REBECCA L. WOLFE, JONATHAN SCHWEIG, ELIZABETH D. STEINER

One Year into the Pandemic, What Secondary Math Teachers Said About Challenges to Standards-Aligned Instruction and Skipping Content

Key Findings

- Most secondary (grades 6–12) math teachers said their students needed something different than standards-aligned math content. One-half reported that standards-aligned math content was not engaging enough to keep students' attention and focus.
- Most secondary math teachers reported skipping at least some standards-aligned math content during the 2020–2021 school year. Teachers who provided remote and hybrid instruction reported skipping content more frequently than teachers working in person.
- Nearly all secondary math teachers who reported skipping standards-aligned math content said it was because they needed to reteach or review math concepts from previous grade levels.

The coronavirus disease 2019 (COVID-19) pandemic upended math instruction—but not equitably. Although little is known about the quality of math instruction in different school settings during the 2020–2021 school year, evidence from national survey data collected throughout the pandemic suggests that students' *opportunity to learn* (OTL)—defined here as time on instruction and content coverage—differed dramatically depending on whether students were learning in person or through an alternative mode of instruction. Specifically, principals and teachers working in schools that relied predominately on remote or hybrid instruction reported shorter school days, fewer instructional minutes, less content coverage, and less rigorous assignments than educators in schools with in-person instruction (Elgart, 2021; Hodgman et al., 2021; Kaufman and Diliberti, 2021; Rickles et al., 2021). Early in the pandemic, math teachers in particular reported adapting their content for remote learning by focusing on basic skills and simplifying their lessons (Wang et al., 2021).

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State content standards are the benchmark for what students should know and be able to do in math at grade level and the measure against which student learning is assessed. Each state's standards consist of a progression of topics that build in complexity from grade to grade. Although federal policy no longer incentivizes states to adopt national standards as it once did, most states have maintained similarly rigorous standards as those implemented in 46 of 50 states during the Common Core Initiative (Hamlin and Peterson, 2018; Troppe et al., 2020).

In this Data Note, we define *standards-aligned math content* as the body of discrete math concepts and topics, including knowledge, skills, and abilities, outlined in each state's content standards for math that students are expected to master at grade level. We define *standards-aligned math instruction* as the methods teachers use to promote student mastery of standards-aligned math content.

School systems' disparate responses to COVID-19 during the 2020–2021 school year reflected deeply rooted social and racial inequities in OTL. Using national survey data collected from district leaders in spring 2021, Hodgman et al., 2021, reported that relative to their counterparts, public school systems that primarily serve students of color, have high percentages of English learners, are large, or are located in urban areas were less likely to provide students with all or most of their instruction in person during the 2020–2021 school year. At the same time, many of the students attending these schools, including disproportionately large numbers of Black and Latino/a/x students and students from low-income families, were more likely to lack reliable access to the internet and lose contact with their schools altogether (Ong, 2020; U.S. Department of Education, 2021a).

As education leaders continue to address unfinished learning and systemic disparities in OTL, it is important for policymakers to recognize how the challenges that math teachers faced during the first year of the pandemic differed by context. It is also important to understand how teachers' instructional choices might have diverged from state content standards in response to students' academic or social and emotional needs and the limitations imposed by remote and hybrid learning. In particular, knowing whether teachers in some settings were more likely to skip standards-aligned content (e.g., omit grade-level concepts or topics from their instruction) than others—and why—could yield useful information about students' OTL math at grade level during the 2020–2021 school year and where policymakers should target additional resources.

In this Data Note, we used nationally representative survey data from secondary (i.e., 6th to 12th grade) math teachers who reported working in general education settings (hereafter, *math teachers*) on the 2020 and 2021 Learn Together Surveys (LTS) to illuminate the choices math teachers made about skipping standards-aligned math content and the challenges they perceived to instruction undergirding these decisions. Specifically, we looked at three research questions:

- What challenges did secondary math teachers perceive to their instruction of standards-aligned math content?
- How frequently did secondary math teachers report skipping standards-aligned math content during the 2020–2021 school year?
- What reasons did secondary math teachers give for skipping standards-aligned math content?

