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Abstract

Elementary students with learning disabilities (LDs) often have limited opportunities to learn science, and little is known about how special educators engage in science instruction. This study drew on a nationally representative survey of elementary special education teachers to describe their roles, preparedness, time allocation, and perceived barriers. Most teachers reported minimal discipline-specific preparation and felt less prepared to teach science than other subjects. Many noted that students with LDs often missed science classes because of pull-out instruction. Common barriers to students receiving science instruction included remediation priorities and accountability pressures in tested subjects. These findings provide a national snapshot of science instruction for elementary students with LDs and point to the need for greater teacher preparation and policy support to ensure access to high-quality science learning for students with LDs.

Keywords

learning disabilities, science instruction, elementary special education, opportunity to learn

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Introduction

Effective science instruction is essential for all students, including those with learning disabilities (LDs). Science, technology, engineering, and mathematics (STEM) jobs are growing faster than other sectors and tend to offer higher wages (National Science Board, 2022), to pursue these opportunities, students with LDs need early access to science. Science instruction also supports reading development by building students' background knowledge and vocabulary, both of which are critical to comprehension (Scruggs & Mastropieri, 1993; Smith et al., 2021). However, science is often not prioritized in elementary education (Blank, 2013; Horizon Research, 2019), a trend that may disproportionately affect students with LDs, who are already behind in science by the elementary grades (Morgan et al., 2016). While intervention studies (e.g., Doabler et al., 2021; Maddox et al., 2025; Romine et al., 2024) show promising results for improving science outcomes among students with LDs, data remain limited on how students with LDs are actually taught science in schools across the country.

While little is known about how science is taught to students with LDs, national achievement data show clear patterns in student outcomes. Specifically, National Assessment of Educational Progress (NAEP) results indicate that students with disabilities score, on average, more than 30 points below peers without disabilities by fourth grade, with gaps that tend to widen through eighth grade (National Center for Education Statistics; NCES, 2022a). Longitudinal studies reinforce this pattern. For example, Morgan et al. (2016) found that science achievement gaps for students with disabilities emerged as early as kindergarten and persisted through elementary school. Limited disaggregation prevents tracking students with LDs separately; however, their presence within the broader disability category suggests that they experience similar, long-standing gaps in science achievement.

Students with LDs make up the largest group served under the Individuals with Disabilities Education Act (IDEA). According to the most recent federal data, 32% of students receiving special education services are identified with a specific learning disability, representing about 5% of the total public school population (NCES, 2024). To date, research on the instruction of students with LDs has focused primarily on reading and mathematics. Science, by contrast, has received comparatively little attention (Therrien et al., 2011; Villanueva et al., 2012), leaving basic questions unanswered about how, when, and by whom the subject is taught.

Special education teachers often determine whether and how students with LDs take part in science through direct teaching, co-teaching, or other arrangements. The ways special educators plan schedules, teach content, and work with general educators have a direct impact on students' opportunities to learn science.

Barriers to Opportunity to Learn Science

Students' opportunities to learn depend not only on what schools offer but also on how instruction is delivered and to whom. This opportunity-to-learn (OTL) framework emphasizes that access to high-quality, content-rich instruction is essential for academic success (Pianta et al., 2007). In its simplest form, OTL refers to "the time allowed for learning" (Floden, 2002, p. 233). Science instructional time is a key indicator of OTL (Blank, 2013). Thus, large-scale NAEP analyses confirm that more time spent on science results in higher NAEP science scores for all students (Blank, 2013). Decades of comparative work have reached the same conclusion: the weight of evidence indicates a positive association between OTL and student achievement (Floden, 2002).

However, opportunity alone is not enough to ensure student achievement; how instruction is organized shapes the extent to which students engage with science learning. Special education teachers may teach through pull-out sessions, co-teaching arrangements, or provide consultative support within general education classes. Such models are meant to individualize instruction, but research and policy to date have centered almost entirely on reading and mathematics (Griffith & Scharmann, 2008; Pederson, 2007), with far less known about how these models operate in science. In many schools, students with LDs are pulled out of science for reading and/or mathematics interventions (Therrien et al., 2025); in others, co-teaching may provide scaffolds that enable participation (King-Sears et al., 2021).

Service delivery models play a central role in shaping students' opportunities to learn and engage in science. Whether through pull-out instruction, co-teaching, or consultative support, these approaches can expand or limit participation depending on how they are implemented (Kaler et al., 2024; McLeskey et al., 2012; Vannest et al., 2009). A persistent challenge is that special education teachers, responsible for teaching multiple subjects, often have limited discipline-specific preparation. Many teacher preparation programs include little science-focused coursework, leaving graduates with only a limited grasp of key concepts (Brownell et al., 2010; Norman et al., 1998). Not surprisingly, many teachers say they feel unprepared to teach science, especially when lessons require inquiry-based methods (Mulvey et al., 2016). Further, at the district level, service delivery models are often chosen for scheduling or staffing convenience rather than for their effectiveness or fit with students' learning needs (McLeskey et al., 2012). These system-level decisions introduce an additional layer of complexity, influencing how science instruction is prioritized and supported in schools.

