PPIC | PUBLIC POLICY INSTITUTE OF CALIFORNIA

The Impact of COVID-19 on Science Education

Technical Appendices

CONTENTS

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Appendix A. Data, sample, and methodology

PPIC Survey on Science Education

The science education survey was developed by researchers at PPIC and WestEd. After reviewing existing literature (including RAND COVID-19 and the State of K–12 Schools survey, AIR National Survey of Public Education's Response to COVID-19 and USC Coronavirus in America Survey) and interviewing state and local policymakers, we identified a potential list of topics to be included in the survey. The draft survey was sent to multiple educational partners, including the California Department of Education (CDE), the California Association of Science Educators (CASE), the California County Superintendents Educational Services Association (CCSESA) Curriculum and Instruction Steering Committee science subcommittee, district administrators, and the PPIC survey team, who gave us constructive feedback. Our advisory group, which consists of national experts on science education, education policy, econometrics and state and local leaders, provided invaluable feedback. We conducted a field test in summer 2021, but the response rate was too low as school staff across the states experienced high burnout due to COVID-19. After consultation with state and district leaders, we launched the survey in mid-September. We obtained district and school contact information from the California Department of Education (CDE), which publishes public school and district data files on a regular basis. The online survey was sent to 1,034 district superintendents and over 10,000 school principals with valid email addresses. We also emailed the directors of curriculum (or equivalent) in the largest 150 districts. The email was addressed to district superintendents and school principals; however, superintendents and principals could forward the email to district/school staff. For this reason, we included in our survey a question asking the respondent's position in the district. Numerous educational partners (e.g., CDE, CCSESA, Exploratorium, CDE Foundation, the California Science Project, Lawrence Hall of Science, Children Now, K–12 Alliance and all county regional leads) provided invaluable assistance in disseminating the survey. Three rounds of email follow-ups were conducted between October and November. A total of 213 districts responded to our survey. A descriptive summary of survey respondents is included in Table 1. A copy of the survey instruments is included in Technical Appendix C.

TABLE 1

Difference in student and district characteristics between respondent and non-respondent districts

	Respondent districts	Non Respondent	p-value of difference
Total enrollment	15263	3330	0.0000
% high-need students	61%	60%	0.6451
% low-income students	54%	54%	0.9390
% English learners	18%	18%	0.8730
% Asian	11%	6%	0.0000
% Black	7%	3%	0.0000
% Latino	51%	47%	0.1305
% white	31%	39%	0.0002
Urban district	35%	13%	0.0000
Rural district	10%	39%	0.0000
High poverty district (% FRPL>=75%)	32%	25%	0.0355
High need district (% high-need >=55%)	66%	61%	0.1864

	Respondent districts	Non Respondent	p-value of difference
High Black/Latino district (% Black + % Latino >=75%)	47%	33%	0.0001
Elementary district	57%	31%	0.0000
High school district	7%	11%	0.0603
Unified school district	31%	43%	0.0016
N of districts	213	821	

SOURCES: Authors' calculations.

PPIC Survey of Science Teachers

We developed a number of questions for science teachers only. Those questions asked about instructional materials, instructional modes, NGSS instructional shifts, and professional learning during the 2020–21 school year, when most schools were closed for in-person instruction. CASE disseminated the survey among its members and 124 science teachers completed the survey. The vast majority (91%) of respondents are middle school or high school science teachers; 74 percent have an advanced degree, and the average years of experience is 15.8. Because of the small size, we caution that the findings not be generalized to science teachers across the state.

Interviews with Educational Partners

We conducted semi-structured interviews with nearly all county regional leads, ten high-need districts with varying size, region and locale, all eight districts that participated in the NGSS Early Implementers initiative, statewide science organizations, and statewide policymakers to identify policy levers that could support science education. The interview questions are different for each group and Appendix D includes the questions for high-need districts.

Interviews with county regional leads

The California County Superintendents Educational Services Association (CCSESA) organizes the 58 County Superintendents of Schools into 11 service areas to identify and promote quality cost-effective educational practices and services and provide support to school districts. County offices worked mainly with districts on a contractual basis to provide professional learning opportunities. COE leads also worked collaboratively with partners to develop statewide resources for science. Ten out of eleven science regional leads were interviewed for this study.

Interviews with high-need districts

We first identify districts with the highest shares of Black, Latino, and English learners. Specifically, we sort districts into two lists:

High Black districts: at least 15 percent of students are Black (statewide average is 5%).

High Latino/EL districts: at least 90 percent of students are Latino (statewide average is 48%), and at least 14% students are English learners.

A total of 45 districts were identified and contacted for interviews (we excluded districts with fewer than 100 students). Those districts were divided into three strata: size, region, and urbanicity, and our follow-up efforts focused on obtaining a final sample that each subgroup is represented (Table 2). Semi-structured interviews were conducted between December 2021 and January 2022, before the Omicron surge.