We analyzed math teachers' responses to the 2021 LTS by school-level characteristics, including the percentage of non-White students, locale (urban, suburban, town, or rural), and free or reduced-price lunch (FRPL) enrollment as a proxy for student poverty and by teacher-reported characteristics, such as mode of instruction (in person, remote, and hybrid)

and whether teachers had an undergraduate degree in math or a master's degree in any subject.

At the time of our spring 2021 survey, 25 percent of math teachers reported teaching in person, 49 percent said they provided hybrid instruction, and 26 percent reported teaching remotely for most of the 2020-2021 school year. Where possible, to add context to our analysis of the 2021 LTS data, we referenced teachers' responses to identical items on the 2020 LTS. The 2020 LTS was distributed in early March 2020. Most of these responses were returned prior to school shutdowns in mid-March 2020; therefore, we interpret the 2020 LTS responses to reflect a prepandemic context. Although the cross-sectional comparisons we make between teacher responses on the 2020 and 2021 LTS are useful for describing descriptive trends, the weights we employed are not designed or intended for longitudinal analyses. We next discuss our data and findings in further detail and conclude with implications and policy recommendations based on our analysis.

Most Secondary Math Teachers Said Their Students Needed Something Different Than Standards-Aligned Math Content; One-Half Reported That Standards-Aligned Math Content Was Not Engaging Enough to Keep Students' Attention and Focus

To identify challenges that math teachers might have perceived to their instruction of standards-aligned content during the 2020–2021 school year, we analyzed their responses to a series of items asking how well standards-aligned math content and instruction comported with their students' needs, interests, and abilities (Figure 1). We also looked at whether teachers said they were able to spend as much time as they would have liked on math instruction. In response to these items, a significant proportion of teachers reported incongruencies related to (1) the compatibility of standards-aligned content with students' needs, however teachers defined them; (2) the ability of standards-aligned math content to engage students' attention and focus; (3) the challenge level of standards-aligned content compared with students' performance levels; and (4) available time for instruction. We interpreted these incongruencies as possible challenges to instruction.

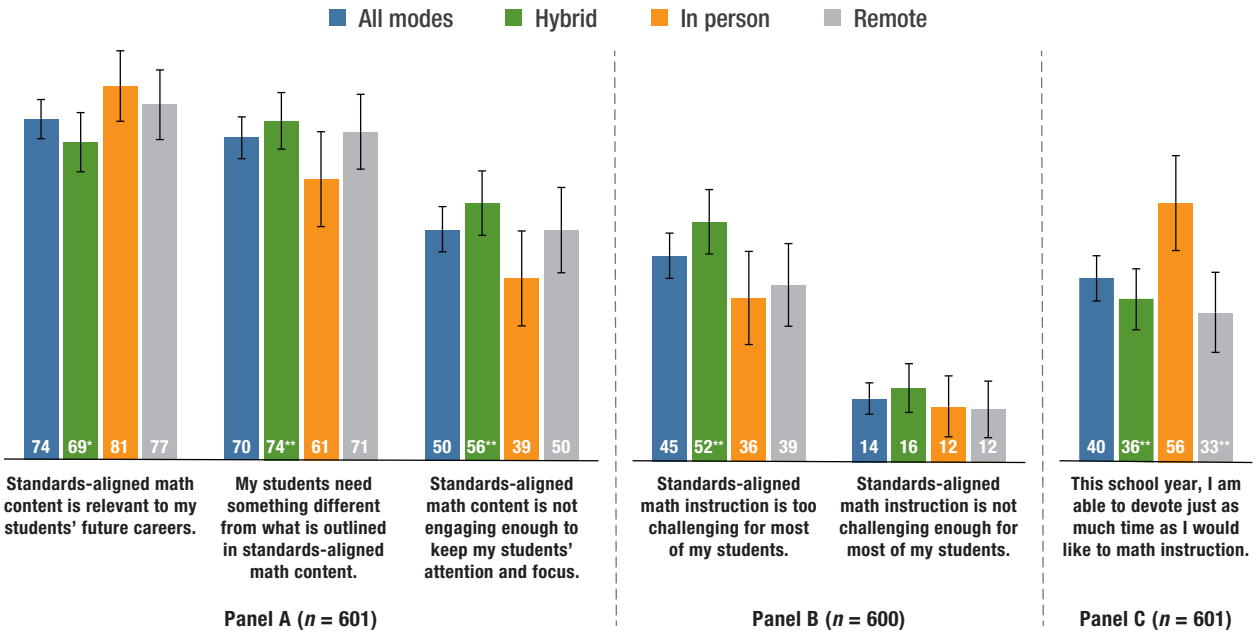
Specifically, although most math teachers agreed that standards-aligned content was relevant for students' future careers, a majority (70 percent) also said their students needed something different than what is outlined in standards-aligned math content (Figure 1, Panel A). One-half of responding math teachers reported that standards-aligned math content was not engaging enough to keep students' attention and focus. We did not ask math teachers what their students needed instead of standards-aligned content or why they felt it was not engaging; however, previous studies suggest when thinking about how to engage students, math teachers are likely to consider whether instructional content and materials appropriately challenge students (Wang et al., 2021). On the 2021 LTS, 45 percent of math teachers said that standards-aligned math instruction was too challenging for their students. Fourteen percent said it was not challenging enough (Figure 1, Panel B). These findings are consistent with those from another spring 2021 American Teacher Panel survey, in which 54 percent of K–12 math teachers indicated that their students were somewhat or far below grade level in math (Kaufman et al., 2021).

