of positive and negative effects, most of which are not statistically significant
- Some evidence suggests high schools produced more favorable effects than elementary or middle schools
- Compared to national norms, growth was observed from fall-to-fall until 2015, particularly in mathematics

STATE TEST & SAT SCORES, GRADUATION ANALYSIS

- Due to inconsistency of state assessments, no trend conclusions can be made
- Graduation rates comparable to statewide rates, with RSU2 exceeding the state average most years
- Slight outperformance of state averages on the SAT in the two years where data is most complete

These analyses were also conducted by grade level, school, and demographic subgroups. They generally did not identify meaningful and sustained differences in performance by family income (as measured by eligibility for free or reduced-price lunch), race/ethnicity, gender or starting achievement. There is some evidence suggesting that high schools may have produced more positive effects than elementary and middle schools.

RAND’s methods for the remaining questions are descriptive and exploratory – they should be considered generators of hypotheses that require more rigorous methods to confirm. RAND also explored RSU2 student rankings relative to national norms on the MAP assessment. Figure 1 below displays the results for the fall and spring MAP assessments in each year. In this display, the horizontal line represents the median student nationally, ranked at the 50th percentile. In these charts, we see relatively consistent growth in fall scores over time, particularly in mathematics.



In mathematics, RSU2 students performed at or above national norms on the fall assessment, but below national norms on the spring assessment. This pattern is consistent with the previous analysis showing negative growth relative to VCGs from fall to spring. Trends are less evident on spring scores. In reading, there is a similar pattern of RSU2 students performing better on fall assessments than on spring assessments, although in all cases students are above national norms in this subject.

In summary, RSU2 students performed at or above national norms on fall mathematics and reading MAP assessments, with generally increasing trends through 2015, declining thereafter.

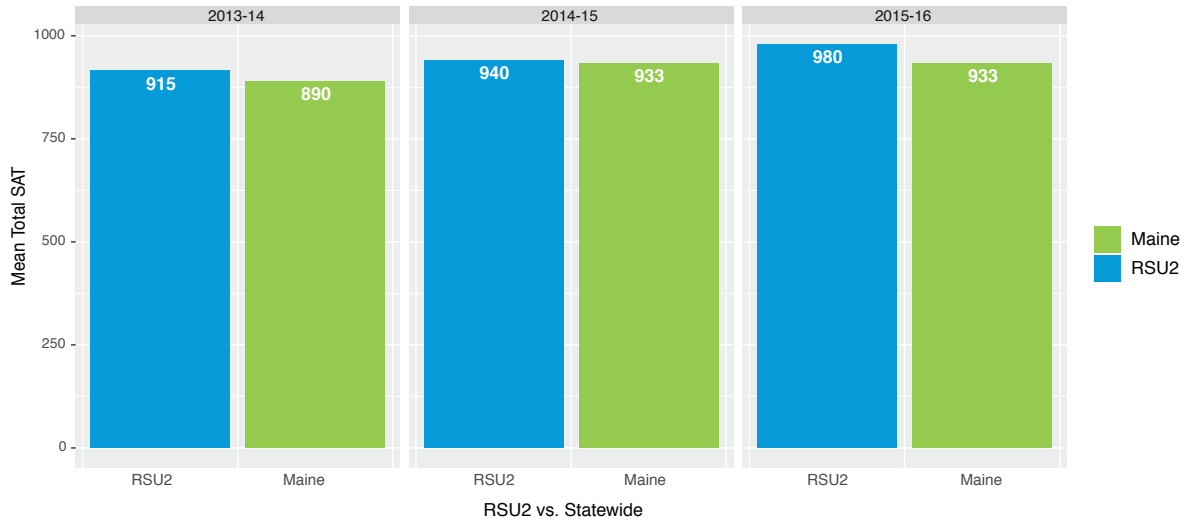
STATE TEST SCORES, SAT SCORES, AND GRADUATION ANALYSIS

In RAND’s analysis of state assessments, students generally performed slightly below norms. However, like most states, Maine has seen changing state assessments - with three different assessments over the span of the nine years for which data was analyzed. This volatility makes it very difficult to determine longer term trends. In other words, while students may have generally performed slightly below state norms, we cannot make any trend conclusions, given the state test was not held constant over the study period.