TABLE 2
Summary of high-need districts interviewed for this study

	# of districts
By County	
Alameda	1
Fresno	2
Kern	1
LA	1
Marin	1
Monterey	1
Sacramento	1
Solano	1
Tulare	1
By Locale	
City: Large	3
City: Midsize	2
Rural: Distant	1
Suburb: Large	2
Town: Distant	1
Town: Fringe	1
By Enrollment	
Small (<4000)	4
Medium (4000 - 10000)	2
Large (>10000)	4

SOURCES: Authors' calculations

Interviews with early implementation districts

The California NGSS K–8 Early Implementation Initiative is a partnership among the K–12 Alliance at WestEd, Achieve, the California Department of Education, and the California State Board of Education to support eight school districts and two charter management organizations in building capacity to implement CA NGSS. It spans 2014 through 2020 and includes the following districts: Oakland Unified, Galt Joint Union Elementary, Tracy Unified, Kings Canyon Unified, Palm Springs Unified, Vista Unified, Lakeside Union, and San Diego Unified; and the following charters: Aspire Public Schools and High Tech High. The districts were funded by the S.D. Bechtel, Jr. Foundation and the charters were funded by the Hastings-Quillin Fund. The K–12 Alliance provides professional learning and technical assistance to the participating districts and charter management organizations to help them implement the CA NGSS in K–8 classrooms. The K–12 Alliance collaborates with members of the entire district and charter management organizations, including superintendents, other district and school administrators, teachers, parents, and the community. We interviewed staff members from all early implementation districts.

Interviews with science education organizations

We interviewed organizations that have been deeply invested in science education and equity across the state, including the California Science Project, California Association of Science Educators, Exploratorium, K12-Alliance, Children Now, California Academy of Sciences, and CCSESA.

Interviews with state policymakers

We interviewed 8 state policymakers from the State Board of Education, California Department of Education, and the California Legislature.

School Accountability Report Card (SARC)

Per the *Williams* settlement in 2004, all public schools must report the availability of textbooks or instructional materials in their annual School Accountability Report Cards (SARCs). We selected a random sample of 376 schools and downloaded their SARCs for the 2019–20 school years. The sampling error is ±5 percent at the 95% confidence level. This means that 95 times out of 100, the results will be within 5 percentage points of what they would be if all California schools were studied. For K–8 schools we extracted textbook title, publisher name, and year of adoption from SARCs, and compared that to the state's approved instructional materials list (https://www3.cde.ca.gov/impricelist/implsearch.aspx) to determine whether the textbook is CA NGSS aligned. Because the state does not have the authority to approve instructional materials for high schools, we did not report the results for high schools.

Local Control Accountability Plans (LCAPs)

All local educational agencies including school districts and charter schools are required to prepare an LCAP that describes how they intend to meet the annual goals for the eight state priorities, and describe the related budget. . The LCAP is a three-year plan that describes the goals, actions, services, and expenditures to support student out comes that address state and local priorities. Districts may use the State Board approved template and the components of the LCAP for the 2021–2024 LCAP year must be posted as one document assembled in the following order:

LCFF Budget Overview for Parents

Plan Summary

Engaging Educational Partners

Goals and Actions

Increased or Improved Services for Foster Youth, English Learners, and Low-income students

Action Tables

Instructions

County superintendents of schools are required to approve districts' LCAPs and post those plans on the website. We collected all publicly available LCAPs for 858 districts and used machine learning algorithms to extract text data and apply topic labeling.

Appendix B. Additional Tables and Figures

TABLE 1

Percentage of districts implementing CA NGSS in elementary, middle and high school grades

Implementing NGSS in…	All districts	High need	High poverty	High Black/Latino	Urban	Rural
Elementary grades	72%	77%	80%*	75%	73%	77%
Middle school grades	83%	82%	89%	83%	77%	92%
High school grades	62%	63%	59%	60%	66%	38%*

SOURCES: Authors' calculations.

NOTE: Sample includes 213 respondent districts. High need districts: at least 55 percent of students are high-need (i.e., low-income, English learners or homeless). High poverty districts: at least 75% of students are eligible for free/reduced price lunch. High-Black/Latino districts: at least 75% of students are Black or Latino. * significant at 10% ** significant at 5% *** significant at 1%

TABLE 2

% districts implementing CA NGSS, by key domains

Implementation	All districts	High need	High poverty	High Black/Latino	Urban	Rural
Curriculum alignment	53%	51%	56%	47%	55%	69%
Teacher PD	41%	41%	39%	42%	46%	39%
Administrator training	24%	27%	29%	31%*	25%	31%
Instructional alignment	45%	47%	44%	41%	43%	62%
Assessment alignment	28%	28%	24%	27%	32%	39%

SOURCES: Authors' calculations.

NOTE: Sample includes 213 respondent districts. High need districts: at least 55 percent of students are high-need (i.e., low-income, English learners or homeless). High poverty districts: at least 75% of students are eligible for free/reduced price lunch. High-Black/Latino districts: at least 75% of students are Black or Latino. * significant at 10% ** significant at 5% *** significant at 1%