On the 2021 LTS, only 40 percent of teachers reported being able to devote as much time as they would have liked to math instruction (Figure 1, Panel C). Teachers who felt they did not have enough instructional time might have struggled to cover as many standards or provide adequate depth of instruction relative to their counterparts, especially teachers with students performing below grade level or students who had missed significant instructional time because of COVID-19 school closures. In these cases, teachers might have needed to spend more time reviewing content from prior grade levels.

Teachers who provided hybrid instruction were more likely than in-person teachers to say their students needed something different than what is

FIGURE 1

Teacher-Reported Perceptions of Standards-Aligned Math Content and Instruction from the 2021 Learn Together Survey



NOTE: Panel A and Panel C are based on the following LTS survey item: "Please indicate your level of agreement or disagreement with the following statements about math standards and instruction." Panel B is based on the following LTS item: "Please indicate your level of agreement with the following statements about standards-aligned math instruction." Respondents could select "strongly disagree," "somewhat disagree," "somewhat agree," or "strongly agree." The bars show the percentage of teachers who selected somewhat agree or strongly agree by mode of instruction in spring 2021: remote (n = 163 [Panel A and Panel C], n = 162 [Panel B]), hybrid (n = 297), and in person (n = 139). Double asterisks indicate statistically significant findings from pairwise comparisons ($p < 0.05$) that met our standards for robustness between teachers providing remote or hybrid instruction compared with in-person teachers. Single asterisks indicate statistically significant findings from pairwise comparisons ($p < 0.05$) that did not meet our standards for robustness (see the "How This Analysis Was Conducted" text box).

outlined by standards-aligned math content and that standards-aligned math content was not engaging enough to keep their students' attention and focus. In addition, teachers who provided hybrid instruction were more likely than either in-person or remote teachers to say that standards-aligned math instruction was too challenging for most of their students. Compared with teachers who provided in-person instruction, fewer teachers who provided remote or hybrid instruction reported being able to devote as much time as they would have liked to math instruction.

Teachers' responses to the six items shown in Figure 1 did not notably differ by the percentage of non-White students or the percentage of FRPL-eligible students in their schools,[1] locale of school, teachers' undergraduate math background, or whether teachers had a master's degree in any subject. For context, teachers' responses in spring 2021 to the items in Panel A were not significantly different from teachers' responses to these items in spring 2020. Although some of the concerns teachers had with standards-aligned content in spring 2021 likely preceded the pandemic, given the dramatically different context in which teaching took place, teachers might have been thinking about these constructs differently in spring 2020 than they were in spring 2021 (i.e., teacher-reported perceptions of challenges to standards-aligned instruction might have been influenced by the inherent limitations of their mode of instruction in spring 2021, whereas in spring 2020, prior to the COVID-19 pandemic, all

teachers would still have been providing in-person instruction); however, we cannot say for sure. We did not ask teachers about instructional time or challenge level in a comparable form on the 2020 LTS.