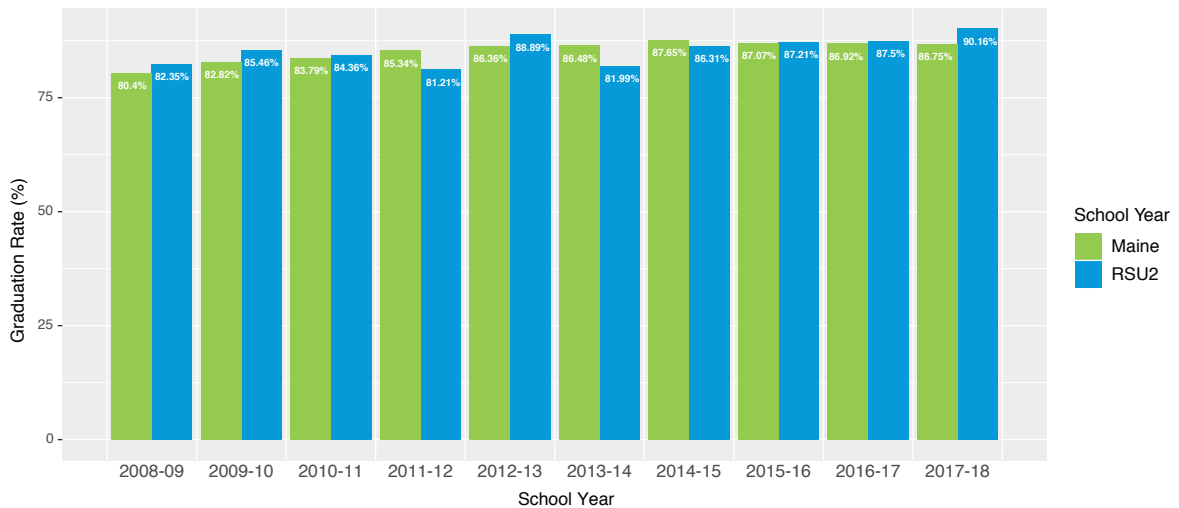
SAT data yield positive findings, showing the subset of RSU2 students with reported scores to have slightly outperformed state averages in the two years where data is most complete (the 2014-15 school year had an unusually high percent of missing data, 59% - see figure 2 below).

Graduation rates were comparable to statewide rates, with both groups experiencing upward trends, and RSU2 outperforming the state average most years (see figure 3 below).

Mean Total SAT Score for RSU2 Students vs. Maine (Figure 2)



High School Graduation Rates (Figure 3)



DISCUSSION

In comparing the results from the two different types of assessments (MAP and state test scores) it is important to note how those assessments differ. The MAP assessment is an online adaptive assessment that can accurately measure achievement and growth regardless of whether the student is performing at grade level. In contrast, state assessments are designed to capture achievement of grade level standards. It may initially appear anomalous to find a positive trend in fall MAP performance relative to norms that is not reflected on state test performance relative to norms. However, this finding is consistent with the possibility that there may have been off-grade-level achievement growth in RSU2 that was not captured on state assessments. This could be an important finding as personalized, competency-based learning intends to help students show growth in mastery of their learning targets and merits further investigation.

Impact for the Field and Future Analyses

While the data we get from formative and summative academic assessments is important, it paints only a limited picture of student success. We also need to understand how students are doing related to important skills and dispositions such as ownership of their learning, growth mindset, grit and self-regulation. We had hoped to analyze some of this kind of student data as part of the RSU2 analysis – but this data simply is not as readily available as the academic data.

In the meantime, we are sharing this somewhat incomplete picture of students' learning in part to further the conversation of how research and data collection needs to change to better capture the kinds of changes happening in personalized, competency-based schools. We must generate different types of data if we intend to show a more complete picture of student development and work with schools and districts to understand the importance of gathering such data.

LESSONS FOR THE FIELD

Schools and districts must prioritize developing a culture of collecting and utilizing data to understand what works for students and to improve classroom practices.

A strong culture of data should include academic and test data as well as data that illustrates student progress in building the social-emotional skills and dispositions necessary for success in an uncertain future.

Access to this data is important to understanding a key value proposition of personalized, competency-based learning: that this approach helps build student mastery, as well as student agency and ownership of learning.