TABLE 3

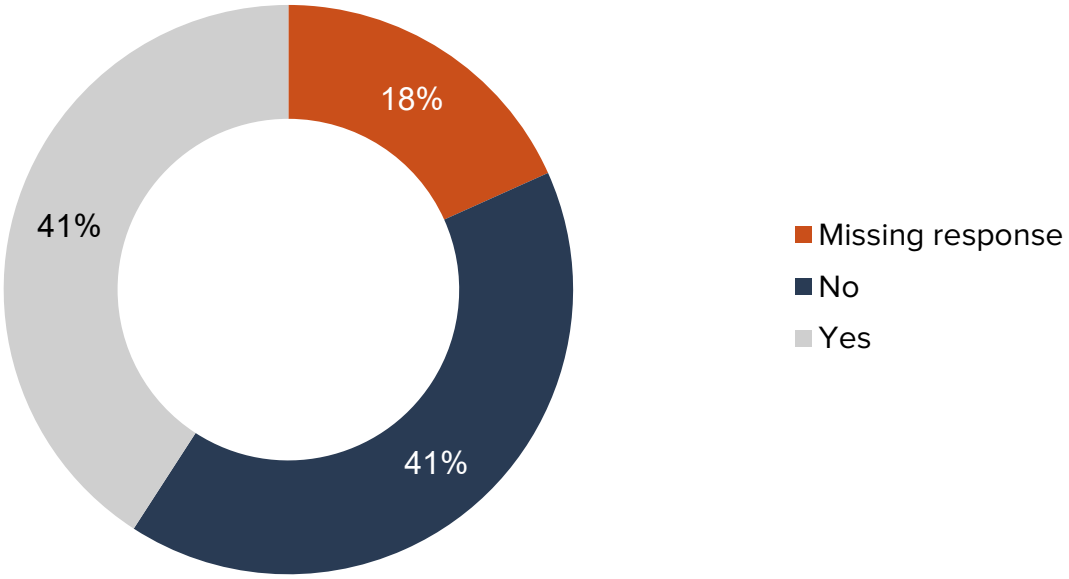
District strategies to support science education during COVID-19

	All	High poverty	High Black/Latino	Urban	Rural	High need
Using supplemental instructional materials	60%	58%	60%	63%	71%	61%
Support social-emotional learning	40%	35%	40%	47%	35%	44%
Monitoring student progress	35%	33%	34%	29%	47%	35%
Assessing student learning	28%	30%	27%	25%	47%*	30%
Small group instruction	25%	26%	27%	32%	35%	26%
Tutoring	15%	11%	15%	15%	12%	17%
Individualized instruction	13%	14%	14%	14%	24%	14%
Extended learning time	5%	8%	7%	2%	6%	7%

SOURCES: Authors' calculations.

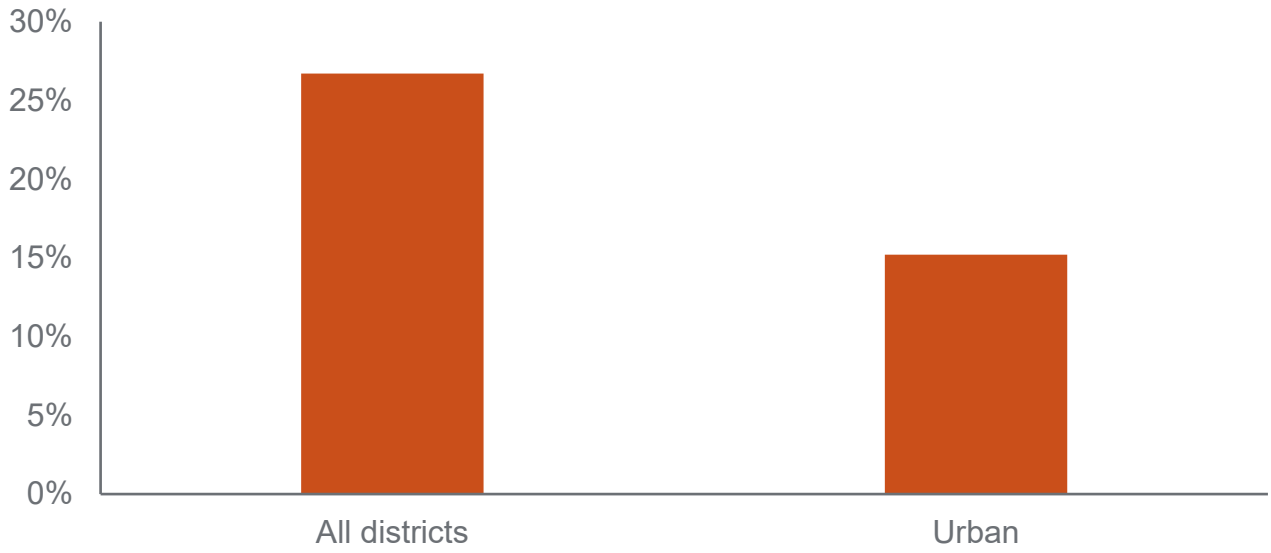
NOTE: Sample includes 213 respondent districts. High need districts: at least 55 percent of students are high-need (i.e., low-income, English learners or homeless). High poverty districts: at least 75% of students are eligible for free/reduced price lunch. High-Black/Latino districts: at least 75% of students are Black or Latino.

FIGURE 1
Most districts did not use science assessments to measure student learning



NOTE: Sample includes 213 respondent districts.

FIGURE 2
% districts said science is a high priority in its recovery plans



SOURCES: Authors' calculations.
NOTE: Sample includes 213 respondent districts.