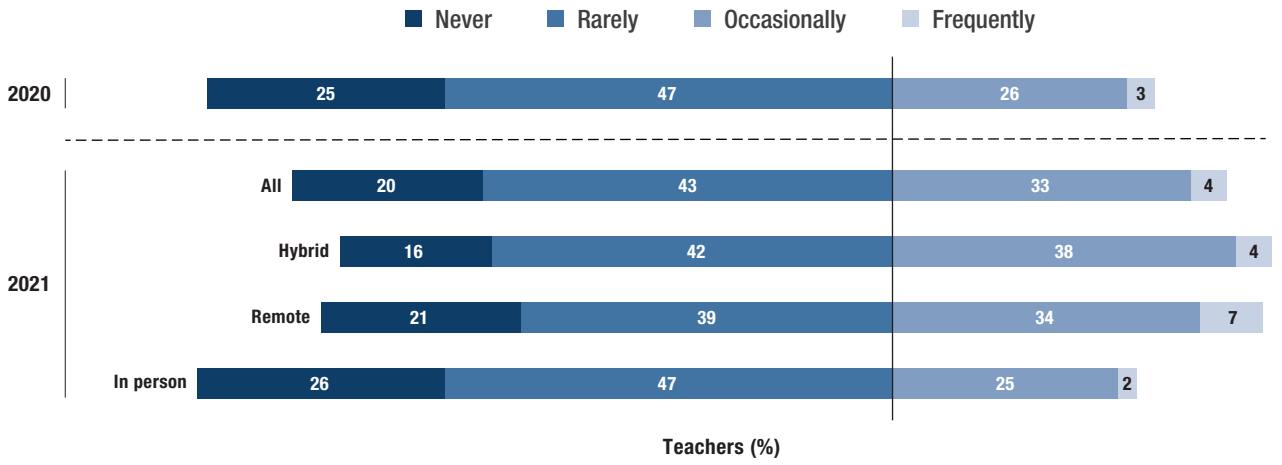
Most Secondary Math Teachers Reported Skipping at Least Some Standards-Aligned Content During the 2020–2021 School Year; Teachers Who Provided Remote and Hybrid Instruction Reported Skipping Content More Frequently Than Teachers Working in Person

We asked math teachers whether they ever skipped standards-aligned content and, if so, how often: never, rarely, occasionally, or frequently. On the 2021 LTS, most math teachers (80 percent) reported skipping standards-aligned content. Thirty-seven percent of teachers reported skipping content frequently or occasionally (Figure 2). In spring 2021, math teachers were significantly more likely to report skipping content at higher frequencies (i.e., frequently or occasionally) than they were before the pandemic, in spring 2020. Although our survey data does not address the quality or rigor of the instruction provided, we reasoned that a response of occasionally or frequently was a fair indication that a teacher covered fewer standards-aligned concepts or topics at grade level than teachers who said they skipped rarely or never.

Teachers providing remote or hybrid instruction were more likely to report skipping content frequently or occasionally compared with in-person teachers. Although few teachers said they skipped content frequently, teachers who provided remote instruction were significantly more likely to report skipping content frequently than in-person teachers (7 percent compared with 2 percent). Our findings comport with other national surveys on which teachers and education leaders whose schools were providing remote or hybrid instruction in 2021 reported