There are many intentional practices that RSU2 is reflecting on and reprioritizing that are not well measured in the available assessment data. These include:

- the transparency of learning targets, mastery expectations, learning opportunities and student progress and assessments
- district and school staff regularly talking about what and how students are learning and how they prefer to learn
- students of all ages can readily explain what and how they are learning – and how their work builds on previous learning and will lead to future learning tasks
- teachers are uniformly passionate about their work and convinced they are on the right track, based on anecdotal evidence – yet completely honest about the challenges they face and are full of ideas for what they could do better
- regular demonstrations of student agency through voice and choice and flexible pacing
- teachers listening to students and providing opportunities for peers to talk and work together

This is not to minimize the importance of rigorous testing and measuring progress in academic subjects such as math, reading and language development. On the contrary, content is critical and must remain an intentional focus for RSU2 and for all districts who are marching forward with personalized competency-based learning. This also becomes an important call to action for the field. Districts and schools must have a strong culture of using data to help inform what works for students. This shouldn't be equated solely with achievement test data, but all types of data that can help us to understand student progress and overall success.

For the RSU2 study, we considered collecting data on additional variables that were ultimately determined to be unavailable at the student level. These included data from the Hope Survey (perceptions of autonomy, a sense of belonging, goal orientation, academic press, engagement and hope), ACCUPLACER scores, and data from the National Student Clearinghouse on college matriculation and persistence. Access to this data is important to understanding a key value proposition of personalized, competency-based learning: that this approach helps build student agency and ownership of learning, as well as the social-emotional skills and dispositions that are critical to student success in an uncertain future.

The postsecondary outcomes data would also help us to address research questions related to students' postsecondary readiness, transition and success. In our own examination of descriptive data from RSU2's National Student Clearinghouse reports, we know that postsecondary enrollment has seen an increase in the most recent year: 71 percent for Hall-Dale High School, which is up from an average rate of 59 percent over the previous 10 years. We also acquired some descriptive data directly from Hall Dale about postsecondary success. This data was collected by reaching out to RSU2 students after high school graduation, and is shown in the table below.

Postsecondary Student Outcomes

Hall-Dale High School

Graduating Year	High School Graduates	Accepted to College	Accepted into 1st Choice	1st Year at College
2016	78	80%	89%	3.4 GPA
2017	52	88%	90%	3.5 GPA
2018	69	89%	90%	N/A

Data Source: Hall-Dale High School analysis of student outcomes after graduation

Recognizing some of what we were missing and how the needs of research are changing, we're approaching our analysis differently in our state transformation efforts, including our work in North Dakota and South Carolina. While we're still considering summative data, we've broadened it to include data on course advancement, student engagement, and well-being. And a significant amount of our future studies will attempt to capture the critical pieces that students like Emily Levasseur teach us are important: civic-mindedness, depth of knowledge and ownership of the learning trajectory. We'll also be adding school walk-throughs, teacher and community input and student voice to the data, just as we do with successful implementations of personalized, competency-based learning.

Conclusion

In our experience working with learning communities that are engaged in personalized, competency-based learning, they excel at personalization: [flexible classrooms and personalized learning plans that leverage student interests](#), [outdoor learning opportunities](#) and [goal-setting](#). What proves more challenging is ensuring that learners understand how what they're doing relates back to standards or state expectations for learning. The goal of every district is to prepare their learners for life after high school. For a diploma to be meaningful and useful, graduates must experience rich learning experiences that they drive and own, with the opportunity to develop and practice the skills and knowledge they need to be successful in any environment.

The data in this report reflects some clear challenges that RSU2 needs to focus on as well as bright spots. It also provides a jumping-off point to draw attention to the limitations of assessment across the country: what we know learners need to know and know how to do isn't always aligned to what we measure, how we're measuring it, and what we hold schools accountable to. It's what we do next in this assessment conversation that matters most, recognizing that all learning is a process – including our own.