System-level policies introduce an additional layer of complexity. High-stakes accountability requirements in reading and mathematics narrow elementary schedules, often crowding out science education (Berliner, 2011; Pederson, 2007). In addition, although every state administers a high-stakes science assessment, it typically occurs only once in Grades 3–5, so teachers

may feel far less pressure to teach science than they do literacy or mathematics (National Academies of Sciences, Engineering & Medicine, 2021). COVID-19 recovery efforts intensified this imbalance: National principal surveys found that post-pandemic catch-up time went almost exclusively to reading and mathematics (Kaufman & Diliberti, 2021). Finally, special educators seldom have common planning time with their general education colleagues (Qualls et al., 2025; Vannest et al., 2011), which limits coordination for inclusive science instruction.

These variables leave students with LDs vulnerable to inadequate access to science learning. One structural indicator of this vulnerability is instructional time. Nationwide survey evidence indicates that elementary schedules devote limited time to science. Specifically, the National Survey of Science and Mathematics Education reported that elementary classes devote just two or three days a week for roughly 20–30 min at a time to science instruction, with daily science occurring in only about one-third of classrooms (Horizon Research, 2019). However, the survey captured schedules only at the classroom level and did not indicate whether students with LDs were present, pulled out, or otherwise engaged.

Taken together, this literature shows that access to science learning for students with LDs is shaped by both time and design: Schools must not only allocate sufficient instructional minutes but also ensure that instruction is organized and delivered in ways that make disciplinary content accessible. Building on this foundation, the present study extended prior national work by examining science instruction from the perspective of special education teachers, who, through their individualized education program (IEP) roles and collaboration with general educators, help shape whether and how students with LDs access science learning opportunities.

Prior Research on Science Instruction for Students With LDs

A national survey of fourth- and fifth-grade general education teachers provided a representative picture of how science instruction is delivered to students with disabilities, including those with LDs (Therrien et al., 2025). Fewer than one in five respondents reported regularly teaching science to students with disabilities, and most expressed low confidence in being able to adapt science lessons or collaborating with special education teachers to support participation. These findings highlight a systemic access gap: Students with LDs often have fewer opportunities to learn science because instructional time for science is already limited, and because the time that does exist often involves students being pulled out for other services. This pattern demonstrates the need to examine how special education teachers approach science instruction, the supports they use, and the barriers they face.

Research, however, also shows that students with LDs can make meaningful progress in science when instruction is explicit, guided, and supported with scaffolding around key inquiry practices. Meta-analyses by Therrien et al. (2011)

and Wilson et al. (2025) found that students with disabilities achieved their strongest outcomes when provided structured or guided inquiry instruction that combined explicit teaching with scaffolding. Other recent studies report the same pattern. For example, studies by De La Paz et al. (2024), Romine et al. (2024), Doabler et al. (2021), and Maddox et al. (2025) each found that explicit modeling, guided inquiry, and instruction that connect literacy and science improve students' reasoning, engagement, and conceptual understanding.

These emerging evidence-based practices align with broader frameworks for inclusive science instruction, such as universal design for learning (UDL), which emphasizes accessibility, representation, engagement, empowerment, and collaboration (CAST, 2024). Together, this body of work shows that structured inquiry supported by explicit instruction can create meaningful opportunities for students with LDs to learn science. However, while these frameworks outline effective practices, much less is known about how they are enacted in real classrooms, particularly by special education teachers.

Understanding these classroom realities is critical for connecting what research shows to be effective to what occurs in daily instruction. This study examined those patterns on a national scale to inform efforts to expand science learning opportunities for students with LDs. The Next Generation Science Standards (NGSS; NGSS Lead States, 2013) provide an aspirational vision in which all students, including those with LDs, actively participate in science and engineering practices. Examining current practices among special educators offers a foundation for understanding how the field can move toward that goal.

Study Purpose and Research Questions

Prior research shows that science is often given limited instructional time in elementary schools and that students with LDs are frequently pulled out for reading or mathematics interventions instead of participating in science instruction. What remains unknown is how special education teachers themselves engage with science instruction. Do they teach it directly, co-teach, or consult with general education teachers, or does science time get consumed by instruction in reading and mathematics? This study addressed that gap in knowledge by surveying a nationally representative sample of elementary special education teachers, documenting (a) how often they teach science, (b) which service-delivery models they use, (c) how prepared they feel, and (d) what barriers they perceive, offering the first practice-level snapshot of science instruction for students with LDs.

The following research questions guided this descriptive work:

1. *Subject coverage and dosage:* What subjects do special education teachers report teaching to students with LDs, and how much time is devoted to each?

2. *Service delivery patterns*: How commonly do special education teachers use pull-out, push-in/co-teaching, or consultation models across subjects?
3. *Teacher preparedness*: How prepared do special education teachers feel to instruct students with LDs in general and in science specifically?
4. *Science-specific barriers*: What obstacles do special education teachers report that may limit science instruction for students with LDs?
5. *Post-COVID changes*: How, if at all, has science instruction for students with LDs changed since the onset of the COVID-19 pandemic?

Method

The sampling design for this project was preregistered on the Open Science Framework (OSF; https://osf.io/3z4bk/overview?view_only=412c386adf314b78906d6f7d8b1914c7). All analyses reported here are descriptive in nature and were not part of the preregistered analytic plan. Because this study was conducted in parallel with a companion survey of general education teachers (Therrien et al, 2025), the school sampling design is similar. However, the teacher recruitment procedures and survey content were distinct and tailored for special educators.