FIGURE 2

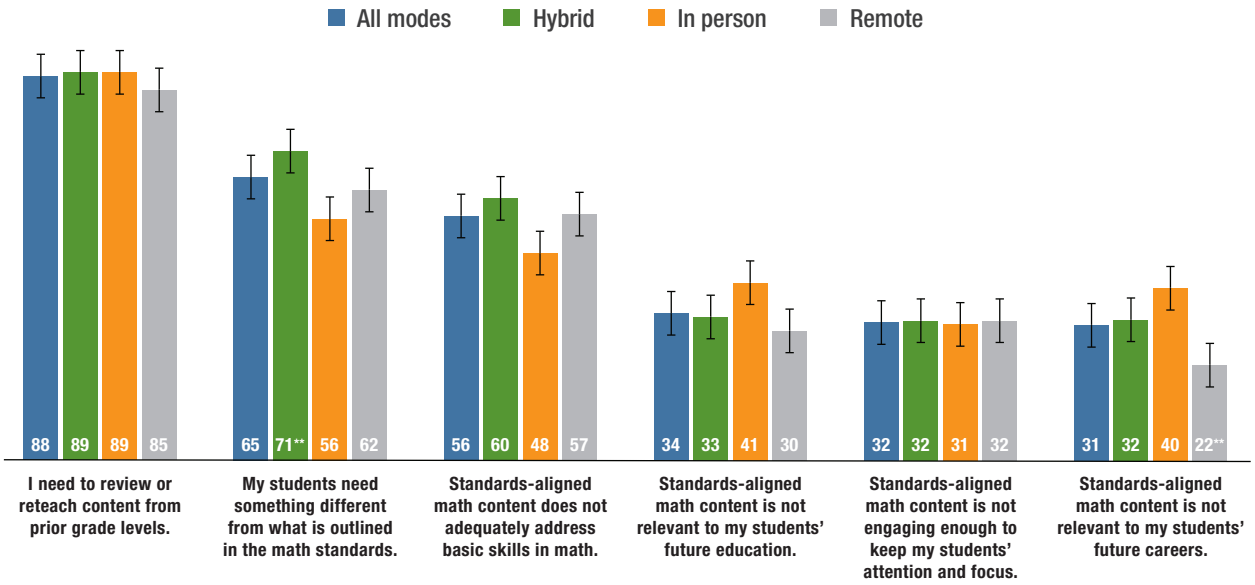
Secondary Math Teachers Who Reported Skipping Standards-Aligned Content by Year and Instructional Mode



NOTE: This figure shows secondary math teachers' responses to the following 2020 and 2021 LTS survey item: "Do you ever skip standards-aligned math content in your instruction?" Respondents could indicate "never," "rarely," "occasionally," or "frequently" (n = 600 in 2021 and n = 827 in 2020). The bars to the right of the vertical axis show the percentage of teachers who selected higher rates of skipping: "occasionally" or "frequently"; the bars to the left indicate the percentage of teachers who selected lower rates of skipping: "never" or "rarely." Based on pairwise comparisons, significantly more ($p < 0.05$) teachers in 2021 reported skipping content at higher frequencies (frequently or occasionally) compared with teachers in 2020. Likewise, significantly more ($p < 0.05$) remote teachers and teachers in hybrid settings reported higher frequencies of content skipping than in-person teachers. Percentages might not sum to 100 due to rounding.

FIGURE 3

Teacher-Reported Reasons for Skipping Standards-Aligned Math Content from the 2021 Learn Together Survey



NOTE: This figure shows secondary math teachers' responses to the following LTS item: "When you skip standards-aligned content in your instruction, to what extent do you agree or disagree that each of the following was responsible for you skipping it?" (n = 487). Teachers answered on a scale from 1 to 5 (1 = strongly disagree, 2 = somewhat disagree, 3 = neutral, 4 = somewhat agree, and 5 = strongly agree). The blue bars show the percentage of math teachers who somewhat or strongly agreed with each subitem among teachers who indicated they skipped standards-aligned content rarely, occasionally, or frequently. Double asterisks indicate statistically significant findings based on pairwise comparisons between the responses of in-person teachers compared with remote teachers or teachers working in a hybrid configuration ($p < 0.05$) that met our standards for robustness (see the "How This Analysis Was Conducted" text box).

lower curriculum coverage than those working in person (Kaufman and Diliberti, 2021; Rickles et al., 2021).

Teacher-reported skipping was not significantly different in schools with high percentages of non-White students, high percentages of students eligible for FRPL, or by locale, nor did it differ by teachers' education level or math background.