APPENDIX: Study Questions and Limitations of the Data

STUDY QUESTIONS

RAND's study attempted to address the following questions:

1. How does yearly growth of RSU2 students on the MAP assessment compare to students matched on individual and school-level characteristics?
 - a. Does this differ for subgroups of students?
2. How does each yearly cohort of RSU2 students rank relative to norms...
 - a. ...on the MAP assessment measuring achievement growth whether or not on-grade-level?
 - b. ...on state assessments measuring attainment of grade-level standards?
 - c. Do rankings from these different types of assessments show qualitatively similar trends?
3. For constant-sample cohorts of RSU2 students, is there a relationship between cumulative exposure to CBE and percentile rankings on state assessments?
4. Do changes in state assessment percentile rankings differ for subgroups of students?
5. How have attendance and graduation rates changed over time?
6. Have the proportions of students demonstrating the academic skills necessary for success in postsecondary education increased over time?
7. Have the proportions of students who successfully transition into postsecondary education changed?
8. Do any of these analyses exhibit inflection points when RSU2 began its transition to CBE in 2011-12 or when it was substantially implemented in 2015-16?

LIMITATIONS OF THE DATA

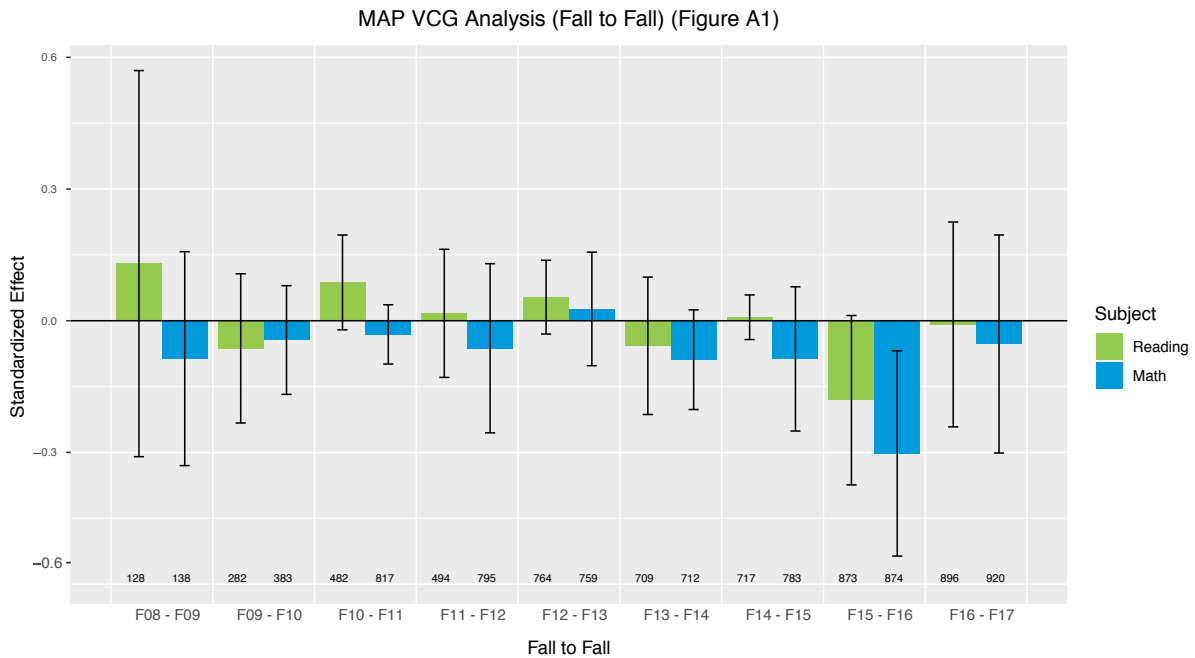
For each year in the analysis, NWEA created a virtual comparison group (VCG) of up to 51 non-RSU2 students matched to each RSU2 student who had MAP scores. The matching was based on fall MAP scores and other student and school characteristics. For both RSU2 and matched comparison students, MAP scores for the following spring were also provided. The primary analysis compared the growth of RSU2 students to that of the VCG students from fall to spring.

Patterns of RSU2 students' MAP test scores motivated RAND to also examine fall-to-fall growth against VCGs as an alternative to the fall-to-spring analysis. The basic concern was that differing testing conditions in the treatment group between fall and spring may have caused the fall-to-spring method to produce biased estimates of growth. By focusing on fall tests only, RAND could obtain estimates that would be less susceptible to this particular bias.

