Learning Recovery Research and Practice Brief

Challenges created by the COVID-19 pandemic affected all children and their families. School closures and learning disruptions made it hard for many students to build strong foundational skills in reading and mathematics, which likely affected learning in other subject areas. The pandemic also deepened inequities experienced by students of color, students from low-income backgrounds, multilingual learners, students with disabilities, LGBTQI+ students, students experiencing homelessness, and other underserved groups. For these students, out-of-school time (OST) programs, such as Nita M. Lowey 21st Century Community Learning Centers, can be important partners to schools, afterschool networks, and families in addressing impacts on learning and growth. This brief offers research-based information and best practices for OST educators to support that work.

Snapshot of Students' Academic Status

According to the National Assessment of Educational Progress, or NAEP (also known as the Nation's Report Card), many students lost ground in mathematics and reading during pandemic school closures. See Tables 1 and 2 for the most recent average scores in mathematics, reading, and science as compared to the prior NAEP administration.

- **Mathematics.** This NAEP assessment measures students' knowledge and skills in mathematics and their ability to solve problems in mathematical and real-world contexts. Nationally, in 2022, the average percentage of fourth-graders scoring below *NAEP Basic* increased to 26 percent, and the average percentage of eighth-graders scoring below *NAEP Basic* increased to 40 percent. (NAEP, 2022a)
- **Reading.** This NAEP assessment measures students' reading comprehension of literary and informational texts. Students read grade-appropriate texts and answer questions that require literal and interpretive understanding as well as critical thinking skills. Nationally, in 2022, the average percentage of fourth-graders scoring below *NAEP Basic* increased to 37 percent, and the average percentage of eighth-graders scoring below *NAEP Basic* increased to 32 percent. (NAEP, 2022b)
- **Science.** This NAEP assessment measures students' knowledge across three content areas — physical science, life science, and earth and space sciences. It also measures four science practices — identifying science principles, using science principles, using scientific inquiry, and using technological design — to determine students' ability to engage in scientific inquiry and to conduct scientific investigations in real-world contexts. The first postpandemic NAEP assessment in science is scheduled for 2024. Nationally, in 2019, the average percentage of fourth-graders scoring below *NAEP Basic* increased to 27 percent, and the average percentages of eighth-graders and 12th-graders scoring below *NAEP Basic* increased to 33 percent and 41 percent, respectively. The NAEP science assessment also asks students about how often they engage in scientific inquiry-related classroom activities. Approximately 30 percent of fourth-graders, 42 percent of eighth-graders, and 50 percent of 12th-graders selected "never to once or twice a year" in response to this item. At all grade levels, fewer than one-fifth (18 percent, 17 percent, and 15 percent, respectively) selected "once or twice a week to every day." (NAEP, 2019)

Table 1: NAEP average mathematics and reading scores from 2019 and 2022

	Mathematics 2019	Mathematics 2022	Reading 2019	Reading 2022
Grade 4	241	236	220	217
Grade 8	282	274	263	260

Note: Based on representative samples of students attending public schools, private schools, Bureau of Indian Education schools, and Department of Defense schools.

Table 2: NAEP average science scores from 2015 and 2019

	Science 2015	Science 2019
Grade 4	154	151
Grade 8	154	154
Grade 12	150	150

Note: Based on representative samples of fourth-, eighth-, and 12th-grade students across the nation.

Overall, learning recovery initiatives have helped some students make up for lost time, according to a report from researchers at Stanford and Harvard (Fahl et al., 2024). The researchers found that, among school districts in 30 States, students made significant gains, but those gains were uneven: Achievement gaps have widened between low- and high-poverty districts since 2019.

Research on Learning Recovery

The U.S. Department of Education's (the Department's) Comprehensive Center Network (2022a) explored research on learning recovery and proposed learning acceleration as the strategy to use. Although remediation is often the go-to response of schools and teachers, studies show that acceleration works better, especially for students who struggle most.