Nearly All Secondary Math Teachers Who Reported Skipping Standards-Aligned Content Said It Was Because They Needed to Reteach or Review Math Concepts from Previous Grade Levels

We asked math teachers who reported skipping standards-aligned content rarely, occasionally, or frequently to indicate their reasons for doing so (Figure 3). Previous studies suggest that teachers modify their curriculum in response to their perceptions of how well instructional materials engage students and provide appropriate levels of challenge, especially when students lack foundational background knowledge (Wang et al., 2021). One year into the pandemic, teachers on our survey reported skipping standards-aligned content for similar reasons.

Among math teachers who reported skipping standards-aligned content, most (88 percent) said it was because they needed to review or reteach content from prior grade levels. Most teachers who reported skipping content also said it was because their students needed something different from what is outlined in their state's math standards and because standards-aligned math content does not address basic math skills. Nearly one-third of teachers who

reported skipping content also made decisions about skipping based on their perceptions of what would benefit their students in the future and whether standards-aligned math content was engaging for students. We did not pose this question to teachers on the 2020 LTS in a comparable form.

Teachers who provided hybrid instruction and reported skipping standards-aligned content were more likely to report doing so than in-person teachers because they felt their students needed something different from what was outlined by their state's math standards. Teachers who provided remote instruction and reported skipping standards-aligned content were less likely to do so than teachers providing in-person instruction because they felt that standards-aligned content was not relevant for their students' future careers.

Otherwise, the reasons math teachers gave for skipping standards-aligned content did not substantially differ by teachers' professional characteristics or by the characteristics of the schools in which they taught.[2]

Implications and Recommendations

This Data Note presents insights into the challenges to standards-aligned instruction that secondary math teachers might have perceived and the choices they made about skipping standards-aligned content during the 2020–2021 school year. Our findings add to the growing body of evidence showing that students in fully remote and hybrid settings had fewer opportunities to engage content at grade level than students learning in person. Specifically, we found that math teachers who provided remote or hybrid instruction reported skipping standards-aligned content more frequently and were less likely to report being able to devote as much time as they would have liked to math instruction than in-person teachers. Our findings carry particular significance for students who attended schools in districts that were less likely to provide in-person instruction during the 2020–2021 school year, including urban districts, districts serving more non-White students, and districts with high percentages of English learners (Hodgman et al., 2021).

We cannot characterize the quality of math instruction provided in different school settings or the nature of the standards-aligned content that math teachers skipped (i.e., whether they skipped sets of standards, more cognitively demanding concepts, or entire units of study); however, nearly all teachers who skipped content said they did so to review or reteach content from previous grade levels. In addition, more than one-half of teachers who skipped said they did so because their students needed something different from standards-aligned math content and because standards-aligned content does not address basic math skills. Given the timing of the 2021 LTS, one year into the COVID-19 pandemic, our findings indicate that most teachers who reported skipping content were adjusting their instruction to cover more foundational concepts or reteach topics from previous grade levels in response to their perception of students' needs, many of whom—particularly those in historically marginalized communities that were disproportionately affected by COVID-19—had returned to school in fall 2020 with significant levels of unfinished learning.

It is possible that math teachers who skipped standards-aligned content to review topics did so as a bridge to grade-level content, supplementing with just-in-time supports to facilitate their instruction of essential math content as recommended by professional advocacy groups (see guidance documents from the Council of the Great City Schools, 2020; National Council of Teachers of Mathematics, 2020; TNTP, 2021). This would imply that teachers were incorporating foundational skills into their instruction as a scaffold to grade-level content rather than as a replacement for grade-level content. At the same time, teachers facing especially substantial challenges to standards-aligned instruction (e.g., reduced instructional hours, barriers related to technology, students with significant social and emotional needs, and higher levels of unfinished learning), with more ground to cover and less time in which to do it, might have devoted disproportionately more instructional

time to foundational topics at the expense of grade-level content compared with teachers facing fewer of these types of challenges.