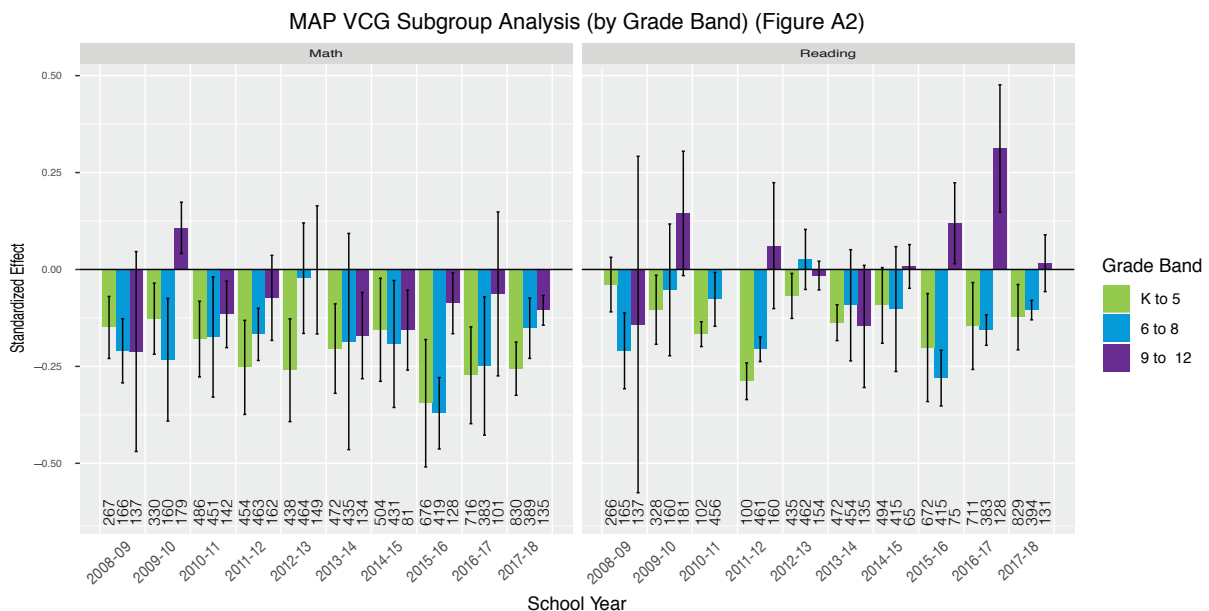
An important limitation of the fall-to-fall analysis to note is that it leaves out about one-third of students who appear in fall-to-spring analyses up to 2016-17, and 100 percent of students in 2017-18. The reason is that any student with fall and spring scores for a particular academic year who lacks a fall score for

the following academic year (either because they graduated, left RSU2, or simply didn't take the test for some other reason) would not be included in the fall-to-fall analysis. Therefore, it should be noted that while fall-to-fall analysis holds the influence of testing conditions constant and thereby may yield more reliable estimates of growth, the corresponding results apply to a more limited number of students than the fall-to-spring analysis.

As opposed to consistently negative effects in the fall-to-spring analyses, these fall-to-fall results show a mix of positive and negative effects, most of which are not statistically significant (Appendix Figure A1)



There is some evidence suggesting that high schools may have produced more favorable effects than elementary and middle schools (Appendix Figure A2).



RAND’s methods for the remaining questions are descriptive and exploratory – they should be considered generators of hypotheses that require more rigorous methods to confirm. RSU2 provided a variety of data elements including student demographics, scores on state assessments, attendance and graduation indicators and SAT scores. Some of these variables have very high rates of missingness, limiting their utility. Moreover, RAND received no data for an external comparison group for these variables; at best they were able to benchmark RSU2 data against norms for a larger group, such as the whole state. For some variables, no external norms were available, so basic descriptive summaries were created.

ACKNOWLEDGMENTS

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KnowledgeWorks is a nonprofit organization dedicated to advancing personalized learning that empowers every child to take ownership of their success. With nearly 20 years of experience exploring the future of learning, growing educator impact and working with state and federal policymakers, our passionate team partners with communities to grow a system-wide approach to sustain student-centered practices so that every child graduates ready for what’s next.