From that starting point, and with information from out-of-school time evidence reviews by the What Works Clearinghouse (Beckett et al., 2009) and information gathered by the Institute of Education Sciences (2022a, 2020b), the Department (2022, 2023) suggests several areas where high-quality, evidence-based OST programs can promote learning recovery and support academic, social, and emotional well-being. Program types that support school-day efforts may include afterschool and summer, work-based, youth development, and experiential or service learning.

Learning Acceleration as a Learning Recovery Strategy

As recommended by the Department (2022), learning acceleration employs "evidence-based strategies that help students fill gaps in skills and content" (p. 1) to reach grade-level mastery. As summarized below, the Department suggests six learning acceleration strategies to support a whole-child approach to learning recovery. Items 1-5 describe strategies and implementation steps for all educators, and item 6 describes OST program strategies.

1. **Provide students with tailored learning acceleration opportunities.**
    - Teachers need high-quality, ongoing professional development and coaching on how to identify content and skills to prioritize, how to design and select instructional strategies, and how to use data to inform instruction.
    - Use vacation time during the school year to offer intensive, targeted programs.

- Adopt and use high-quality, culturally relevant instructional materials that are aligned to grade-level standards.

2. **Implement high-quality and effective tutoring.**
   - Use trained staff and educators as tutors.
   - Provide tutoring in sessions of at least 30 to 50 minutes and at least three times a week during the school day to achieve the greatest effect.
   - Align tutoring with an evidence-based curriculum.
3. **Use high-quality diagnostic and formative assessment to inform and personalize instruction**.
   - Treat students' current understandings as assets to be leveraged in future learning.
   - Assess student learning along multigrade continuums and learning progressions.
   - Use assessment to develop performance-based approaches and connections to curriculum.
   - Provide teachers with guidance and support on understanding and using assessment results to inform instruction.
4. **Integrate and prioritize the social, emotional, and academic needs of all students.**
   - Implement evidence-based schoolwide programs and strategies to support social, emotional, and academic development.
   - Design equitable learning environments by focusing on developing trusting relationships, fostering belonging, creating rigorous and responsive learning environments, and offering integrated support systems.
   - Use evidence-based strategies to create systems, structures, and practices that support all aspects of child development.
5. **Support successful student transitions along the pathway from preschool to postsecondary education and the workforce.**
   - Establish early warning indicators and an intervention system to promote targeted engagement strategies. Track areas such as attendance, assignment completion, discipline, and grades, and use the data to provide specific and timely interventions.
   - Establish summer bridge programs to help students entering middle and high school do so on a path to success.

Learning Recovery: Acceleration vs. Remediation

Learning acceleration is a learning recovery strategy to get students on grade level by providing just-in-time foundational support connected to the grade-level content they're learning. Research shows that learning acceleration is an important strategy for advancing equity and that students who experience acceleration struggle less and learn more than students who start at the same point but experience **remediation** (repeating lessons or practicing skills they didn't master during previous grades) instead.

Sources: Comprehensive Center Network, 2022a; U.S. Department of Education, 2022

- Leverage funding to improve access to and success in "college in high school" programs, which can increase access to college, improve persistence and completion, improve workforce readiness, and reduce overall college costs.

6. **Use high-quality OST learning experiences to support students' social, emotional, and academic needs.**
    - **Align academic focus areas with the school curriculum** so OST educators can build on skills and materials students are already learning.
    - Create systems and processes to **adapt instruction to individual and small-group needs** (no more than 20 students per staff member).
    - **Provide high-quality, engaging learning experiences.** Include opportunities for academic support and for enrichment experiences that develop social and emotional well-being and leadership skills.
    - **Ensure that students with the greatest need for support have opportunities to participate**.
    - Regularly **assess program performance** to improve or adjust activities as needed.
    - **Partner with community-based and local intermediary organizations** to increase access to high-quality opportunities that provide enrichment, expand student interactions with diverse community members, and encourage community engagement.
    - **Support students with disabilities** by providing Extended School Year services under the Individuals with Disabilities Education Act.