Data Sources

Two types of data were used. First, we administered a survey to special education teachers working in elementary schools included in the national sample. Second, we collected school-level demographic and staffing information from the Common Core of Data, which allowed us to benchmark our sample against the national population.

School Sampling and Teacher Recruitment. The survey was conducted in conjunction with a companion study of fourth- and fifth-grade general education teachers (Therrien et al, 2025). To enable comparisons across studies, both surveys used the same nationally representative set of schools, but the populations of teachers recruited differed.

The sampling frame was created using *The Generalizer*, a tool that enables researchers to specify an inference population and identify schools with characteristics that mirror the target population (Tipton & Miller, 2023). To enhance representativeness, schools were grouped into strata defined by five characteristics linked in prior research to science achievement (Curran & Kitchin, 2019): enrollment size, socioeconomic status, geographic locale, racial/ethnic composition, and proportion of English learners. A random sample of 400 schools was drawn across these strata.

Within each stratum, schools were randomized rather than listed by stratum fit, and project staff compiled contact information from publicly available school staff directories. When a selected school lacked special educators' email addresses,

the next school within the same stratum was used. Using school websites, project staff identified individuals with titles indicating a special education role (e.g., special education teacher, intervention specialist, and learning support teacher), and the first author reviewed all titles to confirm role accuracy. Invitation emails containing individualized survey links were sent directly to these teachers between April and June 2023, with two follow-up reminders.

Special education teacher eligibility was determined using a two-step process. First, teachers were identified based on publicly available titles indicating a special education role at schools serving Grades 4 and 5. Second, respondents confirmed their role through a survey screening item. Only individuals who self-identified as special education teachers were included in analyses; those indicating otherwise were automatically excluded. This approach ensured that all participants were current special education teachers in schools that served fourth and fifth grades.

For the general education survey, only fourth- and fifth-grade teachers were invited. In contrast, the present study recruited all special educators identified in each school's publicly available directory, as special education teachers often provide services across multiple grade levels. This recruitment process produced a sample of 1,176 special educators. Responses were received from 101 teachers, representing 81 of the 400 sampled schools. This corresponds to a teacher-level response rate of 9% and a school-level participation rate of 20%.

Sample Representativeness. Comparisons with the Common Core of Data (2021–2022) showed that recruited and responding schools closely resembled the national population of public elementary schools (see Supplemental Table A). Responding schools averaged 518 students (national = 432) and 51% eligibility for free or reduced-price lunch (national = 54%), with similar pupil–teacher ratios (14.2 vs 14.8). Locale distributions were well balanced, with approximately 25% urban, 33% suburban, and 42% town/rural combined, compared to national percentages of 28% urban, 31% suburban, and 41% town/rural nationally (NCES, 2022b), indicating broad geographic representation.

At the teacher level, comparisons with the National Teacher and Principal Survey (2020–2021) likewise showed similar demographic patterns (see Supplemental Table B). Responding special educators were 82.8% White, 5.1% Black, and 5.1% Hispanic/Latino, compared with 87.7%, 9.2%, and 9.0% nationally, respectively. Most held a master's degree (62.4% vs 63.35% nationally). Respondents tended to have fewer years of teaching experience, with 29% reporting fewer than three years compared to 15% nationally, and 9% reporting over 20 years compared to 26% nationally. Nevertheless, overall, these benchmarks indicate that the analytic sample closely approximates the demographic and professional characteristics of U.S. elementary special education teachers.

Quantitative evaluation of representativeness showed that absolute differences between the study sample and national benchmarks were small across both school- and teacher-level indicators. For school characteristics, mean absolute deviations averaged 3.1 percentage points (range = 0.6–4.9). For teacher characteristics, the mean absolute deviation was 3.4 percentage points (range = 0.9–4.9). These differences fall within the range typically regarded as minimal and unlikely to introduce meaningful bias in national survey research, consistent with established standards for evaluating representativeness (Groves, 2006).

Survey Instrument

The questionnaire drew on the 2018 *National Survey of Science and Mathematics Education* (NSSME+; Banilower et al., 2018) but was adapted to emphasize the experiences of special educators supporting students with LDs. The survey instrument is available on our OSF site (https://osf.io/3z4bk/overview?view_only=412c386adf314b78906d6f7d8b1914c7). It included 44 items across four domains: background and preparation (12 items), science instruction (14 items), supports for students with disabilities (10 items), and demographics (8 items). Because of branching logic, individual respondents completed between 30 and 32 items. The instrument was designed to be completed in about 15 min and included a mix of multiple-choice, Likert-style, and open-response items.

Most items were adapted from the NSSME+ (Banilower et al., 2018), but new items were developed to capture special educators' instructional roles, collaboration practices, and perceptions of preparedness. To strengthen content validity, draft items were reviewed by experts in both science and special education. Based on their feedback, revisions were made to improve clarity and appropriateness. The instrument was also piloted with current and former special educators, which allowed us to identify ambiguous wording and refine items prior to administration. Because items were designed as descriptive indicators rather than multi-item scales, internal consistency coefficients (e.g., Cronbach's alpha) were not computed.

In the background and preparation section of the instrument, teachers were asked about their primary instructional role (e.g., resource/pull-out, inclusion, self-contained, and consultant), grade levels served, highest degree earned, certifications, subject-area specializations, and the pathway through which they obtained certification (e.g., undergraduate, post-baccalaureate, or master's program). They also reported whether they had received training in teaching students with LDs and the number of years of experience across several domains (K-12 teaching overall, teaching special education, teaching science, and teaching at their current school).