TABLE 4

Planned programs to support science education, by district characteristics

	All districts (unweighted)	High need	High poverty	High Black/ Latino	Urban	Rural	All districts (weighted by enrollment)
Adopt/Purchase instructional materials	47%	44%**	46%	44%	45%	41%**	46%
Provide teacher training	38%	37%	34%	39%	42%	29%	51%
Set CAST performance goals	32%	30%*	33%	29%	34%	27%	41%
Provide extended learning opportunities	25%	29%***	33%***	26%	23%	24%	40%
Allocate dedicated staff	14%	13%	14%	15%	20%**	5%	27%
Provide science lab equipment and materials	14%	16%*	17%	16%	9%**	12%	17%
Set local implementation goals	13%	12%	12%	12%	9%	18%***	17%
Set course offering, enrollment and/or completion goals	9%	9%	6%	8%	12%	6%**	13%
Set broad course of study goals	8%	8%	7%	7%	6%	17%***	7%
Engage parents	5%	5%	5%	5%	5%	6%	5%
Set local assessment goals	5%	4%	5%	5%	6%	4%	6%
Hire additional teachers	4%	4%	6%	4%	3%	3%	5%
Expand CTE pathways	3%	3%	3%	3%	2%	3%	5%
ELD integration	3%	3%	3%	3%	4%	1%***	6%
Integrate Project Based learning	2%	3%	2%	2%	3%	2%	2%
Broad mention of improving instruction	2%	3%*	4%*	3%	4%**	1%	5%
Set Williams/ Textbook access goals	2%	2%	0%	1%	0%*	3%***	0%
Reduce class size	1%	1%	1%	1%	1%	1%	2%
Provide small group instruction	1%	2%*	1%	2%	1%	0%	2%
Provide credit recovery programs	1%	1%	2%**	1%	0%	0%*	2%
N of districts	858	520	216	320	157	283	856

SOURCES: Authors' calculations.

NOTES: Sample includes 858 districts that posted their LCAPs online. High need districts: at least 55 percent of students are high-need (i.e., low-income, English learners or homeless). High poverty districts: at least 75% of students are eligible for free/reduced price lunch. High-Black/Latino districts: at least 75% of students are Black or Latino. CTE: career technical education. ELD: English language development.

Appendix C. Survey Instruments

Understanding the Impact of COVID-19 on Science Education

Start of Block: Introduction

Q1 Thank you for taking this survey conducted by the Public Policy Institute of California (PPIC), an independent, nonpartisan research institute. This survey was developed in collaboration with the California Department of Education (CDE). The following questions are about **the impact of COVID-19 on science education in your school district**. PPIC researchers will use the information to document how schools navigated these extraordinary circumstances and provide policy recommendations. This survey should take no longer than 20 to 30 minutes to complete. Your response will be kept strictly confidential. If you have any questions about this survey, please contact Niu Gao (gao@ppic.org).

End of Block: Introduction

Start of Block: Background

Q2 In this survey we use "district" and "LEA" interchangeably. If you are a charter school employee, please answer the following questions as they apply to your charter school.

Q5 Please select your county and local educational agency.
County (1)
District (2)

▼ Alameda (1) ... Yuba ~ Wheatland Union High (1492)

Q6 If your LEA/charter school is not listed, please write in your district/charter name:

_____

Q7 Please select your position(s). Select all that apply.

- ☐ District administrator (1)
- ☐ School administrator (2)
- ☐ Science teacher (3)
- ☐ Other teachers (e.g., math/ELA) (4)
- ☐ Other teaching staff (e.g., TOSA, instructional coach) (5)
- ☐ County staff (e.g., science coordinator) (6)
- ☐ Other, please specify (7) _____

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q8 How many years have you taught science at the K–12 level prior to this school year?

_____

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q9 At what grade levels do you currently teach science? Select all that apply.

- ☐ K-2 (1)
- ☐ 3-5 (2)
- ☐ 6-8 (3)
- ☐ 9-12 (4)
- ☐ I do not currently teacher science (5)

Display This Question:

If At what grade levels do you current teach science (select all that apply) = 9-12

Q10 Which subject area(s) do you teach? Select all that apply.

- ○ Click to write Choice 1 (1)
- ○ Click to write Choice 2 (2)
- ○ Click to write Choice 3 (3)

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q11 Please select your highest educational degree.

- ○ Bachelors (1)
- ○ Masters (2)
- ○ Specialist (3)
- ○ PhD (4)
- ○ Other, please specify (5) _____

End of Block: Background

Start of Block: Science education during distance learning

Q12 The next section asks about how your district handled science education in the **2020–21 school year**.

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q13 Which of the following curricular sources did you use during distance learning in the 2020–21 school year, and how does that compare to pre-covid? Compared to pre-COVID instruction, how often did you use the

following curricular sources during distance learning in the 2020–21 school year? If you did not use the source, please select "NA/Did not use".

	Used a lot more during distance learning (1)	Used slightly more (2)	used about the same (3)	Used slightly less (4)	Used a lot less during distance learning (5)	NA/Did not use (6)
commercially published kits/modules (1)	○	○	○	○	○	○
county/district/school developed units (2)	○	○	○	○	○	○
online units students study at their own pace (3)	○	○	○	○	○	○
commercially published textbooks or supplemental materials (4)	○	○	○	○	○	○
paid online lessons or resources (5)	○	○	○	○	○	○
free online lessons or resources (6)	○	○	○	○	○	○
open education resources (e.g., OpenSciEd, InquiryHub, Achieve) (7)	○	○	○	○	○	○
State Board of Education adopted materials for K–8 (e.g., Amplify, FOSS, Green Ninja, Elevate) (8)	○	○	○	○	○	○

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q14 To what extent were those distance learning materials aligned to the Next Generation Science Standards? If you did not use the source, please select "NA/Did not use".