Learning and Engagement Strategies to Address Academic, Social, and Emotional Needs

As OST programs work with school and community partners to address learning recovery, they can select evidence-based learning and engagement strategies that address students' academic, social, and emotional needs (Hanover Research, 2020; Kim, 2022). The specific strategies and areas of emphasis will depend on program capacity and identified needs, but here are some things to consider:

Literacy Learning and Engagement

Research compiled by the National Partnership for Quality Afterschool Learning (2008) indicates that OST literacy activities benefit students most when staff:

- **Use a variety of engaging texts to help students learn and practice literacy skills.** Select fiction and nonfiction picture books, graphic novels, newspapers, magazines, and other types of texts that align with students' interests, cultures, and skill levels. Provide opportunities for students to learn and practice the "big five" components of early literacy: phonemic awareness, phonics, fluency, vocabulary, and text comprehension.
- **Work with the school day to identify grade-level literacy standards, assess student needs, and define learning goals.** School-day educators can help you understand what students are learning in their classes and identify specific needs to help you plan targeted academic support (like homework help and tutoring) and enrichment activities.

- **Incorporate real-world activities.** When students play games, write and tell stories, make recipes, or follow a map, they experience literacy as something that's useful and meaningful to them rather than just "a school requirement."
- **Consider student choice, grade level, age, and skills.** Consult with students, families, teachers, and librarians to plan fun literacy activities and to select materials that match student interests and skill levels.
- **Assess student progress.** Use informal assessment tools like observations and student portfolios to help identify student strengths and areas for improvement. Also, examine school and program data on student attendance, behavior, and academic performance, and use your findings to set goals and priorities.
- **Provide training for program staff.** Staff members need a common understanding of why and how to support students' literacy development. They also need to learn and practice strategies for integrating literacy into enrichment activities and academic supports. Consider engaging a district reading specialist or school-day teacher to help provide ongoing training.

Engaging Families Can Benefit Students

These two examples from summer learning programs show that the right kinds of family engagement can potentially benefit students:

- A randomized trial showed that sending text messages to families of third- and fourth-graders at risk of summer learning loss was effective at improving students' reading scores. The messages provided activity ideas, tips about available resources, and messages about the value of summer learning activities.
- Another study found that upper elementary students' reading comprehension scores improved after a summer program mailed eight books to each student (matched to their interests and reading levels), along with comprehension guides. The program followed up with families if the students didn't return a comprehension check.

Source: Quinn & Polikoff, 2017

The Comprehensive Center Network (2020, 2022b, & 2022c) provides the following recommendations, based on evidence from research and practice, for supporting students' reading skills at various grade levels:

Grades 1–3

- **Big Idea 1:** Start with standards-informed literacy instruction.
  - Provide daily opportunities for students to build and apply foundational skills and to build vocabulary and comprehension skills.
  - Do continuous informal assessment of student learning with feedback to students.

- **Big Idea 2:** Provide explicit support to families or other caregivers to help them understand what and how students need to learn.
  - Teach students and caregivers how to work in different environments.
  - Help caregivers hold meaningful conversations before, during, and after reading together with children.
  - Demonstrate how to help children listen to units of sound.
  - Help children attend to written patterns within words and across words.
  - Model fluent reading and reading for meaning through reading aloud or co-reading.
  - Share ways for parents to help children continue to develop writing skills beyond checking for accuracy.

Grades 4–8: Four Priorities

- **Missing skills:** Disruptions may have prevented mastery of foundational skills.
- **Skills plus content:** Focus on comprehension and vocabulary development — and on application of reading skills in content areas.
- **Alignment and cohesion:** Use multiple contexts (e.g., whole-group reading instruction and interventions for struggling students) and apply literacy during subject area instruction.
- **How to learn:** Help students acquire important learning tools such as critical thinking and digital literacy.