The science instruction section asked teachers to indicate who provided science instruction to their students (general education teacher only, special education teacher only, or

both) and whether instruction was offered as a stand-alone subject or integrated into other subjects. Teachers were also asked which subjects science was most commonly integrated with, whether they had access to state standards, pacing guides, or curricula, and which resources they used to plan lessons. Additional items asked about the frequency and duration of science instruction, whether science was taught throughout the year or in blocks, and barriers that limited their ability to provide science as planned.

The supports for students with disabilities section captured information on the number of students with LDs served, the primary instructional models used (e.g., pull-out, push-in, primary instruction, and consultation), and the extent to which pull-out services for other subjects (reading and mathematics) conflicted with science instruction. Teachers also rated their overall preparedness to teach students with disabilities and their specific preparedness to teach science to students with disabilities.

Finally, the survey also included nine open-ended items, such as "Describe any barriers that make it difficult for your students with disabilities to participate in science instruction," "What supports or resources have been most helpful to you in providing science instruction," and "Please share any additional comments about teaching science to students with disabilities." Although open-ended responses were collected, they were not analyzed or included in this paper; all de-identified responses, along with the complete item set and codebook, are publicly available in the open dataset on OSF to support transparency and secondary analyses.

Analytic Approach

Analyses were conducted in two stages. First, as described above, descriptive statistics were calculated at both the school and teacher level to compare the recruited and responding samples with national benchmarks (see Supplemental Tables A and B). These analyses established the representativeness of the sample used for analysis.

Second, we computed descriptive statistics for all survey items, including sample sizes, means, standard deviations, and percentages. Results are presented by domain (i.e., background, science instruction, and supports for students with disabilities). Although regression analyses were initially considered to explore associations between teacher characteristics and practices, limited variability in key items led to unstable model estimates. As a result, we do not report them here and instead focus on descriptive results to provide an accurate account of the data.

Results

The following sections provide descriptive results on teacher characteristics, science instruction practices, and supports provided to students with disabilities, with particular attention to students with LDs where data allow.

Table 1. General Information.

	N	M	SD	Min	Max	Missing
Type of SE teacher (checked)						
Self-contained (%)	101	32.67	47.14	0	100	0
Inclusion (%)	101	46.53	50.13	0	100	0
Resource/pull-out (%)	101	57.43	49.69	0	100	0
Consultant (%)	101	4.95	21.80	0	100	0
Other (%)	101	1.98	14.00	0	100	0
Grades support (checked)						
Kindergarten (%)	101	37.62	48.69	0	100	0
First grade (%)	101	42.57	49.69	0	100	0
Second grade (%)	101	44.55	49.95	0	100	0
Third grade (%)	101	57.43	49.69	0	100	0
Fourth grade (%)	101	65.35	47.82	0	100	0
Fifth grade (%)	101	62.38	48.69	0	100	0
Middle school (%)	101	11.88	32.52	0	100	0
High school (%)	101	1.98	14.00	0	100	0
Highest level of education						
High school/GED (%)	101	0.99	9.95	0	100	0
Bachelor (%)	101	36.63	48.42	0	100	0
Master (%)	101	59.41	49.35	0	100	0
Doctoral (%)	101	2.97	17.06	0	100	0
Degree in elementary education (%)	101	64.36	48.13	0	100	0
Degree in science education (%)	101	6.93	25.52	0	100	0
Degree in special education (%)	101	80.20	40.05	0	100	0
Teacher certification						
Undergraduate (%)	99	49.49	50.25	0	100	2
Post-baccalaureate (TFA) (%)	99	7.07	25.76	0	100	2
Master (%)	99	41.41	49.51	0	100	2
No formal teacher prep (%)	99	2.02	14.14	0	100	2
When received certificate						
0–2 years ago (%)	97	12.37	33.10	0	100	4
2–5 years ago (%)	97	15.46	36.34	0	100	4
5–10 years ago (%)	97	17.53	38.22	0	100	4
10–15 years ago (%)	97	20.62	40.67	0	100	4
15–20 years ago (%)	97	20.62	40.67	0	100	4
20+ years ago (%)	97	13.40	34.24	0	100	4
General education credential (%)	98	69.39	46.33	0	100	3
Special education credential (%)	98	91.84	27.52	0	100	3
Specialize in any subjects (%)	101	36.63	48.42	0	100	0
Specialized subject						
Reading (%)	37	59.46	49.77	0	100	0
Math (%)	37	18.92	39.71	0	100	0
Science (%)	37	5.41	22.92	0	100	0
Social science (%)	37	18.92	39.71	0	100	0
Other (%)	37	29.73	46.34	0	100	0
Teaching LD training (checked)						
Coursework through college (%)	101	90.10	30.02	0	100	0
Online courses (%)	101	57.43	49.69	0	100	0
PD by current school (%)	101	82.18	38.46	0	100	0
PD by previous employer (%)	101	46.53	50.13	0	100	0
PD by teacher organization (%)	101	29.70	45.92	0	100	0
No training on teaching LDs (%)	101	1.98	14.00	0	100	0
Other (%)	101	4.95	21.80	0	100	0
Years of teaching experience						
Any subject at K-12	99	9.04	8.57	0	33	2
Special education	101	9.22	7.88	0	40	0
Science at K-12	100	4.19	6.17	0	28	1
Science at 4/fifth grade	98	2.60	4.67	0	18	3

(continued)

Table 1. Continued.