Although the long-term impacts of disparate skipping patterns are not well understood, some prepandemic research has demonstrated a link between fewer opportunities to engage with challenging math content and lowered student achievement (Schmidt et al., 2011; 2015). In addition, in the context of COVID-19, recent projections show that these lost opportunities could have the potential to compound, resulting in accumulated unfinished learning over time for students who missed out on essential content during the first year of the COVID-19 pandemic (Kaffenberger, 2021; TNTP, 2021).

In light of our findings and their implications for students who experienced prolonged periods of remote or hybrid instruction during the 2020–2021 school year, we urge state, district, and school leaders to account for how students' OTL in math might have been disproportionately affected by schools' disparate responses to the COVID-19 pandemic and to direct response and recovery resources accordingly. Specifically, we make three recommendations.

Collect OTL metrics at state, district, and school levels to monitor students' learning experiences in math across learning contexts and to inform recovery-related funding efforts. Student achievement data might not provide policymakers with enough information about students' learning environments to make equitable decisions about resource allocation (Marion, 2020; National Academy of Education, 2021). To the extent that students aren't exposed to the same content, differences in their test scores become increasingly less meaningful. Instead, education leaders should supplement their use of summative performance data with quantitative indicators of students' OTL (e.g., access to content, duration of instruction, and quality of learning experiences) to identify need and prioritize resources for students whose math instruction has been disproportionally disrupted by COVID-19. Over both the short and long terms, state and district leaders should use OTL-based metrics to contextualize their student test data and to assist policymakers in the distribution of additional resources and supports for students who need them most (National Academy of Education, 2021).

Communicate with math teachers about which content standards are essential and provide opportunities for teachers to explore promising practices for addressing unfinished learning, including just-in-time approaches. State, district, and school leaders should provide clear—and realistic—guidance to teachers about which grade-level math standards are essential for students' future math learning and encourage teachers to prioritize these standards (U.S. Department of Education, 2021b). Depending on students' needs, including their social and emotional wellness and carryover levels of unfinished learning, teachers might need to combine topics, integrate concepts from previous grades, or skip some standards-aligned content to allow students ample time to engage deeply with grade-level math. Teachers should be equipped to make these decisions strategically, minimizing the impact on students. For students performing below grade level or students whose learning was disproportionately affected by remote or hybrid learning, district and school leaders should prepare teachers to provide just-in-time supports to promote student mastery of more foundational mathematical knowledge as a bridge to grade-level work (TNTP, 2021).

Invest in opportunities for targeted, high-dosage math tutoring that minimize the burden of unfinished learning on teachers. Some students will require additional hours of instruction to make up for unfinished learning; however, school districts need to be mindful of the impacts of the COVID-19 pandemic and associated stress on the well-being of the teacher workforce (Steiner and Woo, 2021). Now is not the time to ask teachers to do more. Fortunately, targeted intensive tutoring provided to students by highly qualified individuals is an evidence-based intervention with a proven track record for mitigating unfinished learning (Kraft and Falken, 2021; Nickow, Oreopoulos, and Quan, 2020; Robinson et al., 2021). School and district leaders should identify funding to jump-start targeted tutoring in schools in which instruction has been

disparately interrupted by the COVID-19 pandemic while also exploring additional federally funded opportunities to permanently embed tutoring into the schoolday at scale (see Kraft and Falken, 2021).

Limitations

This Data Note uses nationally representative survey data to provide insights into the choices math teachers made about standards-aligned content during the 2020–2021 school year. Our findings are subject to several limitations. First, the presented analysis is purely descriptive and should not be interpreted causally. Second, because LTS survey items consist of self-reported measures, they might be subject to reporting bias. In addition, because of the nature of sampling, teachers' responses represent individuals' perspectives rather than the perspectives of all educators in a school or district. Finally, because of differences in how we asked math teachers to identify themselves on the 2020 LTS survey versus the 2021 LTS survey, the composition of math teachers differed slightly between years (i.e., the 2020 sample of math teachers contained disproportionately more special education teachers who reported teaching multiple subjects in resource-only classrooms). We controlled for these differences by removing resource-only teachers from both samples and testing the robustness of our unadjusted comparisons using regression models as described in the "How This Analysis Was Conducted" text box.