	Fully aligned (1)	Somewhat aligned (2)	Somewhat not aligned(3)	Not at all aligned (4)	I don't know (5)	NA/Did not use (6)
commercially published kits/modules (1)	○	○	○	○	○	○
county/district/school developed units (2)	○	○	○	○	○	○
online units students study at their own pace (3)	○	○	○	○	○	○
commercially published textbooks or supplemental materials (4)	○	○	○	○	○	○
paid online lessons or resources (5)	○	○	○	○	○	○
free online lessons or resources (6)	○	○	○	○	○	○
open education resources (e.g., OpenSciEd, InquiryHub, Achieve) (7)	○	○	○	○	○	○
State Board of Education adopted materials for K–8 (e.g., Amplify, FOSS, Green Ninja, Elevate) (8)	○	○	○	○	○	○

Display This Question:

If At what grade levels do you current teach science (select all that apply) = K-2

Or At what grade levels do you current teach science (select all that apply) = 3-5

Q15 **Before the pandemic**, in a typical week, how many days did you teach lessons on each of the following subjects? How many minutes per week were spent on each subject?

(Enter each response as a whole number, for example, 5, 10)

	Number of days per week (on average in a month) (1)	Total number of minutes per week (2)
Mathematics (1)		
English language arts (2)		
Science (3)		
Social science (4)		

Display This Question:

If At what grade levels do you current teach science (select all that apply) = K-2

Or At what grade levels do you current teach science (select all that apply) = 3-5

Q16 **During the 2020–21 school year**, in a typical week, how many days did you teach lessons on each of the following subjects? How many minutes per week were spent on each subject?

(Enter each response as a whole number, for example, 5, 10)

	Number of days per week (on average in a month) (1)	Total number of minutes per week (2)	Click to write Scale Point 3 (3)
Mathematics (1)			
English language arts (2)			
Science (3)			
Social science (4)			

Q17 During distance learning in the 2020–21 school year, did your district require teachers to teach science?

- ○ Yes, synchronous only (e.g., live instruction) (1)
- ○ Yes, asynchronous only (e.g., watching pre-recorded videos, reading paper packets) (2)
- ○ Yes, both synchronous and asynchronous (3)
- ○ No, my district does not require teachers to teach science during distance learning (4)
- ○ I don't know (5)

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q18 During distance learning in the 2020–21 school year, how often did you use the following instructional methods compared to pre-pandemic instruction? If you did not use the instructional mode, please select "NA/Did not use".

	Did a lot more during distance learning (1)	Did slightly more (2)	About the same (3)	Did slightly less (4)	Did a lot less during distance learning (5)
Provided live instruction and activities (1)	○	○	○	○	○
Provided asynchronous instruction (2)	○	○	○	○	○
Did demonstrations led by the teacher/peer (3)	○	○	○	○	○
Asked students to read the paper packages (4)	○	○	○	○	○

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q19 To what extent do you agree with the following statement:

During distance learning in the 2020–21 school year, my instruction primarily involved reviewing content with students that was taught previously, rather than teaching new content.

- ○ Strongly agree (1)
- ○ Somewhat agree (2)
- ○ Neither agree or disagree (3)
- ○ Somewhat disagree (4)
- ○ Strongly disagree (5)

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q20 Thinking about the formal science curriculum you would have covered if your school building had not closed in the 2020–21 school year, approximately what proportion was being covered through the distance learning materials and activities provided to students?

- ○ < 25 percent (1)
- ○ 25 - 50 percent (2)
- ○ 50 - 75 percent (3)
- ○ 75 - 100 percent (4)

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q21 During distance learning in the 2020–21 school year, in a typical week, what were your expectations for the amount of time that students should spend on science instructional activities (e.g., receiving synchronous instruction, watching asynchronous videos, time spent on science homework) ?

	< 1 hr/week (1)	1-2 hr/week (2)	> 2hr/week (3)	Did not teach this grade (4)
Grades K-2 (1)				
Grades 3-5 (2)				
Grades 6-8 (3)				
Grades 9-12 (4)				

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q22 In a typical week, approximately what percentage of your students were completing the assigned distance learning activities?

- ○ < 25 percent (1)
- ○ 25 - 50 percent (2)
- ○ 50 - 75 percent (3)
- ○ 75 - 100 percent (4)

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q23 If students were not completing the science distance learning activities, to the best of your knowledge, to what extent is it due to:

	To a great extent (1)	Somewhat (2)	Very little (3)	Not at all (4)
Lack of access to internet at home (e.g., no internet, speed is too low) (1)	○	○	○	○
Lack of access to computer device at home (e.g., no device, shared device) (2)	○	○	○	○
Lack of student engagement (3)	○	○	○	○
Lack of parent/parent/guardian engagement (4)	○	○	○	○
Lack of academic support (5)	○	○	○	○
Lack of social emotional support (6)	○	○	○	○
Home environment (e.g., shared space in a multi-generation household, too much distraction in household) (7)	○	○	○	○

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q24 To what extent did you receive adequate guidance and support (from any source in your school system) to transition to distance learning during the 2020–21 school year?

- ○ Very inadequate (1)
- ○ Somewhat inadequate (2)
- ○ Neither adequate nor inadequate (3)
- ○ Somewhat adequate (4)
- ○ Very adequate (5)

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q25 To what extent did you receive adequate guidance and support (from any source in your school system) to address the learning needs of **English learners** while your school building is closed during the 2020–21 school year?