	<i>N</i>	<i>M</i>	<i>SD</i>	Min	Max	Missing
Any subjects at this school	100	4.25	4.98	0	20	1
Science instruction provided						
Only from the GE teacher (%)	101	58.42	49.53	0	100	0
Only from you (%)	101	23.76	42.78	0	100	0
From you and the GE teacher (%)	101	17.82	38.46	0	100	0

Note. SE = special education; GED = general educational development; TFA = Teach for America; PD = professional development; LD = learning disability; GE = general education.

Teacher Background and Professional Characteristics

Table 1 presents descriptive statistics on the educational and professional backgrounds of the teachers. Special education teachers in the sample reported their instructional setting, with the most common responses being resource/pull-out (57%) and inclusion (47%), followed by smaller shares in self-contained settings (33%) and other roles (teachers could select more than one option). Teachers served a wide range of grade levels, with the majority supporting third through fifth grade. Nearly 60% held a master's degree, and over 80% had a degree in special education. Most teachers also held certification, with more than 90% reporting a special education credential and 69% holding a general education credential. Among those with self-reported subject-area specialization, reading was most common (59%), followed by social science (19%) and mathematics (19%); only 5% specialized in science.

Special education teachers also reported multiple forms of training related to teaching students with LDs, including college coursework (90%), professional development provided by schools or districts (82%), and online courses (57%). Only 2% reported receiving no training in teaching students with LDs. On average, teachers had nine years of experience teaching K-12 students and a similar length of time in special education roles.

Science Instruction Among Special Education Teachers

As reflected in Table 2, among teachers who reported teaching science ($n = 42$), most indicated that they integrated science with other subjects (67%), particularly reading (93%) and mathematics (57%). While a majority reported that state standards were provided (86%), fewer indicated access to pacing guides (52%) or dedicated science curricula (52%). Teachers drew on a variety of resources, including state standards (73%), online searches (61%), other teachers (51%), and state or district materials (37%); fewer reported using textbooks (27%) or professional development resources (10%).

Teachers' self-reported preparedness to teach science varied. To parallel the national survey of general education teachers, results are reported for fourth- ($N = 23$) and fifth-grade teachers ($N = 22$). For fourth-grade teachers, most described

themselves as somewhat (43%) or fairly well prepared (39%), with only 4% reporting being very well prepared. Results for fifth-grade teachers were similar, although a slightly higher percentage (14%) reported being very well prepared.

Time allocation data for special education teachers who taught science showed that only 22% of them taught it daily, while nearly half (49%) taught science multiple times per week (see Table 3). The average reported instructional time was about 41 min per session. Table 4 shows that barriers to planned science instruction include prioritizing remediation in reading and mathematics (68%) and focusing on tested subjects (e.g., reading) (39%). Special events (e.g., assemblies) were also cited as interruptions (18%).

COVID-19 was reported to have a continued impact on science instruction (see Table 5). However, many teachers who currently teach science noted that they did not teach science either before or during the pandemic and thus could not provide an informed comparison. Among those who did respond, for comparisons of pre-pandemic schedules to the present, 20% reported decreases in science time, 8% reported increases, and 43% reported no change. When comparing the height of the pandemic to the present, 25% reported increases in science time, 13% reported decreases, and 38% reported no change.

Supporting Students With Disabilities

Table 6 summarizes how teachers supported students with disabilities, and those with LDs specifically, in science classes. On average, teachers reported working with approximately 16 students with IEPs, with just over half (51%) identified as having LDs.

Instructional supports during science for students with LDs varied: pull-out instruction (63%) was most common, followed by push-in support (51%) and serving as the primary science instructor (42%). Teachers also reported that pull-out services for reading (60%) and mathematics (53%) frequently conflicted with other subject areas, including science. About one-third of respondents indicated that science instruction was "sometimes" or "often" missed due to pull-out services for other subjects.

Table 2. Science Instruction.

	<i>N</i>	<i>M</i>	<i>SD</i>	Min	Max	Missing
Integrate teaching science						
On its own (%)	42	33.33	47.71	0	100	0
With other subjects (%)	42	66.67	47.71	0	100	0
Integrate subjects (checked)						
Reading (%)	28	92.86	26.23	0	100	0
Mathematics (%)	28	57.14	50.40	0	100	0
Social studies (%)	28	28.57	46.00	0	100	0
Other (%)	28	10.71	31.50	0	100	0
State standards provided (%)	42	85.71	35.42	0	100	0
Pacing guide provided (%)	42	52.38	50.55	0	100	0
Science curriculum provided (%)	42	52.38	50.55	0	100	0
Resources and support (checked)						
State standards (%)	41	73.17	44.86	0	100	1
Pacing guide (%)	41	31.71	47.11	0	100	1
Provided program (%)	41	41.46	49.88	0	100	1
Teacher prep courses (%)	41	9.76	30.04	0	100	1
School/district/state (%)	41	36.59	48.77	0	100	1
PD resources (%)	41	9.76	30.04	0	100	1
Textbooks (%)	41	26.83	44.86	0	100	1
Research articles (%)	41	14.63	35.78	0	100	1
Other teachers (%)	41	51.22	50.61	0	100	1
Online searches (%)	41	60.98	49.39	0	100	1
Other (%)	41	9.76	30.04	0	100	1
Teach fourth-grade science						
Not adequately prepared (%)	23	13.04	34.44	0	100	1
Somewhat prepared (%)	23	43.48	50.69	0	100	1
Fairly well prepared (%)	23	39.13	49.90	0	100	1
Very well prepared (%)	23	4.35	20.85	0	100	1
Teach fifth-grade science						
Not adequately prepared (%)	22	9.09	29.42	0	100	1
Somewhat prepared (%)	22	45.45	50.96	0	100	1
Fairly well prepared (%)	22	31.82	47.67	0	100	1
Very well prepared (%)	22	13.64	35.13	0	100	1
Teaching schedule						
Throughout the year (%)	41	80.49	40.12	0	100	1
In units/blocks (%)	41	19.51	40.12	0	100	1