Adolescent Literacy: Four Recommendations

- Provide explicit vocabulary instruction.
- Provide direct and explicit comprehension instruction.
- Engage students in extended discussion of text meanings and interpretations.
- Tend to student motivation and engagement.

Math Learning and Engagement

Overton and Kuck (2022) suggest using research-based, student-centered practices to help middle and high school students engage with math to reach grade level. The authors suggest focusing on two types of student engagement — cognitive and emotional — and using the following strategies:

- Include standards for mathematical practices.
- Design tasks that nurture creativity.
- Use formative assessment.
- Use technology strategically and with teacher support.
- Use culturally relevant pedagogy. Here, teachers should establish an environment that allows and encourages students to make mistakes, take intellectual risks, and share ideas to increase cognitive flexibility and make new connections to learning.

A meta-analysis by Williams and colleagues (2022) looked at three types of math interventions (instructional, replacement curriculum, and supplemental time) and found all three had similar effect sizes, though supplemental time interventions had the largest effect.

A meta-analysis by Ran, Kasli, and Secada (2020) looked at studies of computer technology designed to help low-performing students learn and practice mathematics concepts and skills. They defined four types of technology: problem-solving, tutoring, game based, and drill and practice. Of several findings, two may have value for OST programs:

- **Newer problem-solving systems had the greatest effect on math achievement.** Such software may offer adaptive features that support targeted, individualized instruction or support; provide realistic problem scenarios that students can relate to; use visual supports such as schematic diagrams and solution trees; and provide explicit instruction and metacognitive scaffolding.
- **Computer-based interventions had the greatest effects for elementary students and did not significantly influence secondary students.** The authors cautioned that studies reporting the highest effects came from performance on researcher-developed tests rather than teacher-developed or standardized tests.

The *Building Math Confidence and Competence Research and Practice Brief* (21st CCLC NTAC, 2024) summarizes evidence-based ideas and best practices for helping students with math and math anxiety in OST settings. Here are some strategies for supporting students in partnership with school-day math teachers:

- **Examine and change incorrect or unhelpful attitudes, beliefs, and language about math.** "I think I can" is a powerful and contagious idea (Boaler, 2022; Chang & Beilock, 2016). Make a conscious effort to replace unhelpful messages like "You have to be smart to get an A in math" with helpful ones like "It's challenging, but you can do it" and "It's OK to make mistakes. That's how we learn" (APA, 2022).
- **Integrate math awareness, skills, and concepts into the program's enrichment activities where possible.** The low-stakes OST environment is well suited to helping students experience math as something that's doable, fun, and useful. Provide opportunities to use math for authentic purposes, to connect math to personal goals, and to help students experience math success (Pattison, Rubin, & Wright, 2017).
- **Show families ways to help children succeed at math.** Reassure family members that they don't have to be math experts to support their child's success (Cox & Friedman, 2019). Family engagement activities like math nights can be a good way for educators, students, and families to share math ideas and experiences, learn and have fun together, build trust, and practice anxiety-reducing strategies like mindfulness and breaking big tasks into doable chunks (Seeley, 2014).
- **Work with school-day math teachers and special educators to intentionally design and deliver the supports students need.** School-day math teachers can describe the grade-level standards and the math concepts students are learning. They can also alert OST staff when a student is struggling to master a key skill or concept. This information can help OST staff intentionally design enrichment activities to meet student needs (U.S. Department of Education, 2022).
- **Support positive teacher-student relationships and interactions.** Instructor-child relations is a key aspect of program quality (McCombs, Whitaker, & Yoo, 2017). Positive relationships build trust, which enables students to take risks that are essential to learning (e.g., estimating the number of jelly beans in a jar) and to social and emotional development (e.g., overcoming the fear of "looking stupid" if their estimate is wildly wrong).