- ○ Very inadequate (1)
- ○ Somewhat inadequate (2)
- ○ Neither adequate nor inadequate (3)
- ○ Somewhat adequate (4)
- ○ Very adequate (5)

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q26 To what extent did you receive adequate guidance and support (from any source in your school system) to address the learning needs of **students with disabilities** while your school building is closed during the 2020–21 school year?

- ○ Very inadequate (1)
- ○ Somewhat inadequate (2)
- ○ Neither adequate nor inadequate (3)
- ○ Somewhat adequate (4)
- ○ Very adequate (5)

Display This Question:

If At what grade levels do you current teach science (select all that apply) = K-2

Or At what grade levels do you current teach science (select all that apply) = 3-5

Q27 Many teachers feel better qualified to teach some subject areas than others. How well qualified do you feel you are to teach each of the following subjects at the grade level(s) you teach, whether or not they are currently included in your curriculum?

	Not well at all (1)	Slightly well (2)	Moderately well (3)	Very well (4)	Extremely well (5)
Life science (1)	○	○	○	○	○
Earth science (2)	○	○	○	○	○
Physical science (3)	○	○	○	○	○
Math (4)	○	○	○	○	○
English language arts (5)	○	○	○	○	○
Social science (6)	○	○	○	○	○

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q28 During distance learning in 2020–21, how often did your lessons provide students with the following experiences:

Engaging in relevant phenomena or problem solving

- ○ Always (1)
- ○ Often (2)
- ○ Sometimes (3)
- ○ Rarely (4)
- ○ Never (5)

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q29 During distance learning in 2020–21, how often did your lessons provide students with the following experiences:

Using the 3 dimensions to explain phenomena or solve problems

- ○ Always (1)
- ○ Often (2)
- ○ Sometimes (3)
- ○ Rarely (4)
- ○ Never (5)

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q30 During distance learning in 2020–21, how often did your lessons provide students with the following experiences:

Using the environmental principals and concepts (EP & C) to explain phenomena or solve problems

- ○ Always (1)
- ○ Often (2)
- ○ Sometimes (3)
- ○ Rarely (4)
- ○ Never (5)

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q31 During distance learning in 2020–21, how often did your lessons provide students with the following experiences:

Engaging in a meaningful, logical learning sequence

- ○ Always (1)
- ○ Often (2)
- ○ Sometimes (3)
- ○ Rarely (4)
- ○ Never (5)

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q32 During distance learning in 2020–21, how often did your lessons provide students with the following experiences:

Student-centered instruction in which students review prior knowledge to negotiate current understanding and engage in sense making

- ○ Always (1)
- ○ Often (2)
- ○ Sometimes (3)
- ○ Rarely (4)
- ○ Never (5)

Display This Question:

If Please select your position(s) (select all that apply). = Science teacher

Q33 During distance learning in 2020–21, how often did your lessons provide students with the following experiences:

Engaging in equitable science (using UDL and SEL)

- ○ Always (1)
- ○ Often (2)
- ○ Sometimes (3)
- ○ Rarely (4)
- ○ Never (5)

Q34 Did your district adopt an NGSS aligned textbook for K–8 before spring 2020?

- ○ Yes, for all K–8 grades (1)
- ○ Yes, but only for some K–8 grades (2)
- ○ No (3)
- ○ NA, district does not serve K–8 (4)

Q35 Did your district adopt an NGSS aligned textbook for high schools before spring 2020?

- ○ Yes, for all high school grades (1)
- ○ Yes, but only for some high school grades (2)
- ○ No (3)
- ○ No, it is up to individual high schools to make the adoption (4)
- ○ NA, district does not serve high schools (5)

Display This Question:

If Did your district adopt an NGSS aligned textbook for K–8 before spring 2020 ? = Yes, but only for some K–8 grades

Or Did your district adopt an NGSS aligned textbook for K–8 before spring 2020 ? = No

Q36 How did the pandemic closure affect your district's plan to adopt NGSS aligned textbooks?

- ○ Delayed the process (1)
- ○ No impact (2)
- ○ I don't know (3)
- ○ Other, please specify (4) _____

Q37 Did your district adopt an NGSS aligned course sequence for middle school science before spring 2020?

- ○ Yes, integrated model (1)
- ○ Yes, discipline specific model (2)
- ○ No (3)
- ○ NA, district does not serve middle school grades (4)

Display This Question:

If Did your district adopt an NGSS aligned course sequence for middle school science before spring 2... = No

Q38 How did the pandemic affect your district's plan to adopt an NGSS aligned course sequence for middle school science?

- ○ Delayed the process (1)
- ○ No impact (2)
- ○ I don't know (3)
- ○ Other, please specify (4) _____

Q39 Did your district adopt an NGSS aligned course sequence for high school science before spring 2020?

- ○ Yes, 3 course model (Biology, Chemistry, and Physics as three separate courses with Earth and Space Science interwoven into those subjects) (1)
- ○ Yes, 4 course model (Biology, Chemistry, Physics, and Earth and Space Science as four separate courses) (2)
- ○ Yes, integrated (every science every year) (3)
- ○ No (4)
- ○ NA, district does not serve high school grades (5)

Display This Question:

If Did your district adopt an NGSS aligned course sequence for high school science before spring 2020? = No

Q40 How did the pandemic closure affect your district's plan to adopt an NGSS aligned course sequence for high school science?

- ○ Delayed the process (1)
- ○ No impact (2)
- ○ I don't know (3)
- ○ Other, please specify (4) _____

Q41 Before the pandemic, did your district use **local** science assessments to measure student learning?