Note. PD = professional development.

Despite these challenges, teachers reported feeling generally well prepared to teach students with disabilities, including those with LDs (75% “very well prepared”), but less confident

when teaching science specifically. Only about 27% reported being “very well prepared” to teach science to students with disabilities/LDs, with most rating themselves as “somewhat” or “fairly well prepared” (29%).

Table 3. Time Allocation of Science Instruction.

	<i>N</i>	<i>M</i>	<i>SD</i>	Min	Max	Missing
Frequency of science instruction						
Daily (%)	41	21.95	41.91	0	100	1
Multiple times a week (%)	41	48.78	50.61	0	100	1
Once a week (%)	41	21.95	41.91	0	100	1
Every other week (%)	41	4.88	21.81	0	100	1
Other (%)	41	2.44	15.62	0	100	1
Minutes for science teaching	36	41.33	21.57	1	100	6

Discussion

The purpose of this study was to conduct a nationally representative survey of special education teachers’ science instruction for students with LDs. The study was designed as a companion to our parallel survey of fourth- and fifth-grade general education teachers’ science instruction for students with disabilities (Therrien et al., 2025). Conducting these two surveys in tandem provides complementary perspectives: (a) general education teachers describe how science instruction is delivered in their classrooms and the challenges they face in adapting it for students with disabilities, and (b) special education teachers report

Table 4. Barriers to Implementing Planned Science Instruction.

	<i>N</i>	<i>M</i>	<i>SD</i>	Min	Max	Missing
Teach science as planned						
All of the time (%)	42	7.14	26.07	0	100	0
Most of the time (%)	42	66.67	47.71	0	100	0
About half the time (%)	42	11.90	32.78	0	100	0
Less of the time (%)	42	14.29	35.42	0	100	0
Barriers (checked)						
Focus on tested subjects (%)	38	39.47	49.54	0	100	4
Remediation is prioritized (%)	38	68.42	47.11	0	100	4
Special events (%)	38	18.42	39.29	0	100	4
Curriculum hard to use (%)	38	2.63	16.22	0	100	4
Not enough materials (%)	38	15.79	36.95	0	100	4
Not have curriculum (%)	38	15.79	36.95	0	100	4
Need too much prep time (%)	38	10.53	31.10	0	100	4
Other (%)	38	18.42	39.29	0	100	4

Table 5. Impact of COVID-19 on Science Instruction.

	<i>N</i>	<i>M</i>	<i>SD</i>	Min	Max	Missing
Compared pre-pandemic to now						
Increase (%)	40	7.50	26.67	0	100	2
No change (%)	40	42.50	50.06	0	100	2
Decrease (%)	40	20.00	40.51	0	100	2
Not teach science (%)	40	30.00	46.41	0	100	2
Compared the pandemic to now						
Increase (%)	40	25.00	43.85	0	100	2
No change (%)	40	37.50	49.03	0	100	2
Decrease (%)	40	12.50	33.49	0	100	2
Not teach science (%)	40	25.00	43.85	0	100	2

Table 6. Supporting Students With IEPs in Science Classes.

	<i>N</i>	<i>M</i>	<i>SD</i>	Min	Max	Missing
Number of IEP students	101	15.79	11.89	4	100	0
Number of LDs (%)	101	51.23	31.22	0	100	0
Number of autism (%)	101	27.09	28.02	0	100	0
Instruction for LDs (checked)						
Primary instruction (%)	101	41.58	49.53	0	100	0
Push-in (%)	101	51.49	50.23	0	100	0
Pull-out (%)	101	63.37	48.42	0	100	0
Consulting (%)	101	16.83	37.60	0	100	0
Other (%)	101	6.93	25.52	0	100	0
Instruction for autism (checked)						
Primary instruction (%)	101	46.53	50.13	0	100	0
Push-in (%)	101	50.50	50.25	0	100	0
Pull-out (%)	101	56.44	49.83	0	100	0
Consulting (%)	101	20.79	40.78	0	100	0
Other (%)	101	8.91	28.63	0	100	0
Conflict subject (reading)						
Often (%)	68	23.53	42.73	0	100	0
Sometimes (%)	68	27.94	45.20	0	100	0
Rarely (%)	68	26.47	44.45	0	100	0
Never (%)	68	22.06	41.77	0	100	0

(continued)

Table 6. Continued.