STEM/STEAM Strategies for Learning and Engagement

Interdisciplinary, project-based learning that incorporates science, technology, engineering, the arts, and math is especially well suited to the OST environment. The National Research Council (2015) mentions STEM learning as one of three desirable characteristics of productive OST programs:

- Engage young people intellectually, emotionally, and socially.
- Respond to young people's interests, experiences, and cultural practices.
- Connect STEM learning in OST, school, home, and other settings.

In Innovation Spotlights: Nine Dimensions for Supporting Powerful STEAM Learning with Technology, the U.S. Department of Education's Office of Educational Technology (2019) presents findings from a systematic literature review on effective STEM learning practices enabled by technology. The report suggests the following:

- **Dynamic representations.** Scientists, mathematicians, and engineers use many types of dynamic representations, such as computer models, interactive simulations, and virtual environments. Using these kinds of representations to allow students to construct and explore various phenomena provides engaging, authentic learning experiences.
- **Collaborative reasoning.** Collaboration is a key element of STEM in educational, workplace, and other settings. Students build valuable skills when they negotiate to develop shared understandings of problems and findings. Digital collaboration platforms can support this process.
- **Immediate and individualized feedback.** Feedback is a powerful learning tool. Digital tools offer the possibility of providing immediate, individualized feedback on tasks (for example, when practicing math skills).
- **Science argumentation skills.** Engaging in STEM learning helps students build critical argumentation skills, including making a claim, judging evidence about the claim, determining the reasoning applied to the claim, and making judgments.
- **Engineering design processes.** Engaging in these processes helps students strengthen problem-solving skills and learn from failure. Digital tools can enhance this iterative, systematic process that allows students to apply STEM skills to real-world problems.
- **Computational thinking.** Formulating and analyzing problems and solutions helps students develop widely applicable skills. Teaching computational thinking in conjunction with other topics, such as computer science, helps students tackle real-world problems.
- **Project-based interdisciplinary learning.** Authentic project- or challenge-based learning activities that span multiple disciplines give students meaningful opportunities to build and apply a variety of skills. Digital technology tools can support this process.
- **Embedded assessments.** Digital assessments can provide valuable information on students' knowledge of STEM ideas and use of STEM practices. Embedded, formative assessment may be particularly effective for students from underrepresented groups.
- **Evidence-based models.** Using data and evidence to construct models helps students develop a deep understanding of STEM practices.

Developing strategic community partnerships to support STEM/STEAM education is an important way to strengthen learning opportunities for students (National Science and Technology Council, 2018; Weyer & Dell'Erba, 2022).

Snapshot of Students' Social-Emotional Status

When schools moved to virtual learning in March 2020, social activities ceased, and collaborative, hands-on learning became difficult to arrange. Students seldom saw their friends in person, lost access to many extracurricular activities, and faced all the now-familiar fears and losses that came with the pandemic. Young people from all backgrounds reported feeling isolated, anxious, and depressed. Some students — especially those from low-income communities and communities of color — also needed to contribute to family finances, either by caring for younger siblings or by finding ways to earn money when parents fell ill or lost jobs. When schools reopened, these students were more likely to be chronically absent (Center on Reinventing Public Education, 2021).

Young children who would have started their school experiences during the pandemic missed opportunities to learn behavioral norms and to practice social and emotional skills. Children who had recently started school lost parts or all of the skills they had been developing. Like older children and adults, young children experienced stress; however, they were less able to understand and manage stress and often experienced behavioral changes (CDC, 2022).

For school-day and OST educators, school closure impacts included greater levels of job-related stress and depression than before the pandemic (Center on Reinventing Public Education 2021).