- ○ Yes (1)
- ○ No (2)

Display This Question:

If Before the pandemic, did your district use local science assessments to measure student learning? = Yes

Q42 Were those local science assessments aligned with NGSS before spring 2020?

- ○ Yes, for all grades (1)
- ○ Yes, but only for some grades (2)
- ○ No (3)

Display This Question:

If Before the pandemic, did your district use local science assessments to measure student learning? = No

Q43 How did the pandemic closure affect your district's plan to align local assessments with NGSS?

- ○ Delayed the process (1)
- ○ No impact (2)
- ○ I don't know (3)
- ○ Other, please specify (4) _____

Q44 Compared to math and ELA, how much of a priority is science instruction in distance learning?

- ○ Higher priority (1)
- ○ About the same (2)
- ○ Lower priority (3)
- ○ I don't know (4)

Q45 38. Which of the following strategies did your district use to support science education during distance learning? Select all that apply.

- ☐ Using supplemental science instructional materials (1)
- ☐ Assessing student learning in science (2)
- ☐ Monitoring student progress (3)
- ☐ Small group instruction (4)
- ☐ Extended learning time (e.g., weekend class, evening class) (5)
- ☐ Tutoring (6)
- ☐ Individualized instruction (7)
- ☐ Support social-emotional learning (8)
- ☐ Other, please specify (9) _____

Q46 Did your district offer additional support to English learners/emergent bilinguals during distance learning?

- ○ Yes (1)
- ○ No (2)
- ○ I don't know (3)

Display This Question:

If Did your district provide additional supports to English learners/emergent bilinguals during dist... = Yes

Q47 Which of the following additional services did your district offer to English learners/emergent bilinguals? Select all that apply.

- [ ] Designated/Integrated EL instruction (1)
- [ ] Small group discussion (2)
- [ ] Communicating in home languages (3)
- [ ] Extra time with ELD teachers/aid (4)
- [ ] Extra supplemental materials (5)
- [ ] Extra family materials, translated (6)
- [ ] Formative/diagnostic assessments for ELs (7)
- [ ] Other, please specify (8) _____

Q48 Did your district offer additional support to students with disabilities during distance learning?

- ○ Yes (1)
- ○ No (2)
- ○ I don't know (3)

Display This Question:

If Did your district provide additional supports to students with disabilities during distance learn... = Yes

Q49 Which of the following additional services did your district offer to students with disabilities? (select all that apply.)

- ☐ Communication with families (1)
- ☐ Providing assistive technology (2)
- ☐ Providing in-person IEP meeting sand services (3)
- ☐ Other, please specify (4) _____

Q50 Did your district offer summer science program(s) in summer 2021?

- ○ Yes (1)
- ○ No (2)
- ○ I don't know (3)

Q51 Did the summer science program prioritize certain student groups? Select all that apply.

- ☐ Yes, for English learners/emergent bilinguals (1)
- ☐ Yes, for low-income students (2)
- ☐ Yes, for students without home internet access (3)
- ☐ Yes, for students who are falling behind academically (4)
- ☐ No, the program is open to all (5)

End of Block: Science education during distance learning

Start of Block: Plans to support science learning in 2021-22 and beyond

Q52 This section we asks about your district's plan to accelerate student learning in the 2021-22 school year and beyond.

Q53 To what extent are the following subjects a priority in your district's education recovery plan?

	Essential Priority (1)	High (2)	Medium (3)	Low (4)	Not a priority (5)
Math (1)	○	○	○	○	○
English language arts (2)	○	○	○	○	○
Science (3)	○	○	○	○	○
Social science (4)	○	○	○	○	○

Display This Question:

If To what extent is the following subjects a priority in your district's education recovery plan? = Science [Not a priority]

Or To what extent is the following subjects a priority in your district's education recovery plan? = Science [Low]

Q54 You have stated that science is not a priority in your district's recovery work. Why?

_____

Q55
Is your district currently implementing the CA NGSS?

- ○ Yes (1)
- ○ No (2)
- ○ I don't know (3)

Display This Question:

If Is your district currently implementing the CA NGSS? = Yes

Q56 In what grade level(s) are you implementing NGSS?

- ○ Elementary grades (1)
- ○ Middle school grades (2)
- ○ High school grades (3)

Display This Question:

If Is your district currently implementing the CA NGSS? = Yes

Q57 The California Department of Education defines three phases of the implementation:

The **awareness phase** represents an introduction to the CA NGSS, the initial planning of systems implementation, and establishment of collaborations.

The **transition phase** is the concentration on building foundational resources, implementing needs assessments, establishing new professional learning opportunities, and expanding collaborations between all stakeholders.

The **implementation phase** expands the new professional learning support, fully aligns curriculum, instruction, and assessments, and effectively integrates these elements across the field.

Which of following best describes your NGSS implementation status:

	Awareness (1)	Transition (2)	Implementation (3)
Instructional materials adoption (1)	○	○	○
Professional development to science teachers and instructional aids (2)	○	○	○
Professional development to administrators (3)	○	○	○
Click to write Statement 4 (4)	○	○	○
Click to write Statement 5 (5)	○	○	○
Click to write Statement 6 (6)	○	○	○

Display This Question:

If Is your district currently implementing the CA NGSS? = Yes

Q58 To what extent is each of the following a priority in your district's plan to implement NGSS in the 2021-22 school year?