	N	M	SD	Min	Max	Missing
Conflict subject (mathematics)						
Often (%)	68	20.59	40.74	0	100	0
Sometimes (%)	68	30.88	46.54	0	100	0
Rarely (%)	68	27.94	45.20	0	100	0
Never (%)	68	20.59	40.74	0	100	0
Conflict subject (science)						
Often (%)	68	8.82	28.57	0	100	0
Sometimes (%)	68	25.00	43.62	0	100	0
Rarely (%)	68	32.35	47.13	0	100	0
Never (%)	68	33.82	47.66	0	100	0
Conflict subject (social)						
Often (%)	68	8.82	28.57	0	100	0
Sometimes (%)	68	32.35	47.13	0	100	0
Rarely (%)	68	25.00	43.62	0	100	0
Never (%)	68	33.82	47.66	0	100	0
Conflict subject (specials)						
Sometimes (%)	67	7.46	26.48	0	100	1
Rarely (%)	67	13.43	34.36	0	100	1
Never (%)	67	79.10	40.96	0	100	1
Pull-out services (checked)						
Reading support (%)	101	60.40	49.15	0	100	0
Mathematics support (%)	101	53.47	50.13	0	100	0
Other (%)	101	19.80	40.05	0	100	0
Prepared teach IEP						
Not adequately prepared (%)	101	0.99	9.95	0	100	0
Somewhat prepared (%)	101	2.97	17.06	0	100	0
Fairly well prepared (%)	101	20.79	40.78	0	100	0
Very well prepared (%)	101	75.25	43.37	0	100	0
Prepared teach science to IEP						
Not adequately prepared (%)	99	17.17	37.91	0	100	2
Somewhat prepared (%)	99	26.26	44.23	0	100	2
Fairly well prepared (%)	99	29.29	45.74	0	100	2
Very well prepared (%)	99	27.27	44.76	0	100	2

Note. IEP = individualized education program; LD = learning disability.

on the science instruction their students receive and their own roles within that instruction. Together, these perspectives provide a comprehensive picture of the opportunities available to students with LDs to engage in science.

Summary of Key Findings

Most special education teachers reported that their students received science primarily from the general education teacher, with fewer indicating shared or direct responsibility for instruction. When special educators were involved, instruction was infrequent, short in duration, and most often integrated with reading or mathematics rather than taught as a stand-alone subject. This finding is consistent with national evidence showing that elementary schools devote little time to science (Blank, 2013; Horizon Research, 2019) and that students with disabilities, including LDs, are often excluded from science instruction altogether (Therrien et al, 2025). Further, these findings reflect broader systemic barriers to equitable access, including limited collaboration between

general and special educators (Qualls et al., 2025; Vannest et al., 2011), competing instructional priorities driven by accountability pressures in tested subjects (Berliner, 2011; Pederson, 2007), and a lack of coordinated support for inclusive science teaching (Kaler et al., 2024; McLeskey et al., 2012).

Special educators reported serving in varied roles across settings, with the most common being resource/pull-out and inclusion. In science specifically, 42% identified as the primary instructor, while larger proportions provided support through pull-out (63%) or push-in (51%) models. However, many noted a scheduling conflict: science often took place in the general education classroom at the same time that students were pulled out for reading or mathematics interventions. As a result, about one-third of teachers reported that students sometimes or often missed science.

Three-quarters of special educators felt “very well prepared” to teach students with disabilities, including those with LDs overall, yet only about one-quarter reported feeling “very well prepared” to teach science to these students. This

pattern suggests that while teachers perceive themselves as generally confident in supporting students with disabilities, they feel less confident when instruction involves science content. This pattern parallels earlier research indicating that special education teacher preparation programs have historically placed limited emphasis on science-specific pedagogy (Brownell et al., 2010; Mulvey et al., 2016; Norman et al., 1998).

Preparedness patterns were generally consistent across teacher subgroups. Teachers serving in inclusion or co-teaching roles tended to rate themselves slightly higher in preparedness to teach science to students with disabilities compared to those in resource or pull-out positions, though these differences were small. Preparedness ratings also did not vary meaningfully by years of experience, certification level, or highest degree earned. These similarities suggest that the gap in science preparedness is a broad, field-wide issue rather than one confined to particular teacher groups (see Tables 1 and 6, and Supplemental Table B).

The most common obstacles to science instruction were remediation (68%) and the emphasis on tested subjects such as reading and mathematics (39%), with some teachers also citing disruptions from special events (18%). These teacher-reported barriers align with longstanding concerns that increasing accountability pressures have contributed to reduced instructional time for science (Berliner, 2011; National Academies of Sciences, Engineering, & Medicine, 2021; Pederson, 2007).

Many special education teachers reported that they had not taught science before or during the pandemic, which limits the conclusions that can be drawn about COVID-related changes. Among those who did respond, about one-fifth reported decreases in science compared to pre-pandemic levels, while about one-quarter reported increases relative to instruction during the pandemic.

Converging Findings

When the findings from this study are compared with those from the companion general education survey (Therrien et al., 2025), the results suggest a concerning pattern. General education teachers reported providing most of the science instruction in elementary classrooms but expressed low confidence in adapting science instruction for students with disabilities, including those with LDs. Special education teachers, by contrast, felt well prepared to support students with disabilities broadly but were often not responsible for science and, when they were, frequently reported feeling underprepared. Across both groups, remediation, testing, and scheduling practices were reported as common barriers to science access. Together, the surveys point to a systemic challenge: The current instructional structures and supports may not adequately position either group of teachers to provide consistent, high-quality science instruction for students with LDs.