Social and Emotional Learning Strategies to Address the Needs of the Whole Child

Social and emotional supports are essential to academic recovery and important to student attendance, engagement, and overall well-being. Program staff need training and support to integrate social and emotional learning (SEL) practices. The *Social and Emotional Learning Research Brief* (U.S. Department of Education, 2018) summarizes evidence-based ways for OST programs integrate SEL practices:

- Create a positive learning environment that supports SEL.
- Build adult social and emotional competencies.
- Partner with families and communities to create a network of supports for students.
- Target key behaviors and skills.
- Set reasonable goals.
- When selecting an SEL program or curriculum:
    - Use data to guide decision-making.
    - Include key stakeholders in the process.
    - Identify needs and goals.
    - Use selection tools and resources.
- Design SEL programs and activities that are S.A.F.E. (sequenced, active, focused, and explicit).
    - Purposeful design leads to skill development.
    - Children have opportunities to practice skills.
    - Time is devoted to developing one or more social and emotional skills.
    - The program plan defines and targets specific skills.
- Plan for effective implementation.
    - Use data to inform decision-making so programs suit community context and needs.
    - Promote ownership and buy-in by including stakeholders in the process and ensuring that the program aligns with student needs.

- Provide sufficient staff support and training.
- Dedicate sufficient time to implementing the program effectively.
- Integrate social and emotional skills into academic content.
- Provide opportunities for students to practice skills on the playground, in the cafeteria, and in hallways and other community spaces.
- Apply social and emotional skills in real time by incorporating them into daily interactions, routines, and teachable moments.

The following recommendations are based on a RAND study (Leschitz et al., 2023) of more than 100 afterschool programs participating in The Wallace Foundation's Partnerships for Social and Emotional Learning Initiative:

- Phase in SEL instruction over time.
- Deliver multiple SEL professional development opportunities spread throughout the year.
- Engage with families about SEL using multiple forms of outreach.
- Track SEL implementation as part of a continuous quality improvement cycle.

Tips to Recognize and Help Students Manage Stress

Learn to recognize unusual behaviors that may be caused by stress. Watch for:

- Excessive crying or irritation in younger children
- Returning to outgrown behaviors, avoiding activities enjoyed in the past
- Excessive worry or sadness
- Unhealthy eating or sleeping habits
- Irritability and "acting out" in teens
- Poor school performance or avoiding school
- Difficulties with attention and concentration
- Unexplained headaches or body pains
- Alcohol, tobacco, or other drug use

Help children and teens react to stress by providing comfort and modeling positive behavior.

- Talk about the source of the stress. Answer questions and share facts calmly and at a level the child can understand.
- Explain ways that you manage stress so the child learns how to cope.
- Try to maintain or initiate regular routines.
- Model taking breaks, getting plenty of sleep and exercise, and eating well.
- Spend time with the child in meaningful activities.

Source: CDC, 2022

Assess Program Needs

This brief addresses several areas of learning recovery, and it may sound like a lot to take on. If you want to use a phased approach, here's a way to find areas to prioritize to start. The Department's Comprehensive Center Network created the Summer and Afterschool Needs Assessment (2023) to help you identify program strengths and areas of need, access targeted resources and experts, and get a 30-minute consultation with a partner from the national Engage Every Student initiative.

Conclusions

The learning acceleration and learning recovery strategies in this research brief echo many practices that high-quality OST programs already engage in. These include building strong relationships with families, schools, and communities; designing engaging activities that match student needs and interests; developing 21st century skills like creativity and problem-solving; and creating a positive program environment that meets the needs of the whole child.

Fine-tuning these practices to support learning recovery may require OST programs to make some adjustments. Programs might want to establish closer alignment and communication with the school day, conduct targeted training for staff (for example, in using data and assessment results to make instructional decisions), or revise or adapt current practices (for example, to achieve smaller group sizes).

Support for learning recovery won't look the same in every OST program since it depends on program capacity, community assets, and student needs. OST programs may need to guard against replicating (rather than supporting and enriching) school-day learning. They also need to make sure staff members have social and emotional support to feel successful and confident so that no one becomes overwhelmed by increased demands and expectations.

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