	Essential priority (1)	High (2)	Medium (3)	Low (4)	Not a priority (5)
Instructional materials adoption (1)	○	○	○	○	○
Professional development to science teachers and instructional aids (2)	○	○	○	○	○
Professional development to administrators (3)	○	○	○	○	○

Q59 Does your district plan to administer the California Science Test (CAST) in the 2021-22 school year?

- ○ Yes (1)
- ○ No (2)
- ○ A decision has not been made (3)
- ○ I don't know (4)

Q61 Does your district plan to provide additional support to English learners/emergent bilinguals in 2021-22 ?

- ○ Yes (1)
- ○ No (2)
- ○ I don't know (3)

Display This Question:

If Does your district plan to provide additional supports to English learners/emergent bilinguals in... = Yes

Q62 Which of the following additional services will your district offer to English learners/emergent bilinguals? Select all that apply.

- ☐ Designated/Integrated EL instruction (1)
- ☐ Small group discussion (2)
- ☐ Communicating in home languages (3)
- ☐ Extra time with ELD teachers/aids (4)
- ☐ Extra supplemental materials (5)
- ☐ Extra family materials, translated (6)
- ☐ Formative/diagnostic assessments for EL/EBs (7)
- ☐ Other please specify (8) _____

Q63 Does your district plan to offer additional support to students with disabilities in the 2021-22 school year?

- ○ Yes (1)
- ○ No (2)
- ○ I don't know (3)

Display This Question:

If Does your district plan to provide additional supports to students with disabilities in the 2021-... = Yes

Q64 Which of the following additional services will your district offer to students with disabilities during the 2021-22 school year? Select all that apply.

- ☐ Communication with families (1)
- ☐ Providing assistive technology (2)
- ☐ In-person IEP meetings and services (3)
- ☐ Other please specify (4) _____

End of Block: Plans to support science learning in 2021-22 and beyond

Start of Block: Budget decisions

Q65 This section we ask about your district's budget for the 2021-22 school year.

Q66 Which the following best describes your school's budget for science education in 2021-22?

- ○ About the same as 2019–20 (1)
- ○ Lower than 2019–20 (2)
- ○ Higher than 2019–20 (3)
- ○ I don't know (4)

Display This Question:

If Which the following best describe your school's budget for science education in 2021-22? = Higher than 2019–20

Q67 You have stated the district received additional money for science education for the 2021-22 school year. How will the district spend the additional dollars? (Check all that apply)

- ☐ Hiring more science teachers (1)
- ☐ Hiring more instructional aid and coaches (2)
- ☐ Purchasing/developing more instructional materials (3)
- ☐ Providing professional development to teachers and administrators (4)
- ☐ Reducing science class size (5)
- ☐ Providing more after school science programs (6)
- ☐ Providing extended learning programs (e.g., weekend class, evening class) (7)
- ☐ Providing science tutoring (8)
- ☐ Providing summer enrichment programs (9)
- ☐ Providing credit recovery programs (10)
- ☐ Purchasing science labs, equipment and materials (11)
- ☐ Bonus pay for science teachers (12)
- ☐ Other please specify (13) _____

Display This Question:

If Which the following best describe your school's budget for science education in 2021-22? = Lower than 2019–20

Q68 You have stated the district received less money for science education for the 2021-22 school year. Which of the following current science programs, services, activities, and/or initiatives will the district cut or scale back for the 2021-2022 budget?(Check all that apply)

- ○ Technology (e.g., internet access, computers) (1)
- ○ After school programs (2)
- ○ Enrichment programs (e.g., robotics) (3)
- ○ Advanced placement programs (4)
- ○ Teacher induction (5)
- ○ Teacher professional development (6)
- ○ Science tutoring programs (7)
- ○ Science class sizes (8)
- ○ Science credit recovery programs (9)
- ○ Support for English learners and students with disabilities (10)
- ○ Other please specify (11) _____

End of Block: Budget decisions

Appendix D. Interview Questions for High-need Districts

Part 1. Identifying institutional factors that may support science education/NGSS

- Can you describe where your district is in terms of NGSS implementation?
    - If already implementing NGSS, can you tell me what you district is doing to prioritize it?
    - If not, what kind of resources or support would help your district prioritize NGSS implementation?
- What are some of the barriers to prioritizing science learning (i.e. funding, staff shortage)?
- Has there been a shift in the focus since returning to in-person learning? (COVID-19 risk mitigation, SEL, managing both in-person and online learning)
- Can you tell us about the degree of unfinished learning in your district/school?
    - Which measure(s) did your district use to assess student learning?
    - Is your district addressing unfinished learning in science?

Part 2. Identifying (state) policy levers that may support NGSS

- (funding) Do you see state funding play a role in supporting NGSS in your district?
    - Is your district using funds to support science education? (e.g., federal, state stimulus)
        - How would state funding further that goal? (Targeted funding to support teacher development)
- (data) What kind of data should the state collect to measure science learning?
    - instructional minutes for K-12
    - access to NGSS aligned instructional materials
    - NGSS aligned science course models for middle and high school students
- (assessment/accountability) How could we change the accountability system to support science education?
    - How often should we assess student science learning?
    - What kind of assessments – formative and informative – should we use to assess student science learning?
    - How about including science in the state's dashboard?
- (policy) Do you see high school graduation policy playing a role?
    - If so, how can we change graduation policy to support science education?
- What are other policy levers that may support science education/NGSS?

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