Opportunities to Learn Science

Our findings are particularly concerning when viewed through the OTL framework, which emphasizes that students must have consistent opportunities to engage with content in order to achieve academically (Floden, 2002; Pianta et al., 2007). In its most basic form, OTL is about time: Students cannot learn what they are not taught (Blank, 2013; Floden, 2002). In this survey, most special education teachers reported that their students received no science instruction from them, and even when science was provided, it was infrequent, brief, or interrupted by pull-out instruction.

Science is already marginalized in elementary schools, with fewer instructional minutes allocated to it than to literacy or mathematics (Blank, 2013; Horizon Research, 2019). Exacerbating this issue, students with LDs are especially likely to miss science because time is set aside for reading or mathematics remediation and other special education services (Therrien et al., 2025). National data confirm the consequences: Achievement gaps in science appear as early as kindergarten and persist throughout elementary school and beyond (Morgan et al., 2016; NCES, 2022a).

Limitations

The study has several limitations. First, the response rate was relatively low, with about 9% of recruited special education teachers participating across roughly 20% of sampled schools. Although the responding sample was broadly representative of the national population in terms of key characteristics, the possibility of nonresponse bias cannot be ruled out. At the same time, very few surveys in special education attempt to construct nationally representative samples, with many relying on convenience samples that cannot be generalized to the broader population at all. In this context, the present study provides more generalizable evidence despite a relatively small number of respondents.

Second, the survey relied on teacher perceptions rather than classroom observations, so the findings may not accurately capture actual classroom practices. Finally, the sample was limited to schools with fourth- and fifth-grade classrooms to align with the companion general education survey, which could reduce the generalizability of the findings. The findings, therefore, reflect special educators working in schools that serve upper elementary grades, even though many respondents worked across broader grade spans.

Implications for Practice and Policy

Our findings suggest that science education will remain limited for students with LDs until it is treated as a core subject alongside reading and mathematics. What teachers do in classrooms often reflects the priorities built into accountability systems, schedules, and preparation programs; at present, those structures tend to downplay science education.

However, science education is essential for access to STEM pathways (National Science Board, 2022); besides, it also supports reading comprehension by building background knowledge and vocabulary (Scruggs & Mastropieri, 1993; Smith et al., 2021). Unless science is elevated to the same level of importance as reading and mathematics, students with LDs will continue to be systematically denied meaningful opportunities to learn it.

At the practice level, schools must protect science instructional time for students with LDs so that it is not routinely replaced by remediation or pull-out instruction. Further, preparation programs must equip special education teachers with stronger science education pedagogy and ensure that general education teachers are prepared to adapt science instruction to meet the needs of students with LDs. These steps align with the principles of the NGSS (NGSS Lead States, 2013), which call for equitable participation in science and engineering practices, and with UDL (CAST, 2024), which emphasizes accessibility, representation, and engagement for all learners.

At the policy level, accountability systems should be recalibrated to value science alongside other core subjects, and schools should be incentivized to support collaboration, such as co-teaching and common planning time (Griffith & Scharmann, 2008; King-Sears et al., 2021). Without stronger coordination between policy, preparation, and classroom practice, the goals of NGSS and UDL will remain out of reach for many students with LDs.

Future Research

Future research should build on this work by incorporating classroom observations to capture what happens during science lessons. While this survey provides valuable insights, it reflects teachers' perceptions rather than actual practice, and teachers may over- or underestimate the amount and quality of science instruction students with LDs receive.

Furthermore, additional research is needed to investigate how various service-delivery models, such as pull-out and co-teaching, impact students' actual access to science content, and how instructional time is allocated when conflicts arise with other subjects. For example, experimental and longitudinal studies could investigate whether adjustments to scheduling, professional development, or accountability policies enhance science opportunities and outcomes for students with LDs. Such efforts would respond to longstanding calls for more systematic investigation of science education for students with LDs (Therrien et al., 2011; Villanueva et al., 2012).

Future studies should also build on emerging evidence-based approaches that integrate explicit instruction, guided inquiry, and literacy–science connections (e.g., De La Paz et al., 2024; Doabler et al., 2021; Maddox et al., 2025; Romine et al., 2024; Wilson et al., 2025). Research using these models could examine how special education teachers implement such practices across diverse contexts and how collaboration with general educators affects students' access

to science learning. Expanding this line of work will help bridge the gap between descriptive national data and classroom interventions designed to improve science outcomes for students with LDs.

Conclusion

This study provides a national snapshot of how science instruction is delivered to students with LDs and the systemic factors that limit students' access. The convergence of findings across the special education and general education surveys provides a comprehensive picture of the barriers that restrict science learning opportunities for students with LDs. Neither group of teachers is currently positioned, prepared, and supported to ensure high-quality and consistent science instruction for these students. Unless accountability structures, scheduling practices, and teacher preparation programs shift to prioritize science alongside reading and mathematics, students with LDs will continue to be denied meaningful opportunities to learn it. Against this background, the persistent science achievement gaps documented in national assessments are not surprising. They are the predictable outcome of a system that has not prioritized science for students with LDs. This is not primarily a teaching problem but one of systemic priorities, and addressing it is essential if students with LDs are to have meaningful access to science instruction and the STEM opportunities it supports.

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Supplemental Material

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