Notes

[1] Teachers in the bottom 25 percent (1st quartile) and in the top 75 percent (4th quartile) of schools by student FRPL enrollment were more likely than teachers in 2nd quartile schools to say standards-aligned content was relevant for their students' futures (82 percent and 80 percent, respectively, compared with 65 percent).

[2] On initial pairwise comparisons ($p < 0.05$), teachers with master's degrees were less likely to report skipping because standards-aligned content was not relevant for their students' future education than teachers without master's degrees (30 percent versus 41 percent), teachers in schools with a majority of non-White students were more likely to report skipping than teachers in schools with a majority of White students because standards-aligned content was not engaging enough to keep students' attention and focus (39 percent versus 26 percent), and teachers in suburban schools were less likely to skip content to review topics than teachers in town schools (87 percent versus 95 percent). However, these findings did not meet our standards for robustness (see the "How This Analysis Was Conducted" text box). By both measures, teachers working in schools in the 2nd quartile for FRPL-eligible students were more likely than teachers in the 1st quartile to say they skipped content because their students needed something different from what was outlined in the math standards (74 percent versus 56 percent).

How This Analysis Was Conducted

This Data Note presents responses on the "Math Materials and Instruction" portion of the 2020 and 2021 LTS from 6th to 12th grade math teachers who reported teaching in general education settings ($n = 836$ in 2020 and $n = 612$ in 2021). Although the cross-sectional comparisons we made between teacher responses on the 2020 and 2021 LTS are useful for describing descriptive trends, readers should note that the weights we employed are not designed or intended for longitudinal analyses. Additional information about the survey method, weighting procedures, and descriptive tables for LTS questions can be found in *Learn Together Surveys: 2021 Technical Documentation and Survey Results* (Young et al., 2021).

We obtained school demographic characteristics from the 2019–2020 National Center for Education Statistics' Common Core of Data and identified teachers' professional characteristics from their survey responses. All comparisons presented in this Data Note were unadjusted for statistical controls and tested for statistical significance using Wald tests to compare the weighted means across subgroups; all noted comparisons are significant at the $p < 0.05$ level. We tested the robustness of these patterns using regression models that controlled for school-level characteristics (i.e., percentage of non-White students, FRPL enrollment, and locale) and teacher-level characteristics (i.e., mode of instruction, whether the teacher had five or fewer years of experience, undergraduate math background, educational attainment, special education assignment, and grade band). Except where noted, all the comparisons presented in this Data Note met our standards for robustness. Because the purpose of this report is to provide descriptive information, we have chosen to present the unadjusted descriptive results rather than the adjusted comparisons used to check robustness.

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About This Report

This Data Note uses 2020 and 2021 Learn Together Survey data to examine challenges to standards-aligned instruction that secondary math teachers reported, how frequently they skipped standards-aligned content, and reasons they gave for skipping content.

The American Educator Panels (AEP) are nationally representative samples of teachers, school leaders, and district leaders across the country. We are extremely grateful to the educators who have agreed to participate in the panels. Their time and willingness to share their experiences are invaluable for this effort and for helping us understand how to better support their hard work in schools. We thank Jill Cannon and Elaine Wang of the RAND Corporation and Erika Litke of the University of Delaware for helpful feedback that greatly improved this report. We also thank Chris Anthony for her editorial expertise and Monette Velasco for overseeing the publication process for this report.

RAND Education and Labor

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More information about RAND can be found at www.rand.org. Questions about this Data Note or about the Learn Together Surveys should be directed to rwolfe@rand.org, and questions about RAND Education and Labor should be directed to educationandlabor@rand.org.

About the Data Note Series

This Data Note series is intended to provide brief analyses of teacher and school leader survey results of immediate interest to policymakers, practitioners, and researchers. If you would like to know more about the dataset, please see *Learn Together Surveys: 2021 Technical Documentation and Survey Results* (RR-A827-3, www.rand.org/t/RRA827-3) for more information on survey recruitment, administration, and sample weighting. If you are interested in using AEP data for your own analysis or reading other AEP-related publications, please email aep@rand.org or visit www.rand.org/aep.

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