

# First through Third Grade Implementation Guidelines

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## Acknowledgement

The New Jersey Department of Education’s (NJDOE) *First through Third Grade Implementation Guidelines* reflect current research and best practices to provide administrators, teachers, instructional coaches, families, and other educators guidance and resources to effectively implement the components of an equitable, developmentally appropriate and New Jersey Student Learning Standards (NJSLS) aligned educational program for First through Third Grades. These guidelines seek to provide educational practitioners with developmentally appropriate practices and resources supported by evidence to support improvements in their 1st–3rd grade classrooms. The *First through Third Grade Implementation Guidelines* were informed by feedback from current research, New Jersey educators, various NJDOE offices, administrators, and higher education early childhood experts. These guidelines were developed as an essential tool in building continuity from preschool age programs to grade three.

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## Introduction

Professionals who work with students in first, second, and third grade know how foundational the early years of teaching and learning are to the ongoing academic success of their students. It is in the primary grades (kindergarten through grade three) (NAEYC, 2020) that children learn how to become fluent readers and writers, master a wide range of mathematical skills and concepts, and discover and understand new processes and ideas in science and social studies. It is also in the early elementary grades that children develop an awareness of themselves as individuals and how to be a participant in a community of learners. The challenge for educators in first, second, and third grade is to present a myriad of concepts in many domains to groups of children who differ academically, linguistically, and culturally. However, given the time to apply what they’ve learned, children in the primary grades make gains in every domain from mathematics to language to science to emotional development.

The *First through Third Grade Implementation Guidelines* are a resource which empowers all educational professionals to provide children with developmentally appropriate learning experiences. This document also aims to empower families with the knowledge and resources needed to actively participate in their child's education. By working together with educators and school administrators, families play a crucial role in creating a supportive learning environment that fosters success for all students.

The New Jersey Department of Education (NJDOE), Division of Early Childhood Services (DECS) has partnered with teachers and administrators in New Jersey (NJ) schools, content experts from the field, as well as colleagues within the NJDOE as part of a continuous, comprehensive approach to preschool through grade three education in NJ. These guidelines join the Preschool and Kindergarten Guidelines already available.

Throughout the guidelines, every effort is made to connect theory, practice, and standards by:

* Drawing on examples of classroom teachers that integrated curriculum and projects to help their students engage with the required content in greater depth;
* Providing examples of how teachers can adjust district curricula and programs to enrich and integrate content children are learning;
* Sharing examples of individualized instruction to meet the needs of all learners;
* Addressing equitable practices which allow all our students to access engaging, standards-based, academically rigorous, grade-level curricula;
* Giving concrete strategies for how educators can address the standards and shape curricula to include inquiry, problem-solving, and communication skills;
* Highlighting opportunities and practices for educators to create environments and learning experiences that encourage children to grow socially and emotionally, to build self-regulation, and to exercise effective approaches to learning, such as persistence and flexibility.

To help you access what you need in these guidelines, the document is divided into five key sections.

**Section 1: Young Children as Learners** provides a definition and exploration of young children as learners, developmentally appropriate practice, development, and diverse learners as well as how educational professionals can be culturally, academically, and linguistically responsive by working with families and communities.

**Section 2: Setting Up to Support Children’s Learning** presents educational professionals with a look into classroom space and time, including environments and schedules, teacher-child interactions, positive transitions, and the promotion of classroom management through developmentally appropriate practice, using multi-tiered systems of supports (MTSS) and positive behavioral intervention and supports.

**Section 3: Exploring Classroom Content** provides educational professionals and families with background about content areas and best practices for mathematics, science, social studies, technology, and English language arts.

**Section 4: Research-based Instructional Strategies** gives educational professionals a look at data-driven instruction, including collecting and using data, scaffolding and differentiation of instruction and units, and teaching and learning through the project approach.

**Section 5: Moving Beyond the Classroom** offers educational professionals, guidance about their work, with a focus on professional growth and continuous improvement practices.

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## Circle of smiling faces of children with heads together looking downwardsSection 1: Young Children as Learners

First through third grade is a time of immense change for children as learners. They are gaining mastery over their bodies and are shifting in the way that they think and process information (Hyson & Biggar-Tomlison, 2014). At six or seven years of age, children no longer rely on their informal understandings of concepts. They are learning to cognitively organize differing disciplinary ideas in response to novel situations. At the same time, they are more cognizant of others in their world and have a greater command of spoken and written language. Therefore, the tools used to help children with their learning should reflect the evolving developmental changes in children.

Piaget found that children at these ages are moving from the preoperational to the concrete operational stage (So, 1964). They can be more fluid in their thinking because they are developing the ability to view a problem from more than one perspective. This means that they are beginning to see how differing ideas are related. Children make these cognitive shifts through interaction with their environment. Consequently, they need to interact with others and engage in rich meaningful conversations about subject matter. According to Vygotsky (1978), all learning occurs first socially before being internalized by children. The development of new knowledge and skills is socially constructed. It is also important to recognize, however, that children’s learning is shaped by the socio-cultural context in which it takes place. What children learn is influenced by what culture values. Although schools value particular kinds of knowledge, families or communities may not emphasize the same types of knowledge.

This section presents the kinds of learning and development children experience in first, second, and third grade while also focusing on children’s cultural and educational diversities. Utilizing a strengths-based approach, guidance is provided on how to enact developmentally appropriate practices that capitalize on the strengths that children and their families and communities bring to the school.

### Developmentally Appropriate Practice

A firm understanding of how young children learn and develop is essential for all primary teachers when planning instruction. Developmentally appropriate practice (DAP) means that children are taught in ways that meet them where they are, individually and as a group, enabling them to reach attainable, yet challenging goals that contribute to their ongoing overall development and learning (Phillips & Scrinzi, 2013). The National Association for the Education of Young Children (NAEYC, 2020) proposes three core principles of DAP. The first principle is to understand the commonality in children’s learning and development. This means knowing the age-related characteristics of learning and the developmental continuum of all children, including the understanding that all development and learning occur within specific social, cultural, linguistic, and historical contexts. The second principle is to know and recognize what is individually appropriate. This means considering each child’s individual abilities, interests, developmental progress, and experiences within context of their family and community to make instructional decisions responsive to these individual variations. The third principle is to embrace what is culturally important. This means getting to know children’s families and their values, expectations, and factors that influence their lives, including their learning and development. Being culturally appropriate means recognizing how each child processes information that may differ due to variations in culture.

Intentional teachers in primary classrooms use DAP to help young children reach challenging yet achievable goals. Educators observe children to learn about each child’s developmental progress, noting social and emotional, cognitive, language, and physical characteristics and development. They take careful note of each child’s culture, previous experiences, home language, and interests and use this information to plan meaningful experiences that target key learning standards. The effective educator then makes plans and draws on a range of teaching strategies to move the child along the learning trajectory through challenging experiences within the child’s reach (Epstein, 2012).

### Developmental Domains

The domains of teaching and learning are interdependent. Development and learning in one domain influences learning and development in other domains. Effective teachers take into account all domains simultaneously. They consider what children need to learn and how they learn and develop socially, emotionally, cognitively, linguistically, and physically. Intentional teachers develop goals and plan instruction and interactions for all children in all areas based on what they know about the child, learning standards, and effective teaching practices. They know what to do to help children reach these goals and can describe the rationale behind their approach. The purposeful planning for each domain results in a more comprehensive approach to instruction. Taken altogether, the domains represent a ‘whole child’ approach to teaching (Kostelnik et al., 2011).

Child development milestones are a critical tool for educators to use for developmental monitoring. Throughout the ages of 6 – 8 there are many changes in a child’s development. The Centers for Disease Control and Prevention (CDC) published a list of general development milestones for children in this age group (CDC, 2023). Using this guidance to observe how children learn and grow over time, educators must actively participate in developmental monitoring, which observes how children grow and change over time and whether students are meeting the typical developmental milestones in playing, learning, speaking, behaving, and moving (CDC, 2023). It is essential to remember that human development is extremely complex and that every child develops differently and has unique needs. It is the educator’s role to meet the child where they are developmentally and to move him or her along a trajectory of development. However, when questions arise about a child’s development, teachers are advised to contact the appropriate experts for advice and guidance.

#### Physical Development

At a very basic level, physical health and well-being are the foundation for all learning. According to Maslow’s hierarchy of needs, needs lower down in the hierarchy must be satisfied before individuals can attend to higher needs (McLeod, 2007). It is difficult for a child to solve a complicated math problem if they are hungry, tired, or troubled in another way. Meeting basic needs is critical, as it allows children to be ready and active participants in their learning.

On average, children grow two to three inches per year from ages six to eight. However, there is considerable variation in both gross and fine motor physical development during this time (Tomlinson, 2014). Children in first through third grade can handle greater physical demands than can younger children, due to their bone and muscle growth. Typically, third grade children, who develop control over their muscles, demonstrate more precision of movement and coordination than do first graders. This precision enables third grade children to participate in games and sports that involve gross motor control. However, hand-eye and foot-eye coordination are not fully developed until about age 9 or 10. The development of children’s fine motor skills is especially evident in writing and drawing. By age 6, most children can print the alphabet and their first and last names as well as write the numbers one through ten with reasonable clarity (Berk, 2019). As children grow in the primary years, their written letters achieve consistent heights, and their writing has more uniform spacing. Children’s drawings become more organized and detailed. Dimensionality, or the ability to copy a three-dimensional form, such as a cylinder, still develops up to age eight.

Children in first through third grade need regular physical movement and may become fatigued by long periods of sitting, even more so than by long periods of active motion (Tomlinson, 2014). Motor action, cognitive development, and behavior are all part of a single dynamic system in the brain, and all these components influence each other. Physical play and exercise are critical to development, in part, because they promote learning and academic success (Trawick-Smith, 2013).

#### Cognitive Development and Executive Functioning

Cognitive development refers to the progress of a child’s ability to think and reason. By age 8 or 9, the brain is nearly adult-size, and head growth slows. Brain development during early middle childhood is characterized by the growth of specific structures, especially the frontal lobes. These lobes, located in the front of the brain just under the skull, are responsible for planning, reasoning, social judgment, and ethical decision making, among other functions. As the size of the frontal lobes increase, children can engage in increasingly difficult cognitive tasks. During this period, lateralization, the dominance of one hemisphere or the other with respect to specific functions, increases. In addition, the corpus callosum, the neural fibers that connect the two hemispheres, thickens, which speeds the processing of information (Berk, 2019).

Children’s thinking becomes more logical, flexible, and multidimensional due to this brain development, enabling them to deal with concrete information that they can perceive directly. They are not yet, however, able to understand complex, abstract concepts or learn through text or direct instruction alone (Tomlinson, 2014). Children still depend on physical actions or direct experiences to learn a new concept (Pica, 2013). Learning at this age requires many opportunities for hands-on application of new skills and active participation in learning activities that build on children’s prior learning and everyday life experiences.

During the first through third grade years, executive function skills continue to develop. Executive function is a set of mental processes that help to manage tasks such as planning, organizing, and paying attention. Growth in executive functioning skills, such as self-regulation of thought and attention, does not occur simply because of maturation. These skills rely on teaching and learning to improve. With support, children in the primary grades gradually increase their ability to focus attention, while filtering out irrelevant information, and begin to engage in longer periods of sustained work.

#### Social and Emotional Development

As children develop cognitive and physical abilities during the primary school years, they also develop socially and emotionally and, as a result, become more responsible and independent. At this age, children also have a stronger ability to follow rules and can play cooperative, rule-regulated games. Thus, teachers can provide children with meaningful work to be completed both independently and collaboratively.

Friendships are also developing during the primary years. In positive friendships, children develop skills that help them learn to meet their own social needs and the needs of others. To promote the development of friendship skills, teachers need to provide experiences such as playing games or sharing materials in the classroom.

Part of developing friendships is learning how to take another’s feelings into account. Children in the primary years begin to both talk and listen to one another. They also begin to work and play in groups with children of similar interests. In the classroom, teachers can help children build friendship skills by having them work together in collaborative groups. While working in groups, children learn to cooperate and communicate effectively with one another. By setting clear rules and expectations prior to group work, teachers provide children with appropriate skills for interacting in social relationships.

During the early childhood (Preschool through third grade) years, children work on refining their self-help and social skills, mastering unfamiliar tasks, exploring their emotions, and coping with stresses. Emotional development is complex, and educators play an important part in helping students learn to communicate well with others, develop personal insight and assertiveness, acquire self-acceptance, and take personal responsibility (Kostelnik et al., 2011).

As children progress from first to third grade, they become more attuned to others’ emotions and how their own behavior affects others. They develop a more realistic understanding of their abilities, understand that people have different perspectives, and begin to make social comparisons; that is, they judge themselves in relation to others. This highlights the need for educational professionals to provide each student with individualized opportunities to be successful. Developing individual instructional opportunities allows children to take the next challenging, but achievable, step in their learning and development. This approach ensures that all children experience success while building their skills and self-esteem.

#### Language and Literacy Development

Language and literacy development is a major focus for children in the primary grades. Building upon the expansion of language development in preschool and kindergarten, the primary grades transition from listening, speaking, and emerging reading skills to reading comprehension and written self-expression. Most children who are not up to grade level in literacy skills by fourth grade generally have a difficult time meeting future grade level expectations (The Annie E. Casey Foundation, 2022). Increases in language development require repeated exposure to new words and numerous opportunities to use them. Children need access to texts and spoken language to learn new concepts and words. As such, strong language skills are the building blocks for learning to read and write. By age 8, children expand their vocabularies to about 20,000 words (Berk, 2018) and are learning new words rapidly, at a rate of approximately twenty words per day. They begin to understand that words may have multiple meanings and see nuances in them. At this age, children engage in rich conversations with peers and adults and discuss new words, including their meanings and connections to other words and contexts.

This increased vocabulary provides support for developing reading and comprehension skills. Reading skills develop quickly and become more advanced as children move from first through third grade. As primary students become more skilled at reading, they rely less on decoding words and begin to recognize words automatically. Children are likely to have a reading vocabulary of 300 to 500 words in first grade, and, by third grade, children are likely to be efficiently reading chapter books, decoding advanced words, and reading fiction and informational texts aloud with fluency (Copple et al., 2014).

Developing young learners’ reading skills is a natural progression towards expressing themselves in writing. First graders are typically creating their own written texts for others to read, using conventions of encoding and spelling common, regular, single-syllable words. Children’s writing abilities in second grade generally progress to demonstrate the use of improved spelling, making good judgements about what to include in written text, and mastering basic mechanics. By third grade, 8-year-olds can produce a variety of written products, including reports and responses to literature.

Strategies for language development must also support multilingual learners (MLs). The number of children who speak another language at home is steadily increasing. Children at this age can become dual language learners, and notable benefits to bilingual learning have been documented (Hur et al., 2020; Valentino & Reardon, 2015). To promote language development, teachers support literacy learning in both English and the child’s home language.

#### Diverse Learners

Although primary teachers’ knowledge of general patterns of development for children ages 6 through 8 is important, the reality is that children are diverse. This diversity will be evident in the range of experiences and competencies that children demonstrate. Diverse learners are students with varying abilities, backgrounds, and learning styles. This includes differences in culture, language, socioeconomic status, and individual needs, such as those with disabilities or exceptional talents. Recognizing and addressing these differences is essential to create an inclusive and effective learning environment. In first grade, some children may read above grade level, while others struggle with more foundational skills such as grade-level high frequency words. Additionally, some students can complete tasks in just a few minutes, whereas others may require extra time to succeed.

There also will be children who vary significantly along the developmental spectrum. They may not necessarily be identified as such, but teachers often work with children who may have special needs and require substantial differentiation of instruction to be able to learn. The [Individuals with Disabilities Education Act (IDEA)](https://sites.ed.gov/idea/) mandates that children with identified disabilities be fully included in regular education classrooms. IDEA is the federal special education law providing rights and protection to children with disabilities and their families. It seeks to provide a free, appropriate public education (FAPE) to children with disabilities and provide their families with a voice in their education. It is highly probable that teachers will be teaching one or several children with an individualized educational program (IEP) that specify required adjustments to their instruction. In addition, these children, and other children in the classroom, may show exceptional talent or giftedness in one or more areas. Knowing their students, educators can tailor instruction to meet students’ unique needs, helping them reach their full potential. Based on the IEP, schools are required to adapt the curriculum, provide supplementary aids and supports, provide related services, implement modifications and accommodations, and change the delivery of instruction etc., to meet the needs of all learners.

All students have neurodiversity, and it is a broad spectrum. Students with varying disabilities are unique therefore, while there is a set of recommended approaches to learning, it is vital to individualize approaches and look at the whole child not just the disability to guide approaches to teaching and learning.

Children in primary classrooms also vary in cultural and linguistic backgrounds. Many families differ in terms of race, ethnicity, socioeconomic background, and culture. Often, teachers assume that, because all their students are within one homogenous grouping, there is no diversity. However, even within homogeneous groups, many differences exist that should be accounted for in the curriculum if children are to feel recognized and supported in their learning (Derman-Sparks & Ramsey, 2011). The curriculum must be diverse and culturally responsive to effectively engage all students and reflect their varied backgrounds.

The challenges and joys of being a primary educator include being able to help each group of diverse young children become competent learners who have mastery over a variety of subject areas and who can work as a community to apply and inquire about their learning. Integral to this work are educators who are not only knowledgeable about children’s learning and development and of subject matter and pedagogy, but who also understand how to utilize children’s differences as a resource. To work with student differences and the diversity they bring to the classroom, teachers need to be committed to ensuring that every child receives an equitable education and is treated fairly. Diversity should be looked on as an asset which fosters an inclusive learning environment. Strategies to promote an inclusive classroom environment can include implementing [High-Leverage Practices](https://ceedar.education.ufl.edu/wp-content/uploads/2024/03/High-Leverage-Practices-for-Students-with-Disabilties-updated.pdf), providing a continuum of placements and services, promoting evidence-based practices such as [Universal Design for Learning](https://www.nj.gov/education/udl/) (UDL), adopting a Social Emotional Learning (SEL) framework to support students’ emotional and behavioral needs, and promoting high-quality [inclusive education practices](https://www.nj.gov/education/specialed/programs/additionalsupports/inclusivepractices/).

When teachers are planning for their students, the opportunity gap must be considered. The New Teacher Project ([TNTP], 2022) defines the opportunity gap as the ways in which factors such as race, ethnicity, socioeconomic status, English proficiency, zip code, and familial situations impact students’ opportunities in life and contribute to or perpetuate lower educational aspirations, achievement, and attainment. Rather than placing emphasis on the students’ ability to achieve academically, the opportunity gap shifts the focus to systemic problems with the educational system. Students who are impacted by the opportunity gap do not have lower achievement scores because they lack ability, interest, or cultural aspects of their community, but because they lack opportunity within the educational system and structure. To affirm and promote a multilingual learner’s native language, schools need to affirm and promote their language and cultural backgrounds throughout the school and within the classroom (Soltero, 2011).

Educators in the primary grades provide the foundation of learning that can support students’ academic success. Primary educators need to be advocates for their students and work with children’s families and communities. So how can educational professionals be culturally, academically, and linguistically responsive in just and fair ways? How can educators work effectively with families to use children’s differences as strengths in the classroom and beyond? The following sections address how New Jersey education can meet the ever changing and diverse twenty-first century students in our state.

### Being Culturally Responsive

Culture involves more than being from a certain place or the food, dress, or customs of a particular community. Cultures are defined by a set of values and worldviews that, in turn, shape norms or rules for behavior as well as the different outward products or artifacts produced by communities, such as food and dress (De Melendez & Beck, 2018). Simple behaviors, such as whether one makes eye contact when talking or how a parent disciplines a child who is misbehaving, are culturally influenced (Milner, 2019). An inclusive, culturally responsive climate creates spaces where all students, parents, educators, and other school staff feel valued, accepted, and secure (Soltero, 2011).

In the United States, what is taught in schools and how it is taught has been historically dominated by the values, rules, and worldviews of the white middle class (Derman-Sparks et al., 2015). Many children in New Jersey's classrooms come from a variety of backgrounds, possibly leading to a disconnect between their learned behaviors and the expectations they face in school. Primary teachers inadvertently may discriminate in the classroom if they do not consider how culture shapes children’s learning and their behavior. For example, Ms. Adams keeps getting frustrated with Houng, a second grade Vietnamese American girl, who repeatedly answers “Yes” when Ms. Adams asks her whether she understands. However, Houng’s written work is often incorrect. Ms. Adams concludes that Houng lacks motivation to learn and chastises her for not seeking help. Ms. Adams has no idea, however, that the literal equivalent of “yes” in Vietnamese is “da,” which also can mean, “I am politely listening to you” (Weinstein et al., 2003).

The first step toward enacting a culturally responsive pedagogy involves an educator’s recognition of themselves as cultural beings whose histories and identities shape how they interact with students (Souto-Manning, 2013; Milner, 2019). Unless teachers can understand how their culture shapes who they are and how they work in the classroom, they will continue to assume that their own ways of being and doing things are the norm (Derman-Sparks et al., 2015; Derman-Sparks, & Ramsey, 2011; Souto-Manning, 2013). In so doing, teachers reinforce their cultural values over those of their students and may be inclined to see children’s differences as problematic.

Once teachers are aware of their own cultural identities and how schools have traditionally emphasized mainstream culture as the norm, it then becomes possible for them to enact curriculum and pedagogy that uses children’s differences as resources, rather than as deficits, for instruction. Valuing and using the linguistic and cultural capital of all students helps to reduce misunderstandings among different cultural groups in the school, has the potential for creating strong cross-cultural bonds, and helps to build understanding between teachers, students, and their families (Soltero, 2011). The following sections describe some of the ways that teachers can incorporate children’s cultures into the curriculum.

##### Creating culturally inclusive classroom environment.

An easy strategy is to ensure that the classroom is structured to show acknowledgement of and respect for diversity. This involves including books and images that portray children from different races, ethnicities, family types, genders, and abilities. Photographs and other displays of the children allow students in a classroom not part of the dominant culture to feel recognized. Visual displays in the classroom in the languages of the children as well as in English also help to communicate inclusion.

##### Allowing children’s discourse patterns into the classroom.

Different cultures have different linguistic codes, and culturally responsive teachers allow these different ways of speaking and communicating into the classroom (Milner, 2019). Of course, children need to learn how to speak and use academic English, however, by validating their cultural discourse patterns, children can build a bridge between their culture out of school and their experience in school. In allowing children’s linguistic codes into the curriculum, teachers also learn how to communicate with their students more effectively. In the previous example, Ms. Adams could learn some words in Vietnamese related to the concepts and label the classroom in the language as well. Further, comparing texts in English and Vietnamese would support and honor the student’s language. This would demonstrate how the teacher is engaging Houng with the curriculum and the classroom environment.

##### Allowing children’s cultural experiences into the classroom.

Often, teachers are so focused on getting through the academic curriculum that they may not pick up on the cultural references that children share. For example, a first-grade teacher may be talking with the children about the things that roll or turn. When showing a picture of a rolling pin, one child may call out, “That’s what we use to make roti.” The teacher might ignore this comment and then ask the children whether they ever make pizza with a rolling pin. In this example, the teacher missed an opportunity to learn more about a child’s personal cultural experiences. If the teacher had known or asked what roti is, she not only would have affirmed this child’s culture, but also would have opened the conversation so that other children could contribute to their experiences with rolling pins and dough.

#### Enacting culturally responsive classroom management strategies.

Teachers need to use a cultural filter when interpreting children’s behavior and be aware of and use cultural discourse patterns to communicate their expectations (Milner, 2019). Children may respond better to a direct discourse pattern such as, “Sit down, please”, rather than an indirect one such as, “Javon, would you sit down, please” or to consequences related to cultural values. If teachers are to be culturally responsive, it is also important that the expectation for classroom behavior are communicated explicitly, modeled, and reinforced consistently to all children (Milner, 2019).

##### Learning from and including families.

Including children’s cultural knowledge and experiences in the curriculum requires teachers to develop their cultural content knowledge (Milner, 2019). One way to do this is to get to know the children’s families. This is not always easy to do, as some families may not believe that they should be involved in their child’s schooling. For example, newly arrived immigrant families who do not have English as a first language may defer to the teacher when it comes to their child’s education. Other families, based on their own schooling experiences, may not be trusting of educators. One way to get to know families, then, is to invite them to the school for an informal event, whether it be a picnic or a reading of a book that children have made that could include the sharing of cultural stories or artifacts. It is important to get to know families on an individual basis as well, which can be done through an interviewing project whereby children interview family members and construct a story. Another way is to make home visits and to get to know where children live, who they live with, and common family practices, including those that involve literacy and language (Milner, 2019).

#### Being Academically Responsive

Too often, the curriculum used to teach subject matter assumes a one-size-fits-all approach. If all students, with their differing academic learning needs, are to master necessary content and skills, teachers need to modify the curriculum. Differentiating instruction to meet the needs of academically diverse students involves adapting either the task, the content, teaching techniques, the learning environment, and assessments for a particular student or group of students. For example, Henry is a first-grade non-multilingual learner who does not have a special education identification. Henry’s teacher shares that he fidgets and moves about the classroom. He is excelling academically. He is reading above grade and has achieved 100% on all math unit tests. He is adept at solving problems in content areas such as science and demonstrates a strong vocabulary obtained from his extensive reading of informational texts. He is flexible in his thinking and points out connections to previous lessons. He is one of the few children in his classroom to have developed an understanding of language that enables him to understand figurative language, such as idioms, which are at and above grade level. Henry likes to participate in whole-group discussions but is not yet self-regulated enough to wait to be called upon. He also has a difficult time keeping his hands off other children nearby while working in large- or small-group settings. After a period of sitting or whole-group instruction, Henry often needs sensory input. He demonstrates this in several ways (e.g., touching his neighbor, gripping his pencil tightly and pressing hard, standing at his desk instead of sitting, chewing on the sleeve of his shirt). In her first-grade classroom, Mrs. Thompson differentiates the environment for Henry. She recognizes that he needs sensory input. Henry knows that he can stand instead of sitting at his desk. Henry also has bouncy bands on his desk to keep his feet moving while sitting. Further, Mrs. Thompson has introduced fidget tools to her class. Henry enjoys the fidget cube. In her lesson planning, Mrs. Thompson modifies for the students, keeping Henry at the forefront. She breaks up the whole-group instruction into age-appropriate time frames to keep Henry’s attention. She also has initiated whole-class yoga to help Henry and his classmates become more aware of their bodies.

Educators think about differentiating the curriculum for children who are struggling, but a strengths-based approach also requires that educators recognize and challenge students who excel academically. For example, gifted and talented students who are working in a subject area or areas at least one or two grade levels above their age group benefit from having the curriculum enriched in some way. Enrichment does not mean more of the same but, rather, adjusting a lesson so that students can go deeper into knowledge.

##### Observing and documenting children’s learning.

The first step in getting to know the children in the classroom is to observe them in a variety of learning situations. Anecdotal records of what children are engaged in, their interests, and their responses to various activities can be used to build a baseline of information about who students are as learners. Young learners are also able to provide input on their learning and thinking. For students in first through third grade, this might be through conferences, surveys, drawings, graphing, writing a short summary, or presenting information orally. Once a teacher has a sense of the children, specific interventions that capitalize on their strengths, while also targeting specific areas of need, can be planned.

##### Using differentiated learning centers and flexible grouping

Children learn from one another and help support the learning of others by working collaboratively in differentiated centers and flexible small groups. Cooperative learning in centers allow diverse learners the opportunity to collaborate with their peers while sharing their unique abilities and interests. In learning centers, students engage in continuous, purposeful, standards-based, differentiated practice, with their peers. Students collaborate and strengthen concepts and skills through invigorating and stimulating projects, games, and activities. Flexible small groups are data-driven. The instruction matches the students’ readiness level for learning a concept or skill using appropriate instructional strategies, delivering suitable content at a pace that is appropriate for diverse learners. During flexible small-group instruction, children engage in standards-based, rigorous learning opportunities where the teacher focuses on a particular concept, strategy, or skill (NAEYC, 2020). Teachers facilitate this through engaging, hands-on learning, scaffolded conversations, and intensive questioning. Flexible small group instruction and purposeful learning centers are effective instructional methods for all students because students work collaboratively with peers in centers or in flexible small groups to engage in meaningful experiences with language and content (Soltero, 2011).

##### Implementing learning activities that allow for different strengths.

Every learning activity can be modified through scaffolding or enrichment. One way to teach to children’s strengths is to implement projects. While some children might investigate different travel options to get to Arizona in a second-grade communities project, others could be creating a brochure with simple text to describe their town. The key is to know the learning progressions of differing content and then work to help children deepen their learning, no matter their learning needs.

##### Using student interests to supplement the curriculum.

Children need to know that they have a place in the classroom and are accepted for who they are. Teachers who include children’s interests and experiences in the curriculum have better success at motivating children to persevere through challenging concepts and skills. For example, Mr. Walsh knows that Carlos, in his third-grade class, is reluctant to write. He also knows that Carlos is interested in graphic novels, so he introduces some graphic novels into his library and reads them to the class during the whole-group portion of the literacy block. He then suggests that Carlos write and illustrate his own graphic novel. Teachers who plan and enact curriculum that has been adapted or modified using children’s strengths and interests enable all learners to find a place in the classroom.

#### Being Linguistically Responsive

Linguistic responsiveness in a primary classroom refers to teaching practices that support the learning, development, and engagement of children from diverse linguistic backgrounds. It includes supports for continued development of children’s home language by authentically incorporating children’s languages into the learning environment. Linguistically responsive practices can facilitate English acquisition by providing scaffolded strategies to support children at any level of English knowledge to fully participate in learning experiences (Castro et al., 2011).

Language learning occurs within a social and cultural context. It is through talking with others and participating in the cultural practices of a community that children learn how to use language. Some educators may believe that because a child does not speak English and the teacher does not speak the child’s language, that the only way to work with MLs assigned to their classroom is through specialized intervention, usually outside of the general education classroom. However, it is through participation in a language assistance program that MLs in grades first through third learn to become proficient users of English.

Using children’s proficiency in their home language, teachers can help MLs become successful speakers and communicators in English (Castro et al., 2011). MLs who have extended learning opportunities in the home language from ages three to eight, consistently outperform those who attend English-only programs on measures of academic achievement in English during the middle and high school years (Soltero, 2011). This work is very important, as helping MLs become speakers of English has a direct influence on early literacy learning. For example, Mrs. Thompson, a first-grade teacher, uses her knowledge of Hindi and of her student’s linguistic ability in English to help her participate in the classroom. Mrs. Thompson works closely with the student, Saanvi, as she acclimates to her new classroom. She is learning English in school and speaks Hindi at home with family. Mrs. Thompson must rely on a variety of resources, as she does not speak Saanvi’s home language. She has formed a warm relationship with Saanvi and helps her feel welcome in the classroom. Mrs. Thompson can understand Saanvi through observation and communicates with her through gestures and pictures. Observing Saanvi’s work with pattern blocks, Mrs. Thompson knows that Saanvi has a strong understanding of problem solving. She challenges Saanvi with visual problem-solving activities and puzzles to continue to develop her problem-solving skills. She notices that Saanvi enjoys reading small books that she brings from home. Mrs. Thompson encourages her to work with a partner during reading time. She asks her to read books in Hindi to her partner while her partner reads picture books to Saanvi in English. Mrs. Thompson also observes Saanvi’s skill in her drawings. In her science journal, Saanvi’s drawings demonstrate an understanding of the science content studied in class. Mrs. Thompson acknowledges Saanvi’s concept development, evident in her journal, and works one-on-one with Saanvi to add labels in both Hindi and English to her drawings. Mrs. Thompson also notices that Saanvi is anxious each time the class leaves the room. To help ease her stress and strengthen her feeling of belonging, Mrs. Thompson uses some words in Hindi, such as hello, goodbye, lunch, art, and music.

##### Using the children’s home language as a tool.

Teachers who are monolingual may believe that they are not qualified to use the children’s home language in the classroom. However, in making this assumption, teachers are doing a disservice to their MLs. Children’s proficiency in their home language supports their learning and the use of English. In small-group interventions, teachers can work with their MLs to read and speak basic vocabulary and sentences in their home language and in English. As was seen in the case of the teacher above, this can be done in combination with visual cues and gestures. When planning instruction, teachers can prepare themselves to use more than one language. To learn more about the home language of their MLs, teachers need to collaborate with families. By showing their MLs that they are interested in learning about their language and culture, teachers send a clear message that both languages are important and valued in the classroom.

##### Having consistent routines.

Learning to speak, read, and write in English requires learning how to participate in daily classroom practices. Having a consistent schedule and using the same kinds of activities for transitions and classroom management allows children with little or no English to feel confident, as they can follow along and be a participant even if they cannot perform all the activities in English.

##### Using gestures, visual cues, and other supports.

Although children may not be able to use English when they first enter the classroom, they can understand and participate in the curriculum if provided with simple supports. Using gestures and movement and modeling what is expected, as well as using pictures and other visuals, can help children to understand what is being asked of them. Similarly, when talking, teachers can use repetition and emphasize key words that they want children to understand. Importantly, teachers need to keep directions simple until MLs can comprehend more complex instruction in English.

##### Providing many opportunities for talk.

It is through talk that children develop their awareness of sounds and learn the meanings of words while also practicing how to speak English. While engaged in talk, children also develop an awareness of how English is used in different social contexts and learn to participate in the academic discourse of the classroom. Therefore, teachers need to provide opportunities for children to talk using both their own language and English. Considering that most MLs usually have a silent period during which they do not speak English but, rather, are developing their receptive vocabulary, it is important that teachers provide many opportunities for informal interactions between children as well as small-group activities in which children who are learning English may feel more comfortable talking with their peers than the adults in the room.

##### Creating a language and literacy-rich environment.

Children learn a language by hearing, seeing, and speaking the language. Presenting images alongside environmental print in English and the home language of children provides visual cues to help children move from one language to another. For example, during morning routines, a first-grade teacher has relevant words written in Spanish, Russian, and English. As she reads and points to the words in English, she asks the children who speak the other languages to teach her how to say the word. Similarly, having books both in English and translated into the languages of children in the classroom provides resources for children to engage with print and oral language.

### Working With Families and the Community

At a district, school, and classroom level, it is vital for educators to work with students’ parents, families, and communities to accomplish common goals to support the educational success of all children. If we hope to move the needle on greater educational equity and social justice, we must empower families to support their child’s learning and ensure that all families and communities have what it takes to build equitable learning pathways for children (Weiss et al., 2018).

When families are empowered as genuine partners in their child’s education, students thrive, schools are stronger, and the whole community benefits. Nevertheless, too often family engagement is seen as disconnected from teaching and learning. Family engagement is not a separate add on or afterthought to teaching. Parents, families, and communities are a large part of a student’s support system throughout their lives.

#### Two-Generation Support with the Community

Two-generation (2Gen) support can increase students’ learning, development, and well-being by simultaneously and respectfully working with children and the adults in their lives. 2Gen partnerships are multigenerational and collaborative relationships between schools, students’ families, and communities. Educators generally initiate 2Gen relationships to close opportunity and achievement gaps and enable families, including those who are marginalized, to gain access to resources, connections, and opportunities to ensure their child is healthy, safe, and prepared for successful learning. Educators can facilitate 2Gen partnerships by increasing their own knowledge about the community and providing all families with awareness and access to information about a network of equitable services, supports, and opportunities within the community. Examples may include social services, programs for food and housing security, mental health support, school breakfast and lunch programs, childcare, before and after care programs, summer camps, visual and performing arts events, athletic programs, language supports, tutoring, counseling, community health centers, links with agencies that provide academic enrichment, museums, libraries with access to technology, etc. It is important for educators to rethink their perspective and approach to parent, family, and community engagement so they can elevate their traditional efforts and truly impact student learning, development, and achievement.

#### Communicating with Families

To fully educate and serve the students in their care, all educators use and provide multiple accessible methods of reciprocal communication to build learning partnerships with families. With technology and hybrid learning as new tools, there are many ways for educatorsto communicate with families such as parent portals, digital learning content, interactive webpages, digital field trips, streaming workshops, online student led parent-teacher conferences, text blasts, multimedia lessons, enrichment activities, classroom blogs, and more. No matter the delivery message or means, reimagining home-school communication provides opportunities for improved relationships that can impact children’s learning and development. As part of state and federal mandates, educators are aware of the requirements within the *Elementary and Secondary Education Act* which includesTitle I, Title II, Title III, and Title IV. The NJDOE provides several implementation supports and examples to help districts meet [Title I requirements for Parent and Family Engagement](https://www.nj.gov/education/title1/engagement/).

#### Using Family Knowledge to Support Student Learning

When communicating with families, educators can position themselves as learners and share their own willingness to learn about their students’ cultural traditions and norms. Educators engage parents and families on multiple levels: the school, classroom, and individual student levels. Students learn through their individual lens of past and current knowledge and their perspective is created in their family and community. Educators can support student learning and development by seeking family input and expertise about their child to create a frame of reference that engages students in the curriculum through personal cultural connections. When educators and families work together and share their knowledge and expertise, it is possible to individualize instruction and help children to use their knowledge from both home and school to learn more effectively (Gillanders et al., 2013).

#### Reaching Out to the Community

High–quality school systems view communities as assets that complement their educational programs so they can provide the best possible education for all their students. Resources and services available in communities are significant contributions to schools and their mission. However, those resources should not be viewed with a singular purpose: namely taking resources. Community resources enrich the educational program, but when educators contribute to the ongoing development of the community, children benefit from the overlapping support from strong teams of learning partners. Community partners may provide safety net services, or new opportunities, to families. Educators focused on implementing a P–3 vision help make life better for children and families by recognizing the important roles of community organizations and facilitating linkages to help families access supports and services to meet their needs (Kauerz et al., 2021).

When developing a plan to build community partnerships, educators prioritize equity and access. Engaging with community organizations should build positive and productive relationships for all children and families, including those who are seeking and needing services, new to the community, or part of a harder to reach traditionally marginalized group. 2Gen community partnerships provide a powerful way to support students. Educators simultaneously work with students and the adults in their lives to ensure the child is healthy, safe, and prepared for successful learning.

Community mapping is an example of a valuable tool schools can create to identify key resources and people through the community. Community mapping involves families and educators generating and answering questions to create a descriptive portrait of available services and how they are used. A legend might include medical facilities, recreation facilities, diverse businesses, restaurants, events sites, transportation, houses of worship, contact information, and other places where families can network and support each other. Using community mapping, families become familiar with services and opportunities that allow them to enrich and support their child’s learning and development.

A child’s community plays an essential role in their education, especially in the early years of elementary school. Community members, organizations, and agencies should be welcomed and included in the educational program whenever possible. Partners can provide ways to address unmet basic needs, ensure children’s physical and psychological safety, model an environment of social and cultural respect, create informed and supportive relationships with teachers and other adults that promote learning and development, and provide opportunities for students’ families to have their voices heard in shaping their school environment. When students and families experience these conditions, they develop a sense of value, belonging, and are more likely to engage in learning in and outside of the school.

#### Resources

The Center on School, Family, and Community Partnerships at Johns Hopkins University School of Education houses the National Network of Partnership Schools (NNPS). The NNPS was founded and is directed by Dr. Joyce L. Epstein, Ph.D., the primary international expert on parent, family, and community engagement for more than five decades. The work is grounded in a research-based framework of six types of school, family, and community partnerships. Researchers and facilitators work with practicing educators across the country to assess effectiveness and increase the knowledge that will improve student learning and strengthen school success. Professionals at the NNPS supply professional development; an abundance of resources, guidance on best practices, support to evaluate progress; and recognize excellent partnership programs. Educators can find the newest research results and ideas for action from the [National Network of Partnership Schools](https://nnps.jhucsos.com/).

The U.S. Department of Education and the Institute for Educational Leadership (IEL), in collaboration with the Southwest Educational Development Laboratory (SEDL), developed the [Dual Capacity-Building Framework for Family–School Partnerships](https://www2.ed.gov/documents/family-community/partners-education.pdf). The resource provides guidance to educators seeking insight on four components of creating effective programs of parent and family engagement including the challenges, essential conditions, policy and program goals, and capacity outcomes. Dr. Karen L. Mapp, chief researcher, and senior lecturer at the Harvard Graduate School of Education (HGSE) has been a leader in the cultivation of partnerships among educators, families, and community members that support student achievement and school improvement.

#### Summary

This section offered a snapshot of children’s development and the role of educators in shaping this development. Although each domain is described separately, it is critical to note that the child develops as a whole. Each domain influences and is influenced by the experiences and development in others. Notably, children’s development before the age of 8 or 9 is uneven and episodic, as children may not develop equally in all domains. No two children develop in the same way. Children enter these grades with a range of skills, prior experiences, and abilities across domains, and they continue to develop at varied paces. Effective educators consider each child individually and tailor instruction to meet all students where they are, while working diligently to move each to the next level in the developmental spectrum. Children’s academic success depends on educators who can use children’s diversities as strengths in the curriculum. The diversities of children in the primary years can help to enrich and enliven the academic curriculum. Key to the work of academic success is educational professional’s development of culturally responsive teaching strategies and a toolkit of cultural knowledge. Working with families and communities is one way that educators can develop their cultural toolkit. To best support their students, educators build relationships and goal centered learning partnerships with families and make time to understand the communities where they live. Partnerships can serve as tools and resources for teaching and learning when educators use a different approach to communication, view family contributions to enrich the curriculum, strive for diminished opportunity gaps, and invest in families’ capacity to support their child’s learning, health, and welfare.

Multicultural  children hugging in what looks like a classroom.


## **Section 2: Setting Up to Support Children’s Learning**

Educational professionals work to create a safe environment conducive to learning for all children. They do this through the social and emotional environment, the physical setup of the classrooms, and the way the time is scheduled. This section focuses on supporting children’s educational experiences through positive approaches to learning, classroom management, and the physical classroom setup. The New Jersey Tiered System of Supports (NJTSS) is a framework of supports and interventions to improve student achievement, based on the core components of Multi-Tiered Systems of Support and the three tier prevention logic of Response to Intervention (RTI).

### Fostering Positive Approaches to Learning

The way in which students approach their learning will impact their level of engagement. Using evidence-based approaches such as the [CASEL Framework](https://casel.org/), educational professionals can foster knowledge, skills, and attitudes across several areas of social and emotional competence and establish equitable learning environments that support students’ social, emotional, and academic development (Borowski, 2019).

Approaches to learning focus on the skills and behaviors students use to engage in learning. Hyson (2008) suggests two key dimensions of approaches to learning. The first is enthusiasm for learning, which is internally motivated, including interest and pleasure in learning. The second is engagement in learning, which is a behavior dimension that consists of attention, persistence, flexibility, and self-regulation. Children who have developed these traits are more attentive, focused, and interested in learning (Jacobs & Crowley, 2014). Cooperative, accepting, and harmonious environments help to promote the development of these skills. Effective teachers use strategies to strengthen children’s engagement and joy in the process of learning. Teachers work with children to develop problem-solving strategies when working on cognitively demanding tasks and in solving socially based conflict. Instead of relying on external recognition or adult praise (Hyson, 2008), children develop their own internal motivation to learn.

Hyson (2008) suggests that educators consider practices that build children’s motivation to learn. Instead of external rewards, such as stickers, Hyson recommends that educators:

* Emphasize children’s effort.
* Emphasize children’s working together, collaboratively.
* Provide challenging tasks.
* Provide lessons or activities that promote connections between concepts and experiences.
* Provide help and support (scaffolding) for children who struggle when mastering a new skill.

In the classroom, teachers can create an engaging environment that invites children to learn. Instead of external rewards, children need opportunities that allow them to believe in themselves and to be excited by the world around them. Further, keeping children interested and engaged is one means to lessen behavioral issues in the classroom.

### Promoting Classroom Management through Developmentally Appropriate Strategies

At any given time, the primary grade classroom consists of differing abilities and social and emotional skills. These differences require that educational professionals know how to use effective, developmentally appropriate strategies for classroom management. Through effective classroom management techniques and proactive strategies, teachers support each child’s individual learning and behavioral needs.

#### Developing Emotional Literacy

Developing a positive teacher-student relationship is an essential element in nurturing children’s social and emotional development. Primary educators who connect with their students through meaningful one-on-one conversations support children’s ability to communicate their feelings and needs and strengthen their emotional literacy. Children are not born with emotional literacy. Emotional literacy is learned and developed over time. Children recognize, understand, and express emotions by “having and developing” emotional literacy. Developing emotional literacy promotes healthy and appropriate responses towards oneself and others. Through emotions, such as anger, happiness, fear, love, and loneliness, children respond to the world around them. Children who have a solid foundation in emotional literacy can tolerate frustration better, have fewer conflicts with their peers, and engage in less self-destructive behavior (Center on the Social and Emotional Foundations for Early Learning, 2005). Building young learners’ emotional literacy skills is an aspect of social and emotional learning that will assist children in managing their emotions, feeling and showing empathy towards others, and making responsible decisions.

Primary educators use various strategies to help children develop emotional literacy. Educational professionals can model ways to recognize their emotions and respond to them in a productive manner in different situations that might arise during the day. For instance, instead of getting upset when a child knocked over a container of beads, Mrs. Thompson said, “Oh boy! Those beads certainly made a loud sound. It’s okay, spills happen! Let’s work together to clean them up.” Mrs. Thompson smiled, sang a made-up bead clean-up song, and then helped Dante put the beads back into the container.

In his third-grade classroom, Mr. Walsh modeled recognizing his emotions and managing his response when some of his students began to talk with others while he was giving directions for a project. He stated to the class how this made him feel: “When people start talking about other things while I’m giving directions, it feels frustrating for me, and I must take a breath. I catch myself and say, it’s okay. I’m going to try again.”

Another strategy to help children develop emotional literacy is to expand their vocabulary of “feeling” words. Emotional literacy emphasizes students learning vocabulary that expresses their feelings, so they can identify their emotions. To a child who is angry when she loses a race, Miss Rivera says, “Janelle, I see you are upset. Let’s take a walk and talk about how you feel.” Instead of identifying the emotion as anger, the teacher provides the word “upset,” which is less harsh and easier to manage. Miss Rivera also offers Janelle opportunities to recognize how she feels by playing games, singing songs, and reading stories that identify new feeling words.

Sometimes children experience conflicts with one another. To avoid accusatory or escalatory language, educators teach children the value of “I” messages. They teach children to say, “I am mad that I wasn’t able to swing,” rather than, “You gave that swing to Sheila, and you promised I could use it next.” Instead of placing blame, children learn to state the problem and to identify their emotion.

### Classroom Space and Time: Environments and Schedules

The layout of a classroom sets the tone. In classrooms aligned with DAP, the room layout reflects the children’s age and culture. The room is welcoming, bright, open, well organized, and well designed. Desks and tables are configured in groups that allow space for children to work together, to move freely, and to spread out. Materials are interesting, varied, and readily available for hands-on exploration. Children’s work is displayed on the walls, engendering a sense of belonging. In this classroom, the teacher and the children are comfortable as the teacher focuses on building effective approaches to learning.

In a DAP classroom, educational professionals create an area large enough for children to sit comfortably in a whole-group circle, partnerships, or facing the teacher or important visual. There are other meeting areas intentionally created that enable intimate learning and discussion while also promoting movement as children transition from other small group areas. These whole group and small group areas can be used to engage children in differentiated targeted instruction, interactive writing, experiential mathematics, hands-on science activities, social studies, project work, or whole-class read-alouds.

#### Positive Classroom Routines

Predictable morning routines and practices can set a positive tone for the day while providing children with structure and a feeling of community and safety (Anyon et al., 2018). A noted strategy for relationship building is to use the beginning of the school day as an opportunity to check in with students, learn about their lives, build community, and set a positive tone for the rest of the day (Anyon et al., 2018). Positive morning practices include personal greetings as students enter the school or the classroom and whole group meetings that incorporate social-emotional learning activities. Morning arrival routines should allow time for children to reconnect with classmates and the teacher. Instead of using arrival time to take care of procedural or managerial tasks, educators should spend time welcoming students to the school and the classroom. Starting each day with a whole-group morning routine provides an opportunity for children to practice social skills and class rules, including respect and responsibility. From being part of the group, children gain a sense of belonging, develop social and listening skills, engage in cooperative interactions, and have an opportunity to express themselves in a supportive, safe environment. Along with building a sense of community, a morning meeting merges social, emotional, and intellectual learning, as it provides a place for children to observe, reflect, speak, and listen. Children also gain an understanding of the day’s plans and events.

#### **Classroom Areas for Group Work, Small Group Instruction, and Independent Learning**

In primary classrooms, young learners will experience various learning activities that require them to work independently or collaboratively in groups. Areas such as desks, small tables, or a carpeted area provide space for children to engage in small-group work, as well as independent work. When determining seating arrangements, teachers consider individual needs and preferences such as seating children together who need a little extra quiet and creating groups with mixed abilities and flexibly changing the groups regularly based on student need. In early primary classrooms, children continue to learn how to work cooperatively.

In a small-group area, primary educators provide instruction to students based on where they are along the continuum and help accelerate their learning. This space can also be used for students to work collaboratively on projects or one-on-one conferences with the teacher. Small group instruction does not only take place at a specific table, rather areas such as desks, small tables, or a carpeted area provide space for children to engage in small-group work with their teacher and peers.

##### Classroom Library

In the classroom library, teachers provide a wide collection of books from all content areas to support project work, student interests, different reading levels, and the cultures and languages of children. To keep students motivated, book collections should change periodically throughout the school year. In classrooms with younger children, books can be arranged in baskets. Having books in baskets allows younger children to see the covers as they flip through the collection to make an independent selection. Placing labels on bins and bookshelves will also assist students in making their choice.

##### Learning Centers or Workstations

Learning centers or workstations are designated, yet flexible, areas in the classroom in which students can work independently or collaboratively on engaging, hands-on tasks. Activities included in this space give students the chance to practice skills taught during whole and small group instruction and build their social-emotional skills. Centers or workstations may be portable or set up in any available space in the classroom (e.g., on tables, carpeted areas, or two or four desks grouped together).

In the classroom, teachers can store manipulatives, tools, and materials in an intentional, organized, and inviting way in baskets or bins. High-quality and open-ended materials that are labeled in English and the children’s home languages are provided and accessible for use during independent work, centers, or projects. Teachers who are developing students' capacity to use appropriate tools strategically make it clear to students why the use of specific tools such as manipulatives, rulers, rekenreks, number grids, and other tools will help them to solve problems. Materials are accessible to children and used daily. NAEYC researchers recommend educators develop children's agency by encouraging self-directed learning activities that are relevant to the curriculum and applicable to learning standards (NAEYC, 2020).

##### Technology Area

Most twenty-first century classrooms consist of students having one-to-one or shared access to a tablet, laptop, or other hand-held devices. Educators need to consider how these devices will be used during the school day in all content areas (i.e., individual work, group work, learning centers, etc.) and create a system and management structure for use. With the integration of educational technology, digital devices are positioned to have their own area (stationary or a portable learning center) in the classroom. Although room size can limit the ability to create a technology area, teachers use creative ways to keep this area separate to prevent distractions.

##### Outdoor Space

Another area essential for learning is the world outside of the classroom and school walls. Teachers can take children outside for walks, allowing them to explore natural and manufactured happenings in the world around them. Nature walks provide children with opportunities to observe and document, inspire topics for project studies (e.g., climate change, living things, air, water, soil, light, construction), and rejuvenate their minds and bodies. Natural materials collected during nature walks can be used as manipulatives in the classroom for math or as objects to explore in the science center.

##### Classroom Displays

Ideally, classroom displays consist of children’s work and information. Displays are current, meaningful, and at children’s eye level. The children’s work on display allows each member of the class to feel valued and important. Teachers can consider displaying draft and final work so that children can see their growth, change process, and the importance of all their efforts. Educators can ask children what they would like to see displayed in the classroom (e.g., their work, their pictures). If there is room in the classroom, teachers could display children’s three-dimensional, hands-on projects. If space is limited, pictures can be taken pictures of the products for display.

Children also need informational displays in the classroom. These displays can include reference charts, word walls with visuals and realia, content boards, process or format reminders, and current teaching tools. Although informational displays change throughout the year, based on content and time of the year, some displays, such as a birthday chart or a classroom norms or routines chart, may not.

##### Classroom Schedules

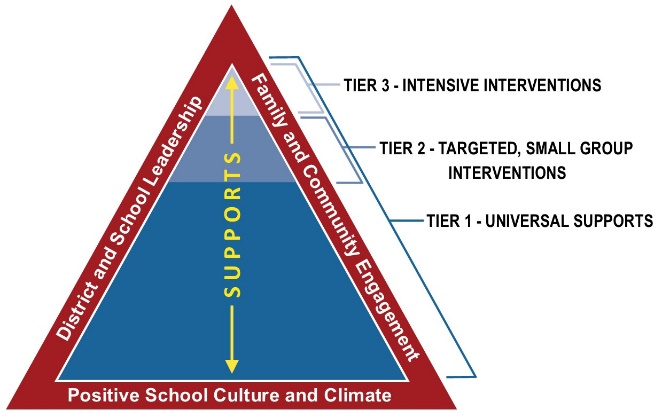
Children and teachers enjoy the comfort of a predictable, yet flexible routine. Knowing what is coming next in one’s day can assuage one’s anxiety or fear. A typical classroom schedule includes arrival time, mathematics, language arts, writing, science, social studies, lunch, recess, and special activities (e.g., art, music). In a traditional schedule, content blocks are scheduled throughout the school day. However, as described in the examples in these guidelines traditional schedules can be modified to support project-based learning and the integration of content areas. In the project-based learning paradigm, content is related, and the schedule is flexible to accommodate the integrated approach. Throughout the day, the students can engage in independent work, small-group instruction, whole group instruction, centers or workstations, and one-on-one work with the teacher as needed.

### The New Jersey Tiered System of Supports (NJTSS)

[The New Jersey Tiered System of Supports (NJTSS)](https://www.nj.gov/education/njtss/) is a framework of academic and behavioral supports and interventions to improve student achievement, based on the core components of multi-tiered systems of supports (MTSS) and the three-tier prevention logic of Response to Intervention (RTI). NJTSS builds upon existing intervention and referral services to organize the delivery of a school’s interventions or supports to address academic and behavioral needs identified through a thorough assessment process. This includes interventions to support both student enrichment and addressing deficits.

Based on successful models of RTI and MTSS from across the country, NJTSS gives schools and districts a systematic way to address learner variability and engage all students in learning opportunities that support grade-level standards mastery and behavioral, health, and social, emotional outcomes. NJTSS maximizes the efficient use of resources to improve support for all classroom teachers and targets interventions to students based on their needs. Through regular monitoring of student progress, along with data-based decision making by problem-solving teams and providing a continuum of supports and interventions based on student performance, NJTSS offers a variety of evidence-based practices designed to improve achievement and promote positive student outcomes. The tiered system involves the systematic development of nine essential components in schools for the effective implementation of the framework with fidelity and sustainability. Those components include:

Figure 1: NJTSS Triangle



[Text version: NJTSS Triangle](#_NJTSS)

* **Effective district and school leadership;**
* **Family and community engagement;**
* **Positive school culture and climate;**
* High-quality learning environments;
* Curricula, and instructional practices;
* Universal screening;
* Data-based decision making;
* Collaborative problem-solving teams;
* Progress monitoring; and
* Staff professional development.

As a multi-tiered approach, NJTSS promotes an equitable educational experience by providing high-quality instruction and interventions matched with student need to help educators make informed decisions about changes in instruction and/or goals through frequent progress monitoring and applying child response data to important educational decisions (Batsche et al., 2005). It is designed to meet the needs of all students by optimizing data-driven decision making and monitoring progress frequently. **NJTSS aligns resources, from within the schools, across school districts and within communities and counties, to provide the right interventions to the right students at the right times. The idea behind a multi-tiered approach is that the majority of students will respond to school-wide strategies (known as Tier 1 supports) but that these strategies may not be sufficient for all students: some students require more personalized support (Tier 2), and an even smaller number may need more intensive measures (Tier 3) taken on their behalf (Chang & Leong, 2020).** The three-tiered model is described below.

For additional information on the implementation of the [New Jersey Tiered System of Supports](https://www.nj.gov/education/njtss/) please visit the website. Additionally, for information specific to the application of the New Jersey Tiered System of Supports for early reading, please visit [NJTSS-ER](https://www.nj.gov/education/njtss/grant/).

#### Universal Screening

As described in the Department’s NJTSS Implementation Guidelines, universal screening is an essential component for any comprehensive multi-tiered system of supports. Universal screening involves assessing all students to identify their performance relative to benchmark expectations. This includes administering reliable assessments that measure specific skills or behaviors that are highly predictive of future outcomes (e.g., Glover & Albers, 2007; Jenkins, 2003).

Universal screening is conducted with all students several times per year (typically in the fall, winter, and spring) to determine student performance relative to defined benchmarks. Screening assessments measure skills or behaviors that are predictive of future performance, to differentiate between students who are likely to fall below, meet, or exceed desired expectations. Screening data are used to identify whether changes are necessary to core instruction, which may require additional intervention, and which students might benefit from more challenging instruction.

#### Tier 1 High-Quality Classroom Instruction

Tier 1 instruction is instruction and curriculum provided to all students with the goal of achieving mastery of grade-level standards. Tier 1 instruction will include differentiation provided by a classroom teacher to support learners in accessing grade-level content. However, some students may have difficulty with grasping grade-level concepts or content despite the delivery of high-quality Tier 1 instruction.

As described above, learners who are not meeting grade-level or development expectations are identified as “at risk” and receive additional Tier 1 supports during the school day which are often provided by the classroom educator. Typically, these supports last for 6 weeks (about 1 and a half months), although the length can vary. Children who demonstrate adequate progress at the end of this period are released from supports, while those who do not show adequate progress could begin receiving Tier 2 supports in addition to Tier 1 supports or other Tier 1 supports are considered.

In Mrs. Thompson’s third-grade class, Tier 1 instruction is provided daily to all students to achieve mastery of grade-level standards. She includes differentiation strategies like flexible grouping, interactive lessons, and targeted questioning to ensure all learners can access the content. Despite her efforts, some students continue to struggle, particularly with multiplication and division.

Two students, Nathan and Mia, have been receiving Tier 1 supports. After six weeks, Nathan has shown significant improvement and will no longer need these additional supports. Mia, however, continues to struggle with division and multi-step problems. Mrs. Thompson recommends that Mia receive Tier 2 interventions alongside continued Tier 1 support to help her make progress.

This approach allows Mrs. Thompson to monitor and adjust instruction to meet her students' needs effectively.

Diagnostics, often recorded as part of progress monitoring, involves regularly assessing student performance through brief assessments, to determine students' rate of improvement or response to intervention and to evaluate the effectiveness of instruction (Center on Response to Intervention). Progress monitoring is used for students receiving Tier 2 or 3 support to determine students’ response to intervention.

#### Tier 2 Targeted Interventions

Children who do not make adequate progress after receiving quality Tier 1 classroom interventions receive increasingly intense instruction to meet their needs. The intensity, frequency, and duration of this targeted instruction is based on their needs, performance, and progress. Additionally, if a school purchases an intervention program, the program will often include recommendations as far as the dosage necessary to achieve the intended impacts of the program. Tier 2 interventions and services are often provided in small-group settings. Two students, Kaylie and Marcus, in Miss Rivera’s second grade class have been receiving Tier 2 interventions for behavior. Miss Rivera recalls the close of the marking period:

Both students received Tier 1 behavioral interventions and did not demonstrate adequate progress, so they were recommended for Tier 2 interventions. While Marcus shows strong skills in following classroom rules and engaging positively with peers, he struggles with managing frustration and maintaining focus during group activities. I am pleased with Marcus’ progress. In the last two months, he has demonstrated significant improvement in self-regulation and social interactions and will no longer receive Tier 2 interventions. Kaylie, however, continues to struggle with impulsivity and needs more targeted support to develop coping strategies and improve attention. She is considered high risk and is being recommended for Tier 3 behavioral interventions.

Tier 2 interventions may be implemented longer than Tier 1 interventions. In conformance with the processes included in the NJTSS framework, students who demonstrate too little progress are considered for more intensive Tier 3 interventions.

#### Tier 3 Intensive Interventions

Tier 3 interventions in grades 1-3 settings are highly individualized, intensive supports designed to address significant challenges in student learning or behavior. These interventions are tailored to meet the unique needs of each student and involve more frequent and detailed progress monitoring to assess the effectiveness of the intervention and make necessary adjustments. The goal is to ensure that students receive the most appropriate support to facilitate meaningful progress.

For example, in an early literacy scenario, a first-grade student named Liam demonstrates persistent difficulties with reading despite Tier 1 and Tier 2 interventions. While Liam can recognize individual letter sounds, he struggles with blending these sounds to form words, resulting in frustration and reluctance to participate in reading activities. As part of Tier 3 interventions, Liam receives one-on-one sessions with a reading specialist who uses evidence-based strategies, such as multisensory phonics instruction, to build his decoding skills. These sessions occur daily and are supplemented by progress monitoring assessments twice a week to track improvements and adjust the intervention plan as needed.

After eight weeks of intensive support, Liam begins to show improvement in his ability to blend sounds and read simple words independently. If sufficient progress is not observed by the end of the intervention period, Liam’s support team may recommend further Tier 3 interventions with adjusted strategies or refer him for a comprehensive evaluation to identify any underlying learning disabilities.

#### Positive Behavioral Interventions and Supports (PBIS)

Positive Behavioral Interventions and Supports (PBIS) is a multi-tiered system approach to planning and implementing interventions with a focus on behavior, conduct, and social and emotional wellness. In a multi-tiered system approach, like PBIS, interventions are organized along a continuum into three intervention delivery tiers: universal prevention (Tier 1), secondary targeted and selective interventions (Tier 2), and intensive tertiary interventions (Tier 3). Each intervention tier has a specific focus and set of practices that guide intervention design and delivery. A multi-tiered intervention system, like PBIS, is designed using processes and practices that are culturally and contextually responsive to the strengths, needs, and priorities of the school and community.

##### Universal Prevention (Tier 1)

At the universal tier, educational professionals use core prevention practices to create a positive and proactive school culture and climate. A school’s culture of prevention is grounded in school-wide expectations that guide how everyone conducts themselves and treats one another. An important feature of operationally defining effective expectations is that they are framed positively using action-oriented language. “Walk at all times”, “ask before taking”, and “use an inside voice” are examples of positively framed expectations that guide the student toward pro-social behavior. Engaging students and parents is necessary to ensure that the selection of expectations, the defining of their meaning, and the articulation of examples is done through the cultural lens of the school community.

To help students achieve the behavioral expectations of the school and primary classroom, educational professionals routinely teach, review, and reinforce the expectations through a variety of planned and incidental opportunities occurring throughout the school year. Instead of teaching students the expectations just once at the beginning of the school year, teachers supplement this initial instruction by embedding opportunities for students to learn about the expectations in-context such as by linking to content area curriculum and planned routines. For example, during a morning meeting routine, the teacher can reinforce learning by reviewing expectations, leading a discussion about the expectations, modeling the expected behaviors, and having students practice or role play expectations. To support in-context learning, teachers use an array of evidence-based practices including positive greetings at the door, pre-correction, opportunities to respond, active supervision, behavior specific praise and teachable moments throughout the school day. By embedding learning scaffolds throughout the school day, students develop the habits and skills needed to experience success across a range of settings and situations.

Employing proactive evidence-based strategies in daily routines maximizes instructional time and creates the foundation for young students to succeed in academic and social situations. Even with proactive strategies in place, situations will occur that require the teacher to respond to unwanted student behavior. When responding to unwanted behavior, educational professionals can use prevention practice principles to respond in ways that re-engage the student back to routine by providing consistent class-wide reminders of the expectation and praising students accordingly. Praise can be an indirect reminder that provides the student with an opportunity to self-correct. If more direct redirection is needed, a teachable moment approach provides behavior specific feedback and offers the student concrete next steps. When warranted, planned logical consequences are used to help the student understand the implications of their actions.

About 80–90% of students will have their needs met when universal tier strategies are consistently implemented. A small percentage of students, up to 20%, may need additional targeted or intensive interventions to support behavior, conduct, and social and emotional needs (Sugai & Horner, 2002). Implementing a consistent universal screening system using multiple sources of data and specific operationalized criteria ensures that students receive needed interventions quickly and specific to their needs. The goal of screening is to identify students in need of intervention early so that they do not struggle while waiting for interventions to occur. School-wide universal screening systems are implemented on a routine schedule, using quantifiable measures, and defined decision rules. As a result of screening identification, students receive interventions at the secondary (Tier 2) or tertiary (Tier 3) level of delivery.

##### Secondary Targeted and Selective Interventions (Tier 2)

Evidence-based secondary systems are designed to deliver interventions that meet the needs of approximately 15% of students (Sugai & Horner, 2002). Like academics, behavior, social, and emotional wellness represent an array of different types of needs that require diverse types of intervention approaches. Thus, the best outcomes are achieved when interventions are matched to the specific type of behavior, social, and emotional needs identified through the screening process. Once selected, evidenced-based interventions are implemented using a standard protocol that results in equitable delivery of interventions across students.

The most common evidenced-based secondary tier interventions include check-in systems, social skills groups, cognitive behavior therapy groups, mentoring, and function driven interventions. Although these interventions tend to occur outside of the classroom, through coordinated efforts, primary teachers can support intervention delivery by using practices such as pre-correction, behavior specific praise, and teachable moments. Additionally, educators may implement class based strategies that include antecedent adjustments (e.g., breaks, offering choices, differentiated assignments), check-ins at pivotal points in routines, appropriately individualized incentives, behavior contracts, and teaching replacement skills. Working with a small-group, teachers can use various strategies, including modeling, role playing, and collaborative problem solving to reinforce positive behaviors and expectations. Student progress is monitored bi-weekly using data rules applied to graphed summaries of student data. When the data suggest that a student is not making expected progress, intervention adjustments, additional strategies, or complementary interventions are layered in to increase the intensity of intervention delivery and the combination of intervention strategies until the right balance is achieved.

##### Tertiary Tier Interventions (Tier 3)

Tertiary tier planning is the most intensive approach to intervention delivery. To design the intervention plan at the tertiary tier, a student specific team is assembled that includes a facilitator, the student’s parents, teaching personnel, and when appropriate the student. Depending on the availability of current and relevant data, planning may require the collection of additional information or data to understand what interventions are specifically needed. Function driven assessments that reveal the nuances of a behavior pattern provide important insights to select specific strategies and replacement skills. While targeted, screening and assessment tools (e.g., anxiety or depression assessments) can provide more direct guidance about shaping therapeutic interventions.

Tertiary interventions are designed specific to an individual student’s needs and may include intensifying existing interventions or adding a new intervention. Through a facilitated problem-solving process that uses the assessment data to drive decisions, the team designs an intervention plan to support the student’s behavior, social, or emotional wellness needs. Intervention plans may include intervention delivery outside of the classroom (e.g., individualized or group counseling) and interventions delivered in the classroom (e.g., a behavior plan designed by an appropriately trained professional, etc.). If needed, additional interventions may be delivered by community providers either at school or at a community location.

Student progress is monitored weekly using behavioral data in consultation with an appropriately trained professional. When the data suggest that a student is not making expected progress, the team should consider intervention adjustments, additional strategies, or complementary interventions to increase the intensity of intervention delivery and the combination of behavioral strategies until the right balance is achieved.

#### Considerations for Student Transitions

Transitions are a time of excitement and anxiety for students and their families. These transitions are important for both emotional and academic reasons to students and their families. Whether moving from grade to grade, school to school, or even transitioning mid-year to a new school, educators need to support children's positive transitions through the primary grades to strengthen early success. A student’s transition experience is the sturdy bridge linking their early childhood experiences with their future academic endeavors. To facilitate successful transitions, a school may establish a transition team that can implement various strategies and activities to involve the family and child in the school setting.

To support positive transition experiences, school districts can establish a P–3 transition team composed of families, community agencies and leaders, and preschool and elementary personnel. The team can establish goals to ensure seamless support for all children, preschool through grade three, and create transition activities based on those goals. These members may include teachers, the Child Study Team (CST), the Preschool Intervention and Referral Specialist (PIRS), language specialists, curriculum coordinators, administrators, school counselors, and nurses. In addition, it is critical to include any preschool provider program located in the community. School administrators can identify a transition facilitator who could set regularly scheduled meetings to re-evaluate district-wide transition activities and events throughout the school year.

The activities and strategies are suggestions to help ensure smooth transitions and success for all. These activities may include but are not limited to the following (Adapted from National Center on Early Childhood Development, Teaching, and Learning [NCECDTL], 2019).

* Provide families with clear information on registration guidelines, community options, information on the school, and health requirements and nutrition information.
* Encourage families to visit future schools, classrooms, and teachers.
* Share reading lists, materials, and activities for families to use throughout the summer months to support their child’s learning at home.
* Hold information sessions where families can ask questions and gain a better understanding of the curricula, the school policies, and community resources.
* Offer meetings with the appropriate staff members (e.g., school nurse, guidance counselor, child study team, language specialist, teacher) focusing on specific child needs and family expectations in the primary years to better prepare children and their families for what is ahead.
* Allow opportunities for teachers to visit classrooms outside of their own grade level (within or outside the district) to bolster the P-3 Continuum and/or to get to know future students by reading, playing, and engaging in activities with them.
* Provide professional development opportunities that combine P-3 teachers to ensure continuity from one setting to another.
* Provide common planning time for teachers in grades P-3 and with administration to ensure alignment from year to year.
* Schedule field trips for children (from both within and outside the district) to spend time in future classrooms.
* Create a transition team composed of families, community agencies and leaders, and preschool and elementary personnel.

#### A Sample Preschool through Third Grade Transition Team Checklist

##### School District Administrator

| **Strategy** | **✓** |
| --- | --- |
| Create a transition team composed of families, community agency leaders, and preschool and elementary personnel (e.g., teachers, child study team, the Preschool Intervention and Referral Specialist (PIRS) members, Early Childhood Advisory Council members, language specialists, curriculum coordinators, and administrators). |  |
| Identify a transition team facilitator who will set and conduct regularly scheduled meetings. Provide time for school personnel to attend the meetings. |  |
| Identify children at risk for learning difficulties with a valid screening tool and provide support targeted to the children’s individual learning needs. |  |
| Plan systems for data collection, analysis, and accountability to provide information about student progress, program quality, and teacher effectiveness from preschool through third grade. |  |
| Create common planning time for teachers within and across grade levels and with specialists to ensure developmentally appropriate curriculum and assessments that are aligned horizontally and vertically. |  |

##### Transition Team

| **Strategy** | **✓** |
| --- | --- |
| Survey families and the community to identify educational and social service needs. |  |
| Include a process for collaborating with families, early learning providers, and local public and private agencies to learn more about students and their families prior to school entry. |  |
| Establish goals to ensure seamless support for all children as they move through each year, including summer, from preschool through third grade. The focus will be on addressing the development of the whole child. |  |
| Provide information to families on the transition to and from each grade level from preschool through third grade, including registration guidelines, placement options, learning and development expectations, and health and nutrition information. |  |
| Create transition activities based on the goals created to ensure seamless support for children and families (e.g. support families with strategies for entrance/exit procedures). |  |
| Generate a timeline for implementing the transition plan. |  |
| Revisit and update the transition plan annually. |  |

##### Teachers

| **Strategy** | **✓** |
| --- | --- |
| Participate on the transition team and/or provide suggestions for activities. |  |
| Meet with other teachers and specialists within and across grades to discuss and implement NJSLS and developmentally appropriate curriculum and assessments aligned horizontally and vertically. |  |
| Meet with teachers within and across grade levels to discuss transition activities and readiness goals for children and families throughout the year. |  |
| Prepare and disseminate developmentally appropriate home learning activities during the school year and the summer months. |  |
| Get to know each child and family. Contact families before school starts and communicate with them regularly throughout the year. |  |
| Welcome new children and their families. Let families know how they can be involved in their child’s school and classroom. |  |

(Adapted from Kauerz & Schaper, 2021)

#### Summary

In developmentally appropriate classrooms, educational professionals assure children that they are a welcome member of the community. This rich, warm learning environment is established at the start of the school year and maintained throughout the year. Positive approaches to learning, the design of the classroom, organization of materials, and daily schedule provide children with a sense of belonging and security which allows for rich and diverse learning opportunities. In classrooms with predictable yet flexible schedules, educational professionals and children are engaged in and excited about learning. For students to learn, they must feel safe, engaged, connected, and supported in their classrooms and schools. Positive learning conditions can contribute to students’ academic achievement and their social and emotional well-being. A positive and welcoming environment is particularly important for students who are struggling in school and need extra support. Educational professionals must work to create an environment where children feel safe and supported. Classrooms are conducive to learning for all children through the social and emotional environment, the physical setup of the classrooms, and even the way the time is scheduled. In addition to supporting children’s educational experiences through positive approaches to learning, classroom management, and the physical classroom setup, educators must be aware of the NJTSS framework of academic and behavioral supports and interventions. The NJTSS framework gives educators the structure to meet the academic, behavioral, health, enrichment, and the social and emotional needs of all students. When educators utilize supports and interventions to improve student achievement and work with children to proactively manage behaviors and develop emotional literacy, they create a positive school and classroom environment that responds to individual children’s needs.

## Children sitting on rug at schoolSection 3: Exploring Classroom Content

As noted, these guidelines are designed to facilitate developmentally appropriate practices and inquiry approaches when teaching academic content. In this section, content areas are presented separately so that each can be explored in detail. Nevertheless, as demonstrated throughout this document, children’s learning is not compartmentalized. Rather, the content and practices, as presented in the upcoming sections, are woven together to provide an integrated approach to learning.

### Teaching Mathematics

The early years (preschool through third grade) are a crucial time in which children gain a firm foundation in their development and comprehension of mathematical concepts. This time is especially important because children’s early knowledge of math strongly predicts their later success in math even into high school (Clements & Sarama, 2013; Clements et al., 2013; Denton et al., 2002). Primary educators use these important foundational years to recognize and build children’s interest in making sense of their world through mathematics. Teachers motivate young learners to apply concepts by connecting the content found in the New Jersey Student Learning Standards for Mathematics (NJSLS - M) to real-world, meaningful problems and situations.

This focus places the many forms of rich discourse and classroom participation as central to quality instruction in mathematics. In the past, conventional classroom discourse often adhered to the Initiation, Response, Evaluation (IRE) Model. Throughout this model of instruction, the teacher poses closed questions, the students answer, and the teacher offers yes/no or correct/incorrect feedback, which assesses children’s thinking but does not actually foster it (Friend, 2017). This teacher-centered approach to instruction leaves little space for student generation of strategies, student explanations or representations, or for productive struggle with mathematical ideas and practices that are reflected in current state standards. In contrast, a more student-centered approach is the basis for the current NJSLS—M, which reflects a more developmentally appropriate method.

When planned and implemented carefully, student-centered activities support the development of underlying cognitive and social emotional skills necessary for school readiness and performance on academic tasks (Clements et al., 2013). In student-centered classrooms, more responsibility is placed on students to generate their own strategies, explain their thinking to fellow students, challenge each other’s reasoning, and struggle with mathematical ideas and processes. In turn, this places more responsibility on teachers to facilitate the learning and to support students in thinking and communicating mathematically. These responsibilities change teachers’ work to posing problems rather than asking students to repeat procedures to produce answers. Notably, teachers need to allow students time to productively struggle with mathematics rather than stepping in to provide solutions. When students do run into difficulties, instructional strategies such as using questioning to scaffold students’ mathematical thinking are needed. Once students have solved problems, the teacher must press the students for complete explanations, which provides a model for other students as well. In orchestrating discussions about student solution methods, teachers can connect students’ ideas to important mathematics concepts and strategies and highlight specific mathematical ideas for students to address through revoicing and reflecting.

#### Developmental Progressions in Mathematics

In learning and development, children follow natural developmental progressions (Clements & Sarama, 2023, Daro et al., 2011; Frye et al., 2013). A developmental progression is the order in which skills and concepts build on one another as children develop knowledge (Frye et al., 2013). It can also be thought of as a typical path that children follow in developing understanding and skills about that mathematical topic. In the way that children typically learn to crawl before they learn to walk, children similarly learn mathematical ideas and skills along a progression (Sarama & Clements, 2009, 2023). In the What Works Clearinghouse practice guide, Teaching Math to Young Children (Frye et al., 2013), teaching mathematics along a developmental progression is recommended as a strategy to support children’s learning of number and operations, geometry, measurement, and other mathematical domains. Research shows that when educational professionals understand how children develop mathematics understanding using developmental progressions, they are more effective in questioning, assessing, and providing scaffolded, developmentally appropriate activities that further children’s development compared to educators who are unaware of the development process (Sarama & Clements, 2009).

The National Governors Association Center for Best Practices found that high-quality early mathematics instruction follows an intentional sequence of developing math skills in which children master one skill, and then another that builds on the preceding skill (Szekely, 2014). Effective teaching must be proximal to the learner’s current state of understanding; therefore, it is imperative that teachers understand what skills and knowledge children already possess. Teachers are then required to address students’ learning needs using a developmental progression that can provide a typical path for learning which leads to achieving a mathematical goal (Daro et al., 2011; Frye et al., 2013; Confrey et al., 2019). Thus, research and the wisdom of expert practice, support intentional teaching using developmental progressions.

Such developmental progressions, then, are the foundation for learning trajectories (Clements & Sarama, 2023). The learning goal, the learning activities, and the thinking and learning in which students might engage, make up a hypothetical learning trajectory (Baroody et al., 2021; Simon, 1995). “Learning trajectories point the way toward math learning that is more effective and efficient, but also creative and enjoyable, through culturally relevant and developmentally appropriate curricula and assessment” (Clements & Sarama, 2016, p. 76). There has been significant research on learning trajectories that identify learners’ thinking along a gradual path to targeted big ideas (Baroody et al., 2021; Confrey et al., 2019; Simon, 1995). Teaching prerequisite levels of thinking using learning trajectories is more efficacious than the often-recommended approach of directly teaching to the target level (Baroody, et al., 2021).

The idea of learning trajectories includes developmental progressions but also explicitly connects mathematical goals and teaching. That is, learning trajectories are descriptions of the paths of children’s thinking and learning in a specific mathematical domain, and a related, conjectured route through a set of instructional tasks. They have three interrelated components:

1. a goal,
2. a developmental progression of levels of thinking, and
3. instructional activities and teaching strategies correlated to each level.

To attain a certain mathematical competence in each topic or domain (the goal), students learn each successive level (the developmental progression), aided by teaching activities designed to build the mental actions-on-objects that enable thinking at each higher level. Thus, utilizing learning trajectories is an asset-based approach that builds on children's natural ways of thinking.

Learning trajectories should not be thought of as a strict stage theory that requires children to master one level before proceeding to the next. Instead Confrey et al. (2019) found that the levels are not rigidly sequenced, allowing students to advance and fall back, making steady progress when viewed over time. Unlike a ladder, where students climb a rung at a time, there is more flexibility, like climbing a wall where there are several hand and foot holds and multiple routes that can be taken to get to the top (Confrey et. al., 2019).

Below is an example of a learning trajectory adapted from Clements & Sarama (2023) Learning Trajectories. This is only a portion of the length measurement trajectory. There are more levels as the trajectories reflect birth through grade 3.

| Developmental Progressions’ Levels of Thinking (observable actions indented) | Instructional Activities and Teaching Strategies |
| --- | --- |
| **Length Direct Comparer**  Physically aligns two objects to determine which is longer or if they are the same length.  Stands two sticks up next to each other on a table and says, “This one’s bigger.”  May use a ruler (as a stick rather than a measuring tool) and directly compare it and another object. Uses terms: long, longer, longest. | Ask children to cut ribbon to match the length of their arms and find things in the classroom that are the same length as these ribbon lengths.  Compare and order five children by height.  Compare sets of objects to find the longest or shortest items. |
| **End-to-End Length Measurer**  Lays units end-to-end to create whole-unit measures for comparison.  When asked, “How many green strips long is the pink paper strip?” the child accurately measures. | Provide more than enough unit pieces than needed to span the length of an object. Ask children to predict how many units would be needed to span the object. Have them check.  Give length clues: “You use me to write with, and I am 7 cubes long. What am I?” “Find something in this room that is 6 cubes long.” |
| **Length Unit Relater and Repeater**  Iterates a single whole unit to measure.  Relates size and number of units, at least qualitatively.  “If you measure with cm, not inches, you’ll need more because each one is smaller.”  Uses rulers with minimal guidance, measuring a length accurately with a ruler if alignment to the zero point is accessible. | Ask children to measure objects using several copies of a unit but fewer than the length of the object. Repeat with new objects and only one unit. Children confront measurements with different units and discuss how many of each unit will fill a linear space. Children may be able to draw a line to a given length before they measure objects accurately. Use activities in which children draw a line of a given length to emphasize how you start at the 0 (zero point). |
| **Length Measurer**  Measures, knowing need for identical units, relationship between different units, partitions of a unit, zero point on rulers, and accumulation of distance. Considers the length of a bent path as the sum of its parts (not the distance between the endpoints). Begins to estimate. | Children use different units of measure, such as the edge of a cube, to determine the length of a non-linear road.  Children measure the classroom and other classroom items by creating units of units in different sized units. Children are able to measure whole and parts of units. |
| **Conceptual Ruler Measurer**  Possesses an "internal" measurement tool. Mentally moves along an object, segmenting it and counting the segments. Operates arithmetically on measures ("connected lengths"). Subdivides a unit at least into halves. Estimates with accuracy. | Children make estimates of lengths of everyday items found inside or outside of the classroom.  Children practice a mental understanding of conceptual measurement by guessing and then checking units into halves, quarters, and eighths |

The NJSLS - M identifies several clusters of concepts and skills for grades 1-3 students. Each cluster, or big idea, has a developmental progression, or the order in which skills and concepts build on one another as children develop knowledge. In mathematics education, these are commonly labeled developmental progressions, or levels of thinking, knowledge, and skill that students are likely to go through as they learn mathematics (Daro et al., 2011). Connecting the big ideas (goals), the developmental progressions, and instructional activities and teaching strategies creates a complete learning trajectory. The Consortium for Policy Research in Education (CPRE) (Daro et al., 2011) recommends that mathematics educators should recognize research on learning trajectories in mathematics as a respected and important field of work. CPRE also recommends that available learning trajectories should be shared broadly within the mathematics education communities and available learning trajectories should be usable tools for educators. Learning trajectories are a promising tool for improving teaching in early mathematics and can facilitate developmentally appropriate teaching and learning for young children (Clements & Sarama, 2016).

#### Problem Solving

For students to generate solution strategies and persevere in solving problems, problems must be posed before teachers show the students solution methods. This shift in how mathematics lessons are carried out requires teachers to pose open-ended problems with a focus on strategic and critical thinking. Problems are posed in a way that is open enough for multiple solution strategies.

##### Problem Solving Types

In grades K – 3, problem solving situations have a hierarchy from easier to more difficult and should be taught using learning trajectories that embody this hierarchy. Teaching problem solving along this developmental progression is essential (Carpenter et al., 2015; Newton, 2017; Newton, 2018). As children develop through these levels, they advance in several ways. They learn more sophisticated problem-solving strategies. They learn to operate on larger numbers. Finally, they also learn to solve more difficult problem types. These problem types are based on the mathematical structure of the problem. First, what is the action (i.e., are we joining sets, separating them, or comparing them)? Second, which number is the “unknown”?

##### Sense Making, Reasoning, and Perseverance

When children solve problems, they are engaged in sense making and reasoning with and about numbers. When solving problems, students need to make sense of problems by explaining and discussing how they are representing the problem through modeling. Unlike a strategy, which is what numbers and operations students will use, a model is how students can show their thinking to solve the problem. Students can model their thinking either concretely (e.g., with cubes, counting bears, or acting it out using any real objects such as toys or dolls), pictorially (e.g., sketches) or abstractly (e.g., mental math, number lines, or number grids) (Newton, 2019). When children regularly engage in problem solving experiences, they are more likely to build perseverance. Children make sense of problems and persevere in solving them by thinking about a variety of ways to solve the problem such as counting on their fingers, using manipulatives, using math drawings, asking friends to help, or measuring. Children can model problem situations using a myriad of engaging concrete materials such as clay, puppets, stickers, and toys. Children then try out solution strategies and if the first solution does not work, they persevere and try another. Teachers can encourage and support this behavior through prompts and questions (Newton, 2019).

##### Why the Key Word Strategy Does Not Work

A widely taught and problematic strategy, or short-cut, for teaching problem solving, is the key-word approach. This is not a strategy that is beneficial to children, and it does not support mathematical inquiry or reasoning (Newton, 2021; Carpenter et al., 2015; Charles, 2011). A key-word approach teaches students to use a particular operation whenever they encounter a certain word or phrase in a problem-solving situation. This strategy is ineffective and does not support students in making sense of the problems they solve (Carpenter et al., 2015; Clement & Bernhard, 2005). Further, Carpenter et al. (2015) found that the key-word approach does not help students to understand the context of the math situation. For example, students may be instructed to use addition whenever they hear “in all” in a problem situation, however, “in all '' may be in the situation, or even in the question, but addition is not the needed operation. In the following problem, “Beth has 5 stuffed animals in all. Two are bears and the rest are dogs. How many are dogs?” The words “in all” are in the situation, but students may use subtraction, think addition, or create a model to solve this problem. In addition, children could make sense of the problem by acting out the situation, using a number line, drawing a diagram, using manipulatives, or reasoning in their head about the situation. Problems may contain no words that might be connected to a particular operation, or they may contain misleading keywords. For example, in the problem, “Aidan has 12 fish. 5 are blue and the rest are orange. How many are orange?” or “Susan collects 6 shells, which are 4 more than Jan collects. How many shells did Jan collect?”, there are no obvious keywords, instead children need to make sense of the situation, perhaps through concrete or pictorial models. When educators introduce the key-words strategy to support students’ understanding of situations, students may rely on the key-word approach as a replacement for making sense of the situations. The use of keywords diminishes mathematical understanding, focuses students’ attention on values rather than quantities, and forces students to think procedurally instead of conceptually about mathematical situations (Charles, 2011; Clement & Bernhard, 2005).

Lessons that engage students in problem solving activities support mathematical practices such as modeling with mathematics, making sense of problems, perseverance, and reasoning quantitatively. In addition, children are expected to communicate their thinking and justify their ideas and strategies. When all educational professionals engage children in problem solving activities daily, they are establishing expectations that encourage risk taking, reasoning, productive struggle, and mathematical discourse.

#### Meaningful Learning, not Memorization of Facts and Procedures

Research suggests that skills and concepts develop together and there is general agreement that mathematics instruction in the early grades should emphasize both procedural and conceptual knowledge (Clements et al., 2013). Students who learn and use fact strategies with accuracy and efficiency outperform students who learn and use approaches such as memorization (Baroody et al., 2016). For example, efficient strategies for addition and subtraction within 20 use number relationships and benchmarks to support students’ conceptual understanding and flexibility (Kling & Bay-Williams, 2014). It is important to teach strategies such as counting on, making ten (e.g., 8 + 6 = 8 + 2 + 4 = 10 + 4 = 14), decomposing a number leading to ten (e.g., 13 − 4 = 13 − 3 − 1 = 10 − 1 = 9) and using the relationship between addition and subtraction (e.g., knowing that 8 + 4 = 12, one knows 12 − 8 = 4), and creating equivalent but easier or known sums (e.g., adding 6 + 7 by creating the known equivalent 6 + 6 + 1 = 12 + 1 = 13).

Timed facts tests offer no understanding regarding how flexible students are in their use of strategies, or even which strategies they are able to use efficiently. (Kling & Bay-Williams, 2014). In addition, there is strong evidence that suggests timed facts tests have a negative impact on students, specifically math anxiety, which can occur as early as first grade (Boaler, 2012; Ramirez et al., 2013). Ramirez et al. (2013) found that timed facts tests negatively affect fact retrieval and number sense. Educators can use meaningful formative assessments such as work samples, observations, interviews, running records, and journaling to assess aspects of fluency such as accuracy, efficiency, flexibility, and the use of appropriate strategies. Using this data, educators can determine what children know and determine what the next instructional steps may be (Kling & Bay-Williams, 2014).

#### Supporting Mathematical Explanations

The National Council of Teachers of Mathematics (NCTM) focuses on research-based mathematics learning. In such learning environments, students are encouraged to discover, detect, and develop associations, as well as solve problems, and share and discuss their ideas and the conclusion they have reached in small cooperative groups composed of teachers and peers (Özdemir et al., 2017).

Students often think of mathematics in terms of correct and incorrect answers, which means that explanations are not central to ‘doing the math’. Shifting the focus of the classroom away from explicitly taught strategies to student generated strategies, places an emphasis on students’ explanations and justifications for their strategies. Students’ explanations need to include why something happens or works mathematically. Teachers can support students’ thinking and discourse using think alouds to explain a strategy or mathematical idea.



For the example above, the teacher could demonstrate what explaining the strategy might look like through a think aloud. She may say, “When I see a problem with tens and ones in it, I know that I need to remember when I’m adding tens and when I’m adding ones. When I use this strategy, I sometimes must remind myself of a few things. First, I add 7 ones and 8 ones and get 15 ones. I know that I can put the 5 ones down here from the 15, but where am I going to put the 1 ten from the 15? I must put it in the tens. Then I add up 1 ten, 5 tens, and 3 tens to get 9 tens and put a 9 in the tens place”.

Teachers can support students by representing multiple strategies. For the problem above, there are multiple ways to represent a single solution strategy. For instance, let’s say that a student solves the problem by combining the tens and ones separately, without regrouping. The student may first add 50 to 30 to get 80, and then add 7 to 8 to get 15. Then the student may combine the sums to arrive at a final answer of 95. This strategy can be represented in many ways.

Graphic showing three different ways of showing 57 plus 38 is solved using an expanded partial addends algorithm. All content is provided in text version linked immediately after the image.


[Text Version: Solving fifty-seven plus thirty-eight](#_Solving_Fifty-Seven_plus)

Each of the representations shows the same strategy; however, there are three different ways to record it, each of which exhibits place value-based understanding. How teachers choose to represent and notate students’ thinking provides a record of strategies and ideas that students can use to make judgments about efficient solutions (Franke et al., 2009). The teacher supports students in finding ways to represent and communicate their thinking, which benefits other students as well. In this way, the teacher is co-constructing explanations and representations with students while validating more than one student's solution. Co-constructing supports students in communicating the meaning of their mathematical thinking and allows other students to make sense of and build from that thinking. It also provides a way to record and assess student thinking when the teacher cannot be present. Finally, it also gives students, especially MLs, a way to show their thinking and to eventually be able to orally explain their understanding of mathematical concepts.

Mistakes, whether in answers or explanations, are opportunities for learning. Although teachers usually ask questions of students with incorrect answers, they often do not focus on the students’ understanding of the problem. Rather, this questioning focuses more on the step that they missed, which frames the mistake as one of repetition, rather than the teacher addressing the mathematical idea or understanding that the student needs to grasp. The next section on questioning addresses this idea in greater detail.

#### Using Questioning to Support Complete Explanations

Oftentimes, when students offer a solution to a math problem and the teacher asks a follow-up question, it is an indication that their answer is incorrect. Questions teachers pose during a mathematics lesson impacts students' math dispositions as well as the kind of knowledge students construct and communicate. The use of good questioning by teachers may mean the difference between constraining thinking and encouraging new ideas, and between recalling facts and constructing meaning (McCarthy et al., 2016). Teachers’ effective use of questions can potentially generate students’ responses about their mathematical thinking, problem solving, and strategies (Martin et al., 2015).

Regularly, teachers ask students to repeat steps with questions, such as “What was your next step?”. Instead, questioning should focus on justification and why various strategies make sense. Productive initial teacher questions might determine whether students understand, agree with, or have used an approach like that of another student. Follow-up questions are important to both student understanding and achievement (Franke et al., 2009). One example can be found in a third-grade study of community. This study asks children to compare and contrast the same location over time. Let us say that students compare a street at four time points, when the street had 10, 22, 46 and 105 houses on it, respectively. Using a scaled bar graph for which each square represents a certain number of houses provides students with an opportunity to represent the data. As students explain their bar graphs and how they represent houses at different points in time, teachers can pose various follow-up questions to press for understanding:

* **Clarification** “So, I’m not sure if I understand what you did. Can you tell me how you showed 46 houses on your graph? Exactly how is your strategy different than that of the group that used each square to represent 5 houses?”
* **Detail** “You decided to use each square to represent 10 houses. How did you represent 105, then?”
* **Agreement/Disagreement** “What do you think about how they represented 105 houses? Why do you think that?”

Teachers use questioning to support students when working collaboratively to solve mathematical problems. The types of questions asked have a significant effect on the classroom learning environment; therefore, knowing what questions to ask as well as when and how to ask them is crucial (Bofferding & Kemmerle, 2015). These types of questions focus on:

* **Sharing more information** “Can you explain your reasoning for having each square represent 5 houses?”
* **Challenging group members** “It sounds like you disagree, David. Can you tell Joy what makes you think that 46 is represented incorrectly?”
* **Discussing alternatives** “I’m wondering if you can find another way to graph the houses.”
* **Coming to agreement** “I hear you saying different things. How will you resolve your different ways of representing the houses?”

In posing these kinds of questions within pairs or groups of students, a teacher engages students in deeper mathematical thinking, raises important mathematical patterns, and models ways in which students can justify their reasoning. These questions are also useful at the whole-class level when orchestrating class discussions after the lesson.

Questioning also can support students who may be struggling to understand mathematical concepts. When students have an incorrect answer, teachers can probe for why it occurred. It is possible that the student simply miscounted, has a misconception, or needs additional practice to solidify their understanding. Rather than focusing on the steps, it is best to ask students how they solved the problem, what they did first, and whether they can explain what they were thinking as they solved the problem. Following up can further illuminate the misunderstanding (e.g., “I’m not sure I understood that last part”; “Okay, I understand that. What did you do next?”; “Can you tell me how you counted?”). These questions serve as an assessment of learning, a form of co-constructing explanations of student thinking, and a model for the types of questions that students should ask themselves and one another.

#### Facilitating Mathematical Discourse

Educational professionals must provide a platform for students to share their ideas, explain their logic, and assess the problem-solving strategies used by their peers to encourage consensus building and develop and foster a discourse culture within the classroom community (Stiles, 2016). Mathematical discourse, defined broadly, is the mathematical communication that occurs in a classroom.

##### Model Expected Behaviors

Mathematics discourse is seen as a vehicle for enhancing student learning. To create a classroom culture that promotes and supports effective mathematical discussions, primary educators must model the expected behaviors and create classroom norms regarding discourse. Using think-alouds, teachers model purposeful mathematical discourse that develops conceptual understanding. It reveals a teacher’s thinking and presents students with a model for how to think through a problem and effectively communicate mathematical thinking. The teacher's role must be to facilitate discourse by posing questions which challenge student thinking. Teachers listen carefully and monitor understanding, while encouraging each student to participate. Questions the teacher can ask to promote discourse might be, "Can anyone repeat what Tychawn said?" or "Who can explain in another way what Sean did?". The student's role in productive mathematical discourse includes listening and responding to the teacher and to one another, using tools to reason, modeling explanations, making connections, problem solving, making convincing arguments, and critiquing the reasoning of others (NCTM, 2014). To foster a clear understanding of both student and teacher roles for discourse in the classroom, it is important to create these classroom norms.

##### Strengthen Mathematical Vocabulary

Along with modeling expected behaviors and setting classroom norms, it is important for primary educators to strengthen mathematical vocabulary to support productive math discourse. Young learners are performing at varying levels of achievement in both written and oral language skills, therefore, for students to communicate their mathematical thinking and analyze the thinking of their peers, they must have a firm understanding of the mathematical vocabulary. Developing a classroom vocabulary chart or word wall using pictures, sometimes student created, and realia, gives students the opportunity to make meaning of mathematical vocabulary through pictures, words, and oral communication (Pace & Oritz, 2015). Developing a shared understanding of mathematical terms can empower young learners to effectively communicate their math strategies and solutions.

##### Select Rich Mathematical Tasks

Another way to support productive mathematical discourse in the primary classroom is through relevant, rich, engaging, visual, and hands-on mathematical tasks. Opportunities to work on meaningful tasks can promote deep mathematical learning (Huber & Lenhoff, 2006). Traditional mathematics lessons where teachers only present a process or procedure followed by student practice, does not foster meaningful mathematical discourse. Rich, real world mathematical tasks ask students to apply their mathematical understandings in new contexts, supporting their confidence and willingness to devise and share solutions to problems that they have not previously been shown how to solve. Children learn best when they are interested, engaged, and involved with hands-on experiences and teachers choose tasks and/or questions that engage and challenge all students’ thinking.

#### Flexible Small-group Instruction

Usually, when teachers present mathematical concepts to the whole group, some students already know the material and other students are not ready for the material; therefore, it is not acceptable for teachers to teach to the middle and hope that the instruction reaches all students (Taylor-Cox, 2013). A brief whole class mini lesson, usually ten minutes in length, followed by flexible small-group instruction and differentiated student learning centers or workstations has proven to be effective (Tal, 2018; Benders & Craft, 2016; Pellegrini et al., 2021). Research has shown that grouping children according to the common needs of the group may result in gains in students' mathematics achievement (Tieso & Margison, 2004).

##### Grouping

Creating flexible small groups in elementary mathematics is a data-driven instructional practice that matches a student’s readiness level for learning mathematics concepts with appropriate instructional strategies, delivering the right content at a pace that is appropriate for each student (Newton, 2021). Small groups with two to four children at one time can have enormous benefits (Taylor, 2020). During flexible small-group instruction, children engage in standards-based, rigorous learning opportunities where the teacher focuses on a particular concept, strategy, or skill. Teachers facilitate this through engaging, hands-on learning, scaffolded conversations, and intensive questioning.

##### Leveraging Data

Determining how to place children in groups is an important decision. Using formative assessment data, teachers group students by targeted areas of need and work at their instructional level in their zone of proximal development. Unlike traditional ability groups, flexible math groups are purposeful and fluid and change over time based on the specific needs of the students (Taylor-Cox, 2013). In flexible math groups students are assessed frequently for growth and reassigned to different groups based on their level of thinking and other specific individual needs. This flexible grouping provides students an opportunity to learn at their level and proceed to higher levels of achievement (Benders & Craft, 2016). Tomlinson (2000) found that flexible grouping is a “nonnegotiable aspect of effective differentiation because students are multidimensional learners who need varied group structures”.

##### Formative Assessment

One of the best ways to gain insight into student learning is to observe children while they are exploring mathematical concepts. This practice is essential for effectively determining what children know and are able to do. While observing students, teachers can identify what kids already know and what they can already do to better plan what they need to learn next. While observing children, anecdotal notes, or brief notes of observations, is an easy way to collect formative assessment information teachers can use to reflect about what the children are learning (Bates et al., 2019). Anecdotal notes and reflection drive instructional planning, helping teachers think more deeply about children’s growth and learning by generating questions and conjectures that fuel additional observations and anecdotal records (Bates et al., 2019). There are several informal ways to take and manage anecdotal note taking such as the use of data binders or note catchers. Taking notes using “concrete documentation of children’s emerging behaviors, knowledge, and skills, ground your ongoing reflective practices'' (Bates et al., 2019, pp. 19–20). This type of intentional and authentic formative assessment contributes to children’s learning and development.

##### Frequency

Optimally, teachers meet with every child in their class multiple times a week in a small group. These small groups allow students the opportunity to talk with each other and ‘do the math’. Students get to use various materials to explore concepts. They may be playing games, acting things out, using objects, using drawings, using tools, or using diagrams. Students are always engaged in hands-on, minds-on activities (Newton, 2021).

##### Benefits of Small-Group Instruction

There are many benefits to small-group instruction (Taylor, 2020).

###### Differentiated Learning

Children come to school with various strengths, interests, experiences, and needs. Teaching children in small groups allows teachers to meet children's individualized instructional needs, introducing ideas and activities in a child’s zone of proximal development (Taylor, 2020).

###### Open-ended Conversations

In small-group learning, children have more opportunities to engage in mathematical discourse. Children can verbalize things they notice and wonder as well as ask their teacher and peers many different questions. Mathematical discussions are much easier to foster in small groups. The teacher can focus on questioning and instruction based on individual children’s understandings and needs (Taylor, 2020; Newton, 2021). The teacher can guide students as they do the math, all the while facilitating conversations that build understanding (Newton, 2021).

###### Student-centered Learning Experience

Some children enjoy practicing math for math’s sake, however other children are more motivated when math is connected to something in which they are interested. In small-group settings, teachers can customize learning and follow the children’s interests to engage children in positive, personalized, and meaningful experiences with math (Newton, 2021).

#### Differentiated Mathematics Centers

Taylor (2020) reports that although many teachers see the benefits of small-group learning, it can initially be confusing to implement. Teachers may worry about what the rest of the class will do while leading a small group. One successful approach can be to meet with each small group while the other children in the classroom are participating in mathematics centers.

Traditional centers, such as a table with a variety of manipulatives, puzzles, or building blocks, promote incidental learning at best and rarely build one mathematical idea on the next. Intentional activities focused on specific mathematics concepts and developmental progressions appear to make notable contributions to children’s learning (Taylor, 2020).

Mathematics centers are where students engage in continuous, purposeful, standards-based, differentiated practice, sometimes individually but usually in pairs or groups. In differentiated math centers, students collaborate and learn about math and practice math skills through invigorating and stimulating projects, games, and activities. Centers focus on clearly defined learning goals, contain materials promoting individualized student growth, address a wide range of readiness levels, and have clear directions. Math centers contain differentiated activities designed for students to learn, practice, or extend their knowledge, understanding, and content skills in their zone of proximal development. Differentiated centers allow students to work towards or beyond the grade level standard with scaffolded help.

Successful centers require that teachers continuously assess students to plan and implement appropriate, engaging, thought-provoking, tiered center activities. Using assessments that inform instruction, such as observations, anecdotal notes, checklists, questioning, interviews, tasks, and students' self-assessments and reflections, children are continuously evaluated so that center activities can be targeted to gaps and student learning is improved over time (Hattie, 2015). The goal of math centers is to encourage students to make sense of math by engaging in sustained concept- and skill-building over time that allows them to build conceptual understanding, procedural fluency, and problem-solving skills.

#### Concrete to Abstract Learning Progression

In math centers and during explicit math instruction, the concrete- representational-abstract (CRA) instructional sequence is used. This learning process has been found to be exceedingly effective when teaching math concepts (Akinoso, 2015). Using the CRA sequence, students improved their performance across multiple mathematical concepts taught and their conceptual understanding of numbers and operations improved (Hinton & Flores, 2019). Findings show that the CRA instructional strategy was more effective at improving students’ achievement in mathematics than conventional procedural strategies (Akinoso, 2015). The CRA instructional sequence of instruction provides a way for teachers to help students gain meaning from numbers and the mathematical concepts those numbers represent.

##### Concrete

The first step is called the concrete stage. During this stage, students use concrete objects to model problems. It is also known as the “doing” stage and involves manipulating objects physically to solve math problems. Students can use beads, counters, clay, rekenreks, base ten blocks, toys and other real-world objects or math manipulatives to solve problems.



##### Representational

The next stage is the representational, or pictorial stage. It is also known as the “seeing” stage and involves using visual representations of concrete objects which may involve drawing pictures or symbols to model problems.

##### Abstract

The final stage in this approach is called the abstract stage or the “symbolic” stage, where children use abstract symbols to model problems. After students have demonstrated a solid understanding of the concrete and pictorial stages of a concept, they progress to the abstract stage. At this stage, teachers introduce concepts at a symbolic level, using only numbers, notation, and mathematical symbols (e.g; +, −).

Below is an activity that can be used across various counting centers. There is an activity for students working at either the concrete level, representational level, or abstract level of understanding. The numbers change but the activity stays the same:

| **Concrete Activity** | **Representational/ Pictorial Activity** | **Abstract Activity** |
| --- | --- | --- |
| Show different ways to make the number shown on the number bracelet.  Number bracelets: Photo showing 4 different bracelet with three beads on each. | Use a pictorial representation of the number bracelet to show many ways to make the number shown. Draw it.  Number bracelet worksheet where children can draw beads to represent a number. | Determine many ways to make the number 5 and record the number sentence.  4 + 1 = 5  2 + 3 = 5  1 + 4 = 5 |

The concrete-representational-abstract approach contains three stages where each stage builds upon the previous stage and must be taught in sequence. Students work at their level of understanding and should not be rushed through these levels. Through a variety of experiences that utilize concrete, representational, and abstract models, math centers give students an opportunity to feel the math, see the math, and do the math!

#### Mathematics Glossary

**Conceptual Understanding:** A real understanding of mathematical concepts, operations, and relations. Students with conceptual understanding know more than isolated facts and methods. They understand why a mathematical idea is important and the kinds of contexts in which it is useful.

**Concrete-Representational-Abstract:** A sequential instructional approach during which students move from working with concrete materials to creating representational drawings to using abstract symbols. The concrete-representational-abstract sequence helps students develop through mental representations to build conceptual understanding of mathematical concepts.

**Developmental Progression:** a typical path that children follow in developing understanding and skill about that mathematical topic.

**Differentiated Instruction:** A teaching theory that promotes varying and adapting a teacher’s instructional methods in relation to individual and diverse students in classrooms.

**Flexible Grouping:** Students are placed into groups according to specific goals, activities, and individual needs based on systematic assessment and on-going observation.

**Learning Trajectories:** Learning trajectories have three parts; a learning goal, a developmental path along which children develop to reach that goal, and a set of activities matched to each of the levels of thinking in that path to help children develop to higher levels of mathematical thinking.

**Whole Group Mini Lesson:** Brief teacher-led lessons with a narrow focus that provides instruction in a skill or concept that students will then relate to an upcoming flexible small-group lesson. Teachers can address specific needs and go more in-depth during small-group instruction. The whole group mini lesson can be used primarily as an introduction to concepts.

**Zone of Proximal Development:** Developed by psychologist Lev Vygotsky (1978), it is the range of abilities an individual can perform with guidance and encouragement but cannot yet perform on their own. The term “proximal” refers to those skills that the learner is “close” to mastering. This learning theory may be observed in a classroom setting, or anywhere else where an individual has the opportunity to develop new skills.

#### Summary

Effective mathematics instruction in first – third grade classrooms requires knowledge of the NJSLS-M with special attention to the Standards for Mathematical Practice. Students should not only be able to solve mathematics problems such as one plus one equals two, but they also need to know why it is true. These standards allow students to learn mathematics concepts deeply instead of widely and build a solid foundation for advanced mathematics learning. Students are expected to explain their reasoning and make connections between procedures and representations in mathematics. This can be fostered using engaging, real-world tasks that require high levels of cognitive demand. Students' reasoning and sense making are crucial components of conceptual understanding, therefore finding ways to maintain high levels of cognitive demand during task implementation is important (Cheng et al., 2011). Using questioning, teachers can leverage these rich tasks to support deep mathematical explanations and rich discourse. Effective use of questioning students can generate students’ responses about their mathematical thinking, problem solving, and strategies. All students are capable of learning mathematics through rich, engaging tasks where they can model, describe, analyze, justify their thinking, and critique the reasoning of others. To provide support for students to develop an identity as being capable of making sense of mathematics, learners are taught at their instructional level in their zone of proximal development. Using small flexible math groups and differentiated math centers teachers meet students where they are along a mathematical developmental progression and take them where they need to go. Currently, it is no longer research based for primary mathematics educators to utilize the traditional methodology of presenting a whole group lesson based on a single procedural strategy followed by assigned independent practice with little to no discourse, problem solving, or cooperative learning. Research has shown the need for instructional shifts in early learning mathematics classrooms for years. Small flexible group instruction must be occurring in all mathematics classrooms to meet the diverse needs of learners. Through this instructional shift students can make sense of mathematics at a pace and instructional level that is appropriate for them, allowing all students to reach their next level of learning.

### Teaching Science

Young children are naturally curious about the world around them. They are eager to explore and investigate the numerous questions they have about their world. Primary educators take advantage of students’ curiosity and inquisitiveness by engaging them in making sense of science and designing solutions to engineering problems. This drives young learners to answer their own authentic questions and solve relevant real-world problems which creates informed decision-makers that are concerned about important issues related to their health, environment and communities (National Academies of Sciences, Engineering, and Medicine [NASEM], 2021).

In supportive learning environments, children are afforded multiple opportunities to work together in collaborative groups. Students are more willing to take risks when providing predictions and explanations for their ideas. Children learn how to persist in the face of adversity. They begin to recognize a failed experiment as an opportunity to learn something new. Science and engineering help strengthen children’s confidence in their abilities. They hone these executive function skills and approaches to learning while developing science and engineering knowledge and skills.

Equitable and inclusive science and engineering learning experiences in first through third grade are essential for success in later learning. These experiences leverage student curiosity about the natural and designed world allowing children to answer questions and solve problems of interest to them while engaging in authentic science and engineering practices (NASEM, 2021). However, an "achievement gap" between students from low- and high-income backgrounds and from dominant and nondominant communities continues in science as in other content areas. Research demonstrates this broadly results from the inequalities in the opportunities students have to learn science and the failure to recognize and leverage the existing science-related competencies of children and communities (National Research Council [NRC], 2012).

"Equity in science education requires that all students are provided with equitable opportunities to learn science and become engaged in science and engineering practices; with access to quality space, equipment, and teachers to support and motivate that learning and engagement; and adequate time spent on science. In addition, the issue of connecting to students' interests and experiences is particularly important for broadening participation in science” (NRC, 2012, p. 28).

#### The New Jersey Student Learning Standards for Science

Students in first – third grades develop an understanding of the three science domains based on the New Jersey Student Learning Standards for Science (NJSLS - S): physical sciences; life sciences; Earth and space sciences which are integrated with three foundational science dimensions: engineering, technology, and applications of science.

The Performance Expectations (PE) in the NJSLS - S define what all students need to understand and be able to do by the end of the grade. They are written as statements that can guide assessment and allow for flexibility in the way students demonstrate proficiency. In grades K–5, the performance expectations are grade specific.

Each PE represents the integration of the three dimensions of science and engineering: Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts.

* **Science and Engineering Practices (SEP)** SEP reflects the major practices that scientists and engineers use to investigate the world and design and build systems. They are both a set of skills and a set of knowledge to be internalized. The SEPs are also what students need to know and do to make sense of phenomena or to design a solution to a purposeful problem.
* **Disciplinary Core Ideas (DCI) DCI** are the most important ideas in the physical sciences; life sciences; Earth and space sciences; and Engineering, Technology and Applications of Science. These ideas represent the content that students need to be able to construct evidence-based arguments.
* **Crosscutting Concepts (CCC) CCC** are a way of linking the different domains of science. The concepts provide an organizational schema for interrelating knowledge from various science fields into a coherent and scientifically based view of the world. These can be thought of as the duct tape of science education.

The integration of the three dimensions of science and engineering can be seen in the following first-grade performance expectation example:

**1-PS4-1:** Plan and conduct investigations to provide evidence that vibrating materials can make sound and that sound can make materials vibrate.

This PE is written by combining the following three dimensions.

* **Science and Engineering Practice.** Plan and conduct investigations collaboratively to produce evidence to answer a question.
* **Disciplinary Core Idea.** Sound can make matter vibrate, and vibrating matter can make sound.
* **Crosscutting Concept.** Simple tests can be designed to gather evidence to support or refute student ideas about causes.

#### Using the Standards to Guide Teaching and Learning

This section describes the structure of the NJSLS - S and explains how the information included can be used to refine teaching, learning and assessment.

As illustrated in Figure 1 (below), every document has four sections:

1. Title (e.g., Earth and Human Activity)
2. Performance expectation
3. Foundation boxes (science and engineering practice(s), disciplinary core idea(s), and crosscutting concept(s) that relate specifically to the performance expectation)
4. Connection box (connections to other disciplinary concepts at grade level, at grade levels above and below, and specific English language arts and mathematics standards that are relevant)

Figure 1: Structure of a NJSLS - S document

|  |
| --- |
| 1. Title (e.g., 3-LS4 Biological Evolution: Unity and Diversity) |
| 2. Performance Expectation(s) and code (e.g., 3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change. [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]) |

##### Alphanumeric Coding of Performance Expectations

Every performance expectation is labeled with a specific alphanumeric code (i.e., 3-LS4-4). The first number identifies the grade or grade band in which the students should receive instruction. This example is a 3rd grade PE. LS4 indicates the PE is about Biological Evolution: Unity and Diversity. Finally, the number at the end of each code indicates the order in which the performance expectation appears in the NJSLS - S. 3-LS4-4 is the fourth PE for Biological Evolution: Unity and Diversity in the 3rd grade.

##### Clarification Statements and Assessment Boundaries

A Clarification Statement provides guidance about the scope of the performance expectation at a particular grade level. The assessment boundaries are meant to specify limits to large-scale assessment. They are not meant to put limits on what can be taught or how it is taught, but to provide guidance to assessment developers.

Foundation Boxes

|  |  |  |
| --- | --- | --- |
| **Science and Engineering Practices** | **Disciplinary Core Ideas** | **Crosscutting Concepts** |
| Engage in Argument from Evidence  Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. | Populations live in a variety of habitats and change in those habitats affects the organisms living there. | Systems and System Models  A system can be described in terms of its components and their interactions. |

###### Foundation Boxes

The foundation boxes provide information about the specific science and engineering practice(s), disciplinary core idea(s), and crosscutting concept(s) that were used to write the performance expectation(s).

###### Science and Engineering Practices (SEP)

The blue box on the left includes just the science and engineering practices used to construct the performance expectations in the box above. Educators are encouraged to utilize several practices in instruction materials and assessments and need not be limited by the performance expectation.

###### Disciplinary Core Ideas (DCI)

The orange box in the middle of the table identifies the science concept used to create the performance expectation. This box identifies the Component Idea (LS4.D: Biodiversity and Humans) as well as the age-appropriate element of the idea. Educators will have a better understanding of what a student needs to understand by reading the complete description of the component idea in A Framework for K-12 Science Education (NRC, 2012). For example, compare the statement “Different properties are suited to different purposes” with the information available by reading LS4.D: Biodiversity and Humans (NRC, 2012).

###### Crosscutting Concepts (CCC)

The green box identifies the CCC used to create the performance expectation. Crosscutting concepts have value because they provide students with connections and intellectual tools that are related across the differing areas of disciplinary content and can enrich their application of practices and students’ understanding of core ideas” (NRC, 2012).

###### Connection Boxes

Three connection boxes, below the foundation boxes, are designed to help educators create a coherent and integrated curriculum.

Connections to:

* other DCIs at the same grade level
* articulation of DCIs across grade levels
* New Jersey Student Learning Standards for Mathematics and English language arts

###### Connections to Other Disciplinary Core Ideas in this Grade Level

This box identifies performance expectations, at the same grade or grade band, that are related. This enables educators to build learning experiences that focus on ideas from across science disciplines.

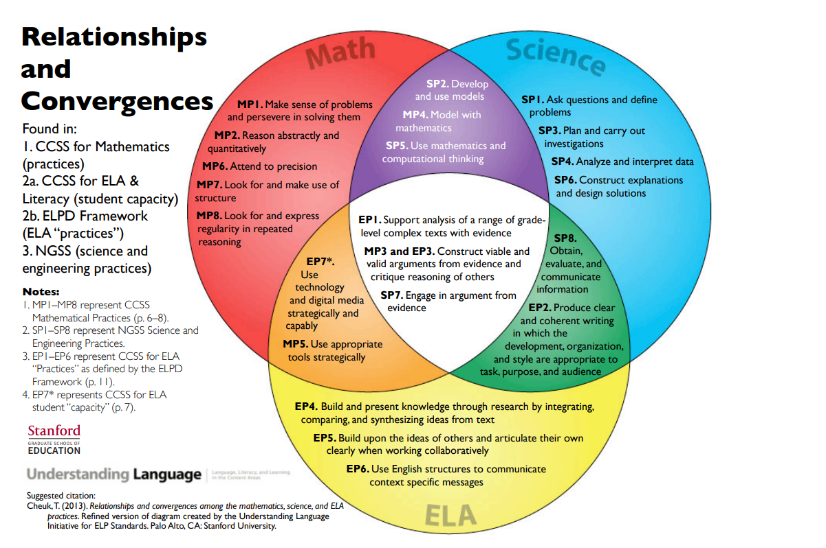
###### Articulation of Disciplinary Core Ideas Across Grade Levels

This box identifies related performance expectations that students learned previously and the performance expectations that will be the focus of instruction in future grades. This helps educators to understand where the kids have been and where they will go in the future.

###### New Jersey Student Learning Standards Connections

The NJSLS for Science, English language arts and Mathematics are aligned at specific grades. The connections to these disciplines are provided in this box.

With competing priorities in first through third grade, this intentional integration can create powerful learning opportunities for all students. The following Venn diagram illustrates the relationships and convergences among the science, mathematics, and English language arts & literacy practices.



[Text Version: Relationships and Convergences Diagram](#_Relationships_and_Convergences)

#### Teaching and Learning Science and Engineering in the Primary Classroom

##### Students Figure Out Their World

Lessons and units should focus on supporting young learners to make sense of a phenomenon or design solutions to a problem. For example, in the lesson *Working Across a Distance* (see below) students were presented with the puzzling phenomenon of magnets being able to move objects on their desk without touching them. Using the Gathering, Reasoning and Communicating Instructional Model, the students were provided the time and resources necessary for them to analyze data to find patterns for how the distance between magnets affects the attraction of the magnets. They did this in order to be able to construct an explanation for how the distance between magnets affects the interactions between the magnets. The scientific concept that magnets can push or pull some objects at a distance is anchored in explaining the phenomena.

###### Working Across a Distance

(Rose et al., 2021)

****Lesson Performance Expectations****

* Analyze data to find patterns for how the distance between magnets affects the attraction of the magnets.
* Construct an explanation for how the distance between magnets affects the interactions between the magnets.

Phenomenon

A magnet under the desktop can cause a nail to move on top of the desk. (Teaching Suggestion: Engage students in playing with magnets to see how many sheets of paper the magnets will stick together.)

Gather

1. Students **explore (SEP)** the **effects (CCC**) of magnets at a variety of distances.
2. **Students develop questions (SEP**) to **plan and carry out an investigation (SEP**) to determine how the distance between magnets **affects (CCC)** the interaction between them (Integrated NJSLS-ELA SL.PE.3.1).

Collecting and Analyzing Data

1. Students use a data chart to **collect data (SEP)** about how the distance between two magnets **affects (CCC)** the interactions.
2. Materials: Two-disc magnets with a hole in the center (ring magnets, 2 per student), cardboard, index cards, book pages, etc.
3. Students **obtain information (SEP)** by reading about how distance **affects (CCC)** the force of attraction between two magnets. (Integrated NJSLS - ELA RI.3.1 and RI.3.7)

Reason

1. Students **analyze data (SEP**)to find **patterns (CCC)** for how the distance between magnets **affects (CCC)** the attraction of the magnets.
2. Students **construct an explanation (SEP)** for how the distance between magnets **affects (CCC)** the interactions between the magnets (Integrated NJSLS – ELA SL.3.1).

Communicate Reasoning

1. Students **use a model to communicate (SEP)** the **effects (CCC)** of distance on the interactions between magnets.

##### Let Go of the Scientific Method

Decades of science education entailed primary students engaging in a form of science inquiry that reduces the investigation to a fixed, linear set of steps. These steps often lack a deep focus on learning and application of science concepts. The complex thinking or work of scientists are not accurately represented by stringent representations of one “scientific method”. It is imperative that students understand how to conduct investigations like a scientist. Currently, there is a shift in the way students conduct investigations. Teaching and learning at the primary level now call for young children to engage in multifaceted science and engineering practices in more complex, relevant, and authentic ways (NRC, 2012).

###### Why do I see so many squirrels, but I cannot find any stegosauruses?

In a cross curricular project-based learning unit, third grade students explore the question: Why do I see so many squirrels, but I cannot find any stegosauruses? Students observe squirrels in their community, plan and conduct investigations, and develop models to explain how the squirrels interact with other organisms in their environment to meet their needs for survival. Students create a model to explain that, as the environment has changed, some animals (e.g., mammals) were able to adapt and survive, while others (e.g., dinosaurs) died out. Throughout the unit, students engage in a range of collaborative discussions, view and interpret information from videos, ask questions about information from speakers, and report on their learning with the class. In addition, students write to explain their scientific models and conduct a short research project about how squirrels survive in their habitat. Finally, students ask and answer questions about informational text and determine the meaning of academic vocabulary in text. (Krajcik, 2020).

##### Science Content is Best Learned by Engaging in the Scientific and Engineering Practices.

Primary educators should design their instruction based on the Scientific and Engineering Practices along with the integration of disciplinary core ideas and cross-cutting concepts. Rather than following the traditional approach of introducing and processing the practices separately, it is more beneficial for young learners to develop and use the practices in the context of what they are learning. For instance, teaching first graders how to use light to communicate with others through the memorization of definitions and following an experiment to see light and sound in action is insufficient. Like a scientist, it is essential for students to engage in multiple practices that are “messy” rather than follow rigid procedures. Primary students should know that using the science and engineering practices does not require following a set sequence when conducting investigations. Investigations may include beginning with posing testable questions, analyzing information, or evaluating a claim. They may conclude with developing explanations, models, arguments, or new testable questions for investigation (Bell & Van Horn, 2014).

Engaging in science and engineering practices implies shifting agency to students who should be supported in designing, executing, and building knowledge about the natural and designed world. Doing so actively engages all students by making the learning process more inclusive. When students come up with varying results from an experiment an opportunity is presented to pause and analyze those differences. Though engaging primary students in these types of investigations requires more instructional time than common science instruction, young learners appreciate the creative effort of scientific work (Bell & Van Horn, 2014). Assisting students in using science and engineering practices also develops critical thinking skills they can apply to any situation.

###### What Big Ears You Have

(Armstrong et al., 2022)

Phenomenon

Students have been shown pictures of rabbits and discussing how the rabbits use big ears.

Challenge

Students **design a solution (SEP)** that mimics the **structures (CCC)** of animals to improve a person’s hearing.

Gather

1. Students **obtain information (SEP)** from observing pictures of ears on rabbits and other animals.
2. Students **define the problems (SEP**) of how to improve hearing.
3. Students **obtain information (SEP)** by reading about hearing and animal **structures (CCC)**.

Reason

1. Students **design a solution (SEP)** that mimics the **structures (CCC)** of animals to improve a person’s hearing using materials such as cardstock, tape, scissors, pipe cleaners, straws, paper cups, string, etc.
2. Students build the **device (SEP)** to improve their hearing.

Class Discussion - About the Criteria for Testing Solutions

1. Students **test their device (SEP)** to determine how well it works to meet the desired task. Questions to initiate discussion about how the ears work, but also on structure and function:

Q: How did the structure of the rabbit ear help you design your device?

Q: Why can you hear more sound with your device?

Q: How did you test your device to show that it improves your hearing?

Q: How does your device collect more sound?

Communicate Reasoning

1. Students **construct an explanation (SEP)** for how their device improves hearing.

Opportunities to make student thinking visible (assessment)

**Group Performances:**

1. **Obtain information (SEP)** from observing pictures of ears on rabbits and other animals.

**Class Discussion About Phenomenon:**

1. **Define the problems (SEP)** of how to improve your hearing.
2. **Obtain information (SEP)** by reading about hearing and animal **structures (CCC**).

**Class Discussion:**

1. **Design a solution (SEP)** to mimic the **structures (CCC)** of animals and improve your hearing.
2. **Build the device (SEP)** they design to improve your hearing.
3. **Test your device (SEP)** to determine how well it **functions (CCC)** to improve hearing.

**Individual Performance:**

1. **Construct an explanation (SEP)** for how their device improves hearing.

##### Students Learn Science Through Productive Talk

All students can benefit from actively participating in well-structured science discussions. Science talk thrives in a safe environment in which students feel respected, are comfortable taking risks, and know that their ideas are valued. The science and engineering practices in the NJSLS - S promote social interactions and require that primary students communicate. They involve reasoning with others and exploring a mutual understanding of science phenomena. Teachers may vary the structure (e.g., whole group, small-group, think-pair-share) of science talk to be brief or extended and integrated during different phases of the learning sequence.

To engage students in science and engineering practices, they need access to and experience with discourse-rich sensemaking conversations. For more information review the [Talk Science Primer](https://inquiryproject.terc.edu/shared/pd/TalkScience_Primer.pdf) (Michaels & O’Connor, 2012).

###### Pollination Station

(DeWitt et al., 2022)

Phenomenon

Butterflies have interesting mouthparts and fly from flower to flower each day.

Challenge

Design and engineer (SEP) a structure (CCC) that mimics animal structures that function to transfer pollen between flowers.

Gathering

1. Students develop questions (SEP) to obtain information about the mouthparts of butterflies and how pollen is transferred from one flower to another by butterflies.
2. Students obtain information (SEP) about butterflies by reading about how the structure (CCC) of the butterflies' mouthparts function.
3. Students obtain information (SEP) on how pollen is transferred among flowers by insects.

Reasoning

1. Students **design and engineer (SEP)** a **structure (CCC)** that mimics how a butterfly obtains its food and moves pollen from the “flower models” provided.

(Materials needed to create a flower model: graduated cylinder, salt, magic marker, and water.)

1. Students **construct an explanation (SEP)** for how the **structure (CCC)** of the butterfly mouthpart functions to help it obtain food.

Class Discussion

1. Questions to initiate discussion:

Q: How do other plants or animals benefit from the butterfly obtaining their food in this way?

Q: How does the structure of the mouth help the butterfly have better access to the flower?

Q: How does the plant benefit from the butterfly; how does the butterfly benefit the plant?

Q Why are some mouths different from others?

Q: Why does the butterfly’s mouth getting close to the flower help the plant be pollinated?

(Teaching Suggestions: Focus questions on the relationship of structure and function and how pollen travels from one place to another.)

Communicating

1. Students **use models and writing to communicate (SEP)** how the mouthpart of the butterfly also **functions (CCC)** in pollinating plants.

(Teaching Suggestions: This model should focus on the relationship of how the mouthparts get food for the butterfly, but the butterfly also transfers pollen from plant to plant.)

**Attend to the Learning Progressions**

Knowing what students learned prior to entering your classroom is valuable information. The New Jersey Department of Education has published Learning Progression Documents for each of the three dimensions of the NJSLS – S which can be found on the NJDOE [Standards Transparency and Mastery Platform](https://www.nj.gov/education/standards/stamp/) (STAMP) Science website.

##### Principles for Creating More Equitable and Inclusive Science Learning Experiences

A fundamental shift in thinking about how primary students learn is necessary to make science learning equitable and inclusive. Educators need to shift instruction from focusing on students “knowing” science to instruction that focuses on young learners figuring out the natural and designed world. This shift opens opportunities for all students to experience learning in ways that are meaningful to them.

##### Designing Learning Experiences for Students Receiving Special Education Services

* Educators should consult learners’ Individualized Education Programs (IEP) or Section 504 plan.
* Engage in Universal Design for Learning (UDL). UDL supports teachers in establishing learning environments that are accessible to all learners. It emphasizes creating learning environments and instructional strategies in ways that do not create barriers (Rogers-Shaw et al., 2018).
* Adopt a Social Model for Disability. “In this view, disabilities do not inherently reside in the individual. Rather, obstacles learners face are created by the tasks, pedagogies, and cultural views within the learning environment” (Tesoriero et al., 2019, p. 2). Educators should remove common barriers inherent to K-12 science education and instead use knowledge of the individual characteristics of learners to design environments that leverage their individual strengths.
* Leverage the strengths of learners. While there are some common barriers (STEM Teaching Tools [STT], 2022) that are inherent to first through third grade science education, implementing the developmentally appropriate practice principles of knowledge of the individual characteristics of learners in the classroom should enable teachers to design environments that leverage their individual strengths.

##### Engaging Multilingual Learners in Three-Dimensional Science

**Making Science Multilingual, a joint endeavor formed by WIDA and the National Science Teaching Association, devised eight design principles to define the integration of contemporary three-dimensional science and language-in-use instruction (MacDonald et al., 2020). These principles include the following aspects:**

* Science identity: Use or develop culturally and linguistically diverse curricular materials that portray scientists, engineers and science-literate individuals working across many contexts and that provide examples of professionals of different genders.
* Equitable engagement: Use relevant phenomena to engage MLs in sensemaking and in all instructional activities that constitute three-dimensional science teaching, from the exploration of phenomena to the elicitation of preliminary student ideas and the iterative and collaborative co-construction of explanations. Exploration materials, props, and images may be used as cues to language and concepts.
* Language development: Emphasize communication-rich science and engineering practices to provide opportunities for MLs to develop content knowledge and language. Language development must be fully contextualized within classroom activities and classroom discourse. When educators support students as they gather evidence, coordinate that evidence with other’s ideas and evidence, and weigh the strength of evidence, shared sensemaking about phenomena is promoted and space is created for MLs to analyze different ideas and build knowledge and language.

#### Professional Learning Resources for Science

The [New Jersey Department of Education Science](https://www.nj.gov/education/standards/science/Index.shtml) webpage has curated resources to support educators.

The [National Science Teaching Association](https://www.nsta.org/) (NSTA) offers a wide array of products and services, some at no cost.

The [New Jersey Science Teacher Association](https://njsta.org/) (NJSTA) is a local affiliate of the NSTA. They offer professional learning resources that are specific to New Jersey.

#### Summary

True science and engineering cannot be learned in isolation or by turning to a certain page in a textbook. Science and engineering are experienced by collaborative learners who are ready to explore the natural and designed world around them. Hands-on experiences are critical. Lessons and units should focus on supporting young learners to make sense of a phenomenon or design solutions to a problem rather than on the accumulation of isolated facts. It is essential that all students are provided adequate time and resources necessary for later learning and helps students develop their identity as someone who can solve challenging problems. The NJSLS – S provides a great deal of information that can be used to create meaningful interdisciplinary units of instruction and to create coherent curriculum across grades and from grade to grade. There are free and low-cost professional learning resources available that can be accessed through the NJDOE, NJSTA, and the NSTA.

### Teaching Social Studies

Social studies instruction teaches children how to explore, navigate and understand the world around them. It is essential as they become citizens of their classroom, school and community to learn how to form and articulate their opinions, identify and solve problems, negotiate roles, understand inequality, respect diversity, and acknowledge that their actions and decisions have consequences on themselves and others (National Council for the Social Studies, 2019). The development of these skills is at the heart of primary social studies education and the New Jersey Student Learning Standards for Social Studies (NJSLS-SS, 2020).

Social studies education has been increasingly marginalized at the elementary level with the reduction of instructional time. This is contrary to the benefit of our students and leading research that suggests increased instructional time in social studies leads to improved reading ability (Tyner & Kabourek, 2020). Social studies provide students with the essential background knowledge and contextual understanding to enhance reading comprehension.

#### Evidence-based Social Studies Instructional Strategies

Since primary social studies education focuses on students understanding the world around them, it is easy to integrate social studies into interdisciplinary units that showcase its value in conjunction with other content areas. Though the Council of Chief State School Officers (CCSSO) recommends at least 45 minutes of daily social studies instruction in grades kindergarten through five, experts understand the challenges that go into devoting so much time to social studies instruction. To provide additional opportunities for social studies instruction, educators can pair geography lessons with science, economics instruction with mathematics, and history/civics with English language arts or visual and performing arts. To further extend this mindset, schools can partner with local community organizations to more fully address issues impacting the immediate surroundings.

Passive instructional methods based in lecture and recall have been deemed largely ineffective in the instruction of social studies content (Ritter, 2012). Highly effective social studies educators utilize active learning strategies to engage students in the learning process. This may manifest as student-led inquiry projects, collaborative learning experiences, project-based learning, and opportunities for students to share their experiences and personalize learning paths custom to their needs and interests.

#### Diversity, Equity and Inclusion in Social Studies

Diversity, equity, and inclusion begins with recognizing and appreciating the diversity that exists within the school community (Muñiz, 2020). To incorporate and value the differing identities that exist, primary teachers may consider the following:

* How do my own identity and life experiences influence my classroom practices?
* How do my identity and life experiences impact my relationships with my students and their families?
* Does my school oppose systemic bias, and if not, what actions can I take to advocate for change?
* Does my classroom contain diverse instructional resources and materials, reflecting student backgrounds and family structures?
* Do I incorporate students' identity, culture, and family traditions through meaningful instruction throughout the year?
* Do I provide students opportunities to discuss key issues in the community and the world in my classroom?
* Do I create, plan, and facilitate activities and assignments that empower students beyond the classroom walls?
* Am I connecting social studies content to students' daily lives?
* How am I upholding high standards for all students, while attending to students that have historically struggled?
* Have I established classroom norms that create a welcoming, inclusive environment for all learners?
* Do I provide my students opportunities to develop empathy and respect for people from similar and different backgrounds?
* What actions am I taking to include all families in my classroom and the school community?

Primary educators are encouraged to use community resources and knowledge to inform their teaching. For example, Miss Rivera invited family members of children to become participants in the class research project by being interviewed about their communities. Positioning family members as knowledgeable experts can function in several ways to assist students who may be culturally or linguistically marginalized from schools. By inviting family members who come from non-dominant cultural groups or who are part of communities that are not typically involved to share their experiences, teachers create opportunities for students to more strongly identify with the school and to recognize that valuable knowledge exists in every family and community. Further, by including the families of MLs, these students can use their dual language skills to serve an academic project through translating for their peers.

#### NJSLS-SS

The NJSLS-SS serve as a framework to guide social studies instruction in grades kindergarten through twelve. The mission of social studies education in New Jersey is to “provide learners with the knowledge, skills, attitudes, and perspectives needed to become active, informed, and contributing members of local, state, national, and global communities” (NJDOE, NJSLS-SS, 2020). The standards identify the specific knowledge and skills that students must learn within a designated grade-band, e.g., K–2, 3–5, 6–8, or 9–12. That means the core ideas and performance expectations articulated in the grade band must be taught in at least one of the specified grades to prepare students to progress to the next grade band.

##### Structure of the Standards

The NJLSLS-SS (grades 1–3) are comprised of two core standards: 6.1 U.S. History and 6.3 Active Citizenship in the 21st Century. Each standard is organized into four main strands: Civics, Government and Human Rights; Geography, People and the Environment; Economics, Innovation, and Technology; and History, Culture and Perspectives; that each feature a series of disciplinary concepts.

**Disciplinary Concepts:** The structural framework to organize conceptual understanding of a discipline.

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**Core Ideas:** The essential understandings or big ideas that are necessary for understanding the discipline. They are taught over multiple grade levels at progressive levels of depth and complexity.

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**Performance Expectations:** The specific knowledge and/or skills students must be able to know and do to demonstrate understanding of a discipline.

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**Practices:** The behaviors and habits of mind considered to be unique to constructing knowledge within a specific discipline.

For the elementary Standards, grades K–2 and 3–5, the performance expectation code (e.g., 6.1.2.CivicsCP.1) should be interpreted as follows:

|  |  |  |  |
| --- | --- | --- | --- |
| **6.1** | **2** | **CivicsCP** | **1** |
| Standard number | By the end of grade | Strand / Disciplinary Concept | Performance Expectation |

###### Example structure of 6.1.2.CivicsPI.2

**Disciplinary Concept:** Civics, Government and Human Rights: Participation and Deliberation

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**Core Idea:** Local community and government leaders have roles and responsibilities to provide services for their community members.

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**Performance Expectation:** 6.1.2.CivicsPI.2: Investigate the importance of services provided by the local government to meet the needs and ensure the safety of community members

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**Practice:** Developing Questions and Planning Inquiries

Within each disciplinary concept, there are core ideas that can be used as essential understandings for each grade band. The core ideas make it easy for primary educators to identify the big ideas that students should grasp by the end of each grade band. The core ideas are learned through the implementation of the performance expectations that specify the knowledge and skills students must master as part of the standards. Performance expectations can be used by teachers in lesson planning as student learning objectives. When understanding the performance expectations, it is important to see them in context to the core idea. This provides a frame of understanding for educators to implement the performance expectation.

#### Teaching and Learning Social Studies in the Primary Classroom

Social studies instruction in early elementary, grades kindergarten through second, focuses on developing students’ understanding of their role in their family, community, country, and world. Students learn foundational ideas of government, democracy, human rights, the common good, citizenship, and civil discourse as well as explore the American identity through symbols, holidays, and monuments that are reflective of our values and principles.

In upper elementary, grades three through five, social studies instruction begins with the various levels of government functions, powers, and responsibilities. Students explore topics of geography and economics through a local and state context, while learning the various histories, cultures and perspectives of the United States starting with the native populations of the U.S. through 1763 with an emphasis on the geography, history, and civics of New Jersey.

While the core ideas and performance expectations describe the what and how of instruction, the practices identify the embedded skills that students must learn in accompaniment to the content.

##### Social Studies Practices

Disciplinary practices are the content specific skills that students develop throughout their K-12 academic career. Practices are embedded throughout the standards and directly correlate to the core ideas and performance expectations. It is essential for primary educators to ground their social studies instruction in skill development through implementation of one or more of the practices into each lesson. It is these foundational skills that ultimately enable students to acquire the content and knowledge learned throughout their social studies career.

The following explains each of the seven social studies practices and provides an example of each of the practices in action. Each lesson example was designed to demonstrate how core ideas and performance expectations can be implemented in the primary classrooms. The examples demonstrate how early elementary educators can facilitate standards-based instruction, while reinforcing skill development.

###### 1. Developing Questions and Planning Inquiries

This practice encourages teachers to facilitate student-led inquiry through questioning. Students are naturally inquisitive but need structured learning experiences to develop the ability to ask compelling questions and devise a plan on how to investigate those questions. For example, a first-grade teacher, Mrs. Thompson launched a study of community with the shared experience of reading a book about community to her students and taking a community walk. She then engaged in a unit that focused on student-generated questions. To plan a social studies project, the teacher skillfully assists students to develop questions that lead to deep inquiry and that allow them to explore the core concepts and performance expectations identified in the NJSLS-SS. Specifically, Mrs. Thompson asked students to use the community map (i.e., geography) that they constructed to identify who works at each location and how it relates to community life (i.e., Civics).

* **Related Core Idea.** Local community and government leaders have roles and responsibilities to provide services for their community members.
* **Related Performance Expectation.** 6.1.2.CivicsPI.2: Investigate the importance of services provided by the local government to meet the needs and ensure the safety of community members.

###### 2. Gathering and Evaluating Sources

Finding, evaluating, and organizing information and evidence from multiple sources and perspectives enables students to effectively investigate their world. Students gather evidence from several sources using active learning and data-gathering techniques. These data-gathering techniques may include interviewing, observing phenomena, taking photographs, reading information, looking at maps or graphics, and taking field trips. Students evaluate sources by distinguishing between fact and opinion. For example, in Mr. Smith’s third-grade class, students worked collaboratively on a community research project to learn about their school community's historical development and origin. Before beginning the project, Mr. Smith took the class to the community library to hear about the town's development from a local historian. In the classes following the presentation, Mr. Smith divided students into four groups, each group evaluating and organizing information and evidence from different sources to learn about the community. The sources included historical photographs, primary source newspapers, census graphs and visualizations, and early township maps. Students presented their research and contrasted findings based on the source type. This project allowed students to actively learn about the community and investigate the world around them through multiple sources.

* **Related Core Idea.** Historians analyze history accounts through various sources, including differing accounts of the same event.
* **Related Performance Expectation.** 6.1.2.HistorySE.3: Use historical data from a variety of sources to investigate the development of a local community (e.g., origins of its name, originating members, important historical events and places).

###### 3. Seeking Diverse Perspectives

Making sense of research findings requires thinking about what information is included, whether the information answers the question, and what may be missing. Exploring diverse perspectives assists in developing a comprehensive understanding of history that highlights the varying experiences of differing peoples. For example, in Ms. Anderson’s second-grade class students learned about different ways we celebrate America. Students learned that Columbus Day and Indigenous Peoples’ Day are celebrated on the same day. Ms. Anderson shared a video about Indigenous Peoples’ Day from the Public Broadcasting Service (2015). Next, students discussed the video and looked at a primary source etching (Hall, 1856) of Christopher Columbus landing in the New World. Ms. Anderson provided a few supporting questions (e.g., Who is visible in the painting? Do the people in the painting look happy or sad?) to guide students in their analysis. Students completed a t-chart focused on how the Native Americans viewed Columbus and how Columbus viewed the Native Americans. This lesson highlighted multiple perspectives through a primary source and how different viewpoints may lead to different accounts of the same event.

* **Related Core Idea.** Two or more individuals can have a different understanding of the same event.
* **Related Performance Expectation.** 6.1.2.HistoryUP.1: Use primary sources representing multiple perspectives to compare and make inferences about why there are different accounts of the same event.

###### 4. Developing Claims and Using Evidence

Once students have gathered information, they can begin to consider the evidence presented and develop a claim that answers the guiding question based on the evidence. For example, in Mr. Makino’s third-grade class he facilitated a lesson about the importance of voting and the need for individuals’ participation within a democracy. Mr. Makino asked students to consider why voting is an important element of democracy. To help students develop a claim to answer this guiding question, Mr. Makino planned a voting simulation in which students selected different controversial topics to vote on. Students voted on each topic and could participate in as many or as few voting simulations as desired. Following the voter simulation, the students tallied the number of votes within each election and discussed why some students voted in some elections and not others. To further understand why people participated in some elections and not others, students analyzed local voting data (primary source) to measure voter turnout in recent local elections. Based on the voting simulation and the local voting data analysis, students developed a claim to answer the preliminary guiding lesson question.

* **Related Core Idea.** Historians use evidence from multiple sources to support their claims and arguments about the past.
* **Related Performance Expectation.** 6.1.5.CivicsCM.2: Use evidence from multiple sources to construct a claim about how self-discipline and civility contribute to the common good.

###### 5. Presenting Arguments and Explanations

Using a variety of formats designed for a purpose and an authentic audience forms the basis for clear communication. Students must learn to determine the ideal format for the selected audience to present their argument and supporting evidence. For example, as part of their first-grade social studies curriculum, Mr. Mottern’s class investigated the history of their town and how it has evolved over time. Located in an urban area surrounded by wealthy suburbs, this town currently has a large population of Spanish speaking families. Throughout the school year, the students went on walking trips to investigate the stores, restaurants, entertainment venues, community helpers (firehouse, police department, library, hospital, etc.), buildings and landmarks. Some students were even able to interview local residents to ask questions about the town and how their lives have been impacted by the community in which they live. Students compiled their observations in a variety of formats including drawings, sketches, audio recordings, video recordings, and opinion writing, all reflecting both the English and Spanish languages. To share the students’ ideas, the teacher curated their artifacts and posted them on the class website. QR codes linked to the artifacts were then strategically placed around the town and residents could scan the QR codes to learn more about the town in which they live. Additional examples of the students utilizing QR codes (e.g., linked to a video interview with a NJ Transit worker who explained how the pandemic has caused a decrease in the number of riders on the train each day; linked to drawings of the church with a handwritten paragraph explaining how the church is now used as a preschool).

* **Related Core Idea.** Historians create arguments outlining ideas or explanations based on evidence.
* **Related Performance Expectation.** 6.1.2.HistoryCA.1: Make an evidence-based argument about how and why communities change over time (e.g., locally, nationally, globally).

###### 6. Engaging in Civil Discourse and Critiquing Conclusion

Once students have developed cohesive arguments it is important for them to share, reflect and refine their conclusions. This not only involves critiquing/questioning the claims of others, but also listening to and respecting contrary views. Debate can help students to come to a new understanding or learning while offering opportunities for discourse, relationships, and social-emotional learning (Frazin & Wischow, 2020). For example, Mrs. Sustick’s second-grade class considered the rules and policies of the school; they took positions and debated the pros and cons of the different rules. Using a predictable talking/debating routine established early in the school year, students were given the following topic to consider. At this school all students must wear a school uniform that consists of khaki pants and polo shirts in certain colors. Mrs. Sustick stated that school uniforms provide cohesion and unity for the school community. Students were given a few minutes to think about the idea and then they joined their debate partner, and each picked a different side. After choosing their side, they broke into “caucuses”, one for pro’s and one for con’s. In those groups students discussed reasons for or against the statement. After a few minutes the students went back to their original partner and debated the idea. This process allowed students to plan their thoughts, listen to others and thus acquire language and perspective, and critical thinking skills. Every student’s voice is heard either with their partner or with their caucus (Frazin & Wischow, 2020).

* **Related Core Idea.** When all members of the group are given the opportunity to participate in the decision-making process, everyone’s voice is heard.
* **Related Performance Expectation.** 6.1.2.CivicsPD.1: Engage in discussions effectively by asking questions, considering facts, listening to the ideas of others, and sharing opinions.

###### 7. Taking Informed Action

The goal of social studies is to create active citizens and taking informed action is an essential aspect of citizenship. Taking informed action involves creating and/or implementing action plans, through consensus, designed to solve problems and create positive change in one’s class, school, community or world.

Consider the following example:

Encouraging interest in the community and recognizing the need to reduce climate change, third-grade teacher Ms. Perez invited students to examine their school and the surrounding community for areas of possible improvement. After brainstorming ideas as a class, students surveyed their peers and the school community to conduct a needs assessment. The class compiled the data and agreed upon the need for more recycling in their school community. To further their understanding of the recycling process, students invited representatives from the county reclamation center to advise them on the best ways to recycle in their school community. Collaborating with the school administration, the class requested additional receptacles for recycling, and during lunch, they demonstrated how students could compost their leftover food for the school garden. They then created public service announcements on a video application to showcase their concerted efforts. Other students and community members were also invited to post a video on a video application demonstrating how they recycle at home and at work.

* **Related Core Idea.** Through participation in the decision-making process (e.g., voting, petitions, contacting elected officials, serving in their community) people can initiate change.
* **Related Performance Expectation.** 6.3.5.CivicsPD.1: Develop an action plan that addresses issues related to climate change and share with school and/or community members.

#### Summary

The social studies standards deem instruction in first through third grade emphasizes developing learners who are civic-minded, globally aware, and socially responsible through project-based interdisciplinary instruction. Instruction is most effective when:

* adequate time is devoted to social studies instruction (Heafner & Fitchett, 2012),
* taught through an interdisciplinary lens, (e.g., geography with science, economics with math, and history/civics with English language arts) and interdisciplinary units are evidence-based and action and solution oriented,
* instruction is standards-based and embodies the core ideas and performance expectations,
* lessons incorporate the social studies practices and emphasize skill development through active learning opportunities,
* instructional materials are representative of the diversity of our world, portraying the experiences and stories of individuals of different races, ethnicities, genders, mental/physical abilities, and/or religions, and
* students’ unique and diverse identities are recognized and appreciated as assets to the learning community.

### Teaching with Technology

Technology is everywhere which means young learners are more likely to enter classrooms with experience using various devices. As a result, the 21st century educator must appropriately integrate technology within instruction to build students’ digital skills and knowledge in preparation for a technologically advanced workforce. When used effectively, technology can address the impact of current learning losses as well as mitigate the prospect of future learning losses (U.S. Department of Education, Office of Educational Technology, 2023). When designing lessons, educators have a nearly endless variety of exciting and engaging technologies from which to choose. The tools available to educators today can involve and benefit all stakeholders. When considering the inclusion of technology, educators should consider the following questions:

* How does this technology support learning objectives?
* Do all students have equitable access to this technology?
* Is the designed experience developmentally appropriate?
* Which digital literacies and skills (standards) would this technology help develop?

Educators must evaluate the inclusion of technology to ensure that learning experiences are safe for children. This evaluation also includes a reflection phase. Through carefully selecting and integrating technologies into teacher practices, students will simultaneously develop key content and technology skills.

#### Aligning Practice with the NJSLS

Technology empowers children to become global citizens and participate collaboratively and ethically in the digital world. Educational professionals promote digital citizenship and technology literacy by aligning practice with standards for computer science and design thinking as well as career and life literacies while addressing critical technical and ethical skills. The NJSLS approach technology by outlining specific practices and literacies needed to prepare our students for careers and a globally connected society.

The NJSLS-Career Readiness, Life Literacies, and Key Skills (NJSLS-CLKS) Standard 9.4, focuses on ensuring all students are prepared with the necessary knowledge, skills, and dispositions to thrive in an interconnected global economy (NJDOE NJSLS-CLKS, 2020). Standard 9.4 specifies literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy that are critical for students to develop to live and work in an interconnected global economy. Though there are several essential disciplinary concepts listed for this standard, this section will focus on the following disciplinary concepts: digital citizenship, information and media literacy, and technology literacy.

##### Digital Citizenship

Students’ knowledge of digital citizenship is defined by the U.S. Department of Education, Office of Educational Technology, as norms and practices to address appropriate and responsible technology use which requires users to think critically, behave safely, and participate responsibly online (U.S. Department of Education, 2015). Early elementary students must learn how to responsibly use technology (i.e., laptops, internet, and digital devices) to engage with society and how to use it as a learning tool.

Primary students are members of the global society and the NJSLS pays direct attention to the role they play as digital citizens. The 2020 NJSLS for Computer Science and Design Thinking (NJSLS-CS&DT) recognize the benefits for young learners to be connected to a network or the Internet but also require educators to ensure authentication measures, such as strong passwords, to protect devices and information from unauthorized access. The mindful and respectful use of technology includes being safe online, safeguarding children’s personal data by being cautious about what information they share, having positive online interactions, and giving credit for already created work. Young learners should understand that thoughtful and respectful actions online can create a positive and supportive digital community.

##### Information and Media Literacy

Information and media literacy are essential for inquiry-based learning exhibited throughout high-quality early elementary curricula. It empowers learners to access, retrieve and produce well managed resources. With the abundance of information available online, it is more important than ever for learners to be able to find relevant, reliable, and accurate sources for purposeful use. That means the emphasis is placed on being able to critically evaluate the content children consume and make informed choices about the sources they use as they create their artifacts. Information and media literacy empowers learners to become active participants in creating and disseminating knowledge.

##### Technology Literacy

Students with technology literacy can effectively and responsibly use digital tools for various purposes. The NJSLS-CLKS for technology literacy lists several performance expectations for the core idea “Digital tools have a purpose”. For example, in standard 9.4.2.TL.6 (Illustrate and communicate ideas and stories using multiple digital tools) students are expected to incorporate technology successfully and appropriately as a medium to communicate their learning by the end of second grade.

Primary students are expected to use their technology literacy to apply digital tools to create and communicate and to collaborate using technology effectively with others. Standard 9.4 for technology literacy requires students to recognize and explain the advantages of working with others in digital environments to produce better products. This is an essential skill needed in a high-quality inquiry-based early elementary learning environment.

#### Technology Teaching to Support and Frame Inquiry-Based Learning

Young children naturally explore and want to learn about their world. Primary educators can tap into their natural curiosity and build their knowledge through an inquiry-based learning approach. Inquiry-based learning is a student-centered practice in which teachers engage children by connecting them to and exploring real-world problems through teacher and student-generated questioning. This practice facilitates students’ learning from basic curiosity to critical thinking and understanding on a topic. Educators and young learners work collaboratively to build knowledge, skills, and understanding that they could not gain independently. As knowledge is co-constructed, emphasis is placed on meaning rather than on acquiring facts. Technology can contribute to co-constructing and collaborating to gain knowledge and understanding. Integrating technology into inquiry-based learning has many benefits such as a more engaging and practical experience for the student where they can gain important life skills (i.e., teamwork, communication, and critical thinking).

Technology can be a helpful resource for inquiry-based investigations and give students tools to think critically and solve problems. It can help students investigate questions, find information, collaborate, and communicate their findings when integrated appropriately. The expectation of the computer science standard, NJSLS-CS&DT 8.1.2.CS.1, asks students to select and operate computing devices that perform given tasks accurately and quickly based on user needs and preferences. The key is selecting the right tool for the task at hand and ensuring that it is being used engagingly and productively. For example, if students are researching a topic, they might use an online database or search engine. Not all databases and search engines are created equal. Being able to determine the best fit for the task at hand is an important skill. If students are communicating their findings, they might use a word processing program or presentation software. Educators can use technology thoughtfully to help learners get the most out of inquiry-based learning.

#### Gradual Release of Responsibility

“Appropriate experiences with technology and media allow children to control the medium and the outcome of the experience, to explore the functionality of these tools, and pretend how they might be used in real life” (Radich, 2013, p. 18). Exploring new technology tools and/or apps with a play mindset is completely appropriate for primary school children and should be encouraged. However, when teachers play an active role modeling and guiding developmentally appropriate technology use, children can grow and learn.

##### Responsible Use of Technology

**The** increased use and reliance on technology in the current educational environment has brought increased conversations about appropriate content and privacy for educators, students, and commercial companies.

Educational professionals are responsible to ensure that the technology content and/or applications being utilized are appropriate and that students remain safe while online. As a result, educators must know the student privacy requirements when utilizing technology including web services and apps.

##### Children’s Online Privacy Protection Rule (COPPA)

The primary goal of COPPA is to place parents in control over what information is collected from their young children online. The Rule was designed to protect children under age 13, while accounting for the dynamic nature of the Internet. The Rule applies to operators of commercial websites and online services (including mobile apps and IoT devices, such as smart toys) directed to children under 13 that collect, use, or disclose personal information from children, or on whose behalf such information is collected or maintained (such as when personal information is collected by an ad network to serve targeted advertising). COPPA only applies to personal information collected online from children, including personal information about themselves, their parents, friends, or other persons (Federal Trade Commissions, 2022).

##### Family Educational Rights and Privacy Act (FERPA)

FERPA is a federal law that protects the privacy of student education records (Rights, 2014). Teachers need to be aware that when using 3rd party applications (e.g., website, apps, software, etc.) students’ personal identifiable information cannot be shared with 3rd party individuals or companies. Guidance from your district administration is recommended when implementing new technology.

##### Modeling

Teachers demonstrate the skills needed to use technology by having children copy or model their actions. Teachers can model the use of technology using think-alouds to voice their thought processes. Teachers can think aloud the steps of utilizing a device or an app while working on a project or task. Modeling technology should never solely focus on the use of the device or app; in contrast, it is more effective to model the technology's use through a project or a task applying it through a content-based project. For example, as part of an upcoming project, a class may need to store and graph data using a spreadsheet. The teacher models how to use the spreadsheet for the students by saying, “As I look at the spreadsheet, I notice rows and columns. I like to enter the column headers at the top, centered and in bold text. I don’t put a header in the ﬁrst column, as it can refer to both the column and the row.” Later in the modeling process, the teacher creates and describes a graph using the data entered into the spreadsheet. Once the graph has been completed, the teacher models how to make assumptions based on the graph. As a next step, the teacher works with a small group to help them enter data, create a graph, and then analyze it.

##### Guided Practice

Modeling is the first exposure to a new technology while guided practice is the child’s opportunity to try it (Fantozzi, 2022). As children practice technical skills in the classroom, they demonstrate proﬁciency and understanding. Guided practice will build up students' skill level and confidence, allowing teachers an opportunity to monitor and guide students’ progress, offering just-in-time support for the child’s skill level. Children may need multiple attempts to practice their technology skills before they master them. Consider the spreadsheet example above. Children may immediately understand the look of the spreadsheet. They recognize the toolbar and understand the associated vocabulary, including “cells,” “headers,” “rows,” and “columns.” Children will enter the numbers in the correct cells. They may remember how to bold and center the headers. They may not remember how to format the cells for addition and subtraction or how to create and read a graph based on the data. Providing multiple opportunities for guided practice helps build children’s conﬁdence and increases their success rate.

##### Independent Practice

During independent practice, children are invited and encouraged to work on their own, applying what they have learned. This could be done as a whole group, in centers, or independently. An important part of independent practice is teacher coaching and feedback (Fantozzi, 2022).

When using a gradual release of responsibility model of instruction, it is not intended that teachers follow a series of strict sequential moves expected to be accomplished in a single class period (Webb et. al., 2019). On the contrary, students’ needs should drive this model of instruction. Flexible implementation of this model of instruction emphasizes several entry points for children. Teachers begin with an invitation to learning that allows them to observe and informally assess what their students know and their development, confusion, and misconceptions (Webb et al., 2019). Through this knowledge, teachers begin instruction based on students’ strengths, demonstrating resources from their experiences and prior learning.

#### Reflection on Technology Integration

When trying new things, it is still possible that instructional activities may not proceed as smoothly as intended. Even if everything went as planned, it is essential to consider how to make improvements. This reflection phase should include teachers and learners. Research shows that the metacognitive act of reflection is beneficial for young learners as well (NAEYC, 2020).

##### Teacher Reflection

As part of a regular lesson reflection, educators should answer questions like the ones listed below:

* Were the objectives achieved?
* Did the use of technology meaningfully contribute to student learning?
* How can this (or other) technology enrich the experience of students who excelled?
* How can this (or other) technology support the learning of students who struggle?
* Where in the SAMR Model did this technology fit?

To help guide your reflection (or planning), the SAMR Model, developed by Dr. Ruben Puentedura, will assist your evaluation of technology (Puentedura, 2013). The SAMR Model stands for substitution, augmentation, modification, and redefinition. Your use of technology will fit in 1 of 2 main categories:

1. Enhancement **or**
2. Transformation

SAMR Model

|  |  |  |
| --- | --- | --- |
| ****S**** | **S**ubstitution: the tool replaces a traditional tool or method | Enhancement |
| ****A**** | **A**ugmentation: the tool provides additional features when compared to traditional tools | Enhancement |
| ****M**** | **M**odification: the tool significantly impacts the lesson design and outcome | Transformation |
| ****R**** | **R**edefinition: the tool allows the teacher/students to redefine the lesson in a way not possible with traditional tools. | Transformation |

This reflection will help you decide whether to include technology in your lesson and how to modify and improve lessons that use technology.

##### Student Reflection

Educators should encourage students to reflect on the tools used to enhance or transform a lesson. Sometimes, educators provide students with the ability to select from various tools. Whether they are traditional or technology-based, students and teachers can benefit from the feedback provided by this reflection.

Digital surveys can be used to collect and analyze data from these reflections. Some questions to consider for inclusion in a student reflection may be:

* Which tool(s) did you select?
* How did this tool help you?
* How could this tool have been better?
* Did you have any difficulty using this tool?
* If you could select a different tool, which would it be and why?

#### Artificial Intelligence

Artificial Intelligence (AI) is not new. Educators and students in grades 1-3 have utilized AI tools through adaptive assessments, spellcheck, grammar programs, and/or personalized learning in which activities or exercises are adjusted to a student's pace and understanding (Mills et al., 2023). The uses for AI can also be a fun, engaging, and student driven tool in elementary school classrooms. One of the challenges for educators is that AI is rapidly evolving which has made it difficult for schools and districts to come up with clear guidance and support (Mills et al., 2023). The [NJDOE Office of Innovation](https://www.nj.gov/education/innovation/ai/) offers an overview of foundational AI terms and concepts, high-level discussion questions regarding AI in education to consider at the school leadership and classroom educator levels, resources to learn more about AI, resources for educators to teach their students about AI, as well as links to further research and reports regarding AI. In addition*,* The International Society for Technology in Education (ISTE) offers a guide for elementary teachers*, Hands-On AI Projects for the Classroom A Guide for Elementary Teachers*, to provide educators with a variety of activities to teach students about AI as well as student centered project ideas.

It is important to remember that AI works best alongside teachers. Teachers can guide discussions about how AI works and ensure the information students encounter is age appropriate (Leonard, 2023). It is important that students in grades 1-3 understand the capabilities and limitations of AI tools. With teachers’ help, students can learn not to rely on AI, but rather to use it in a responsible way that supports their learning process.

Providing Equitable Access to Technology

Though progress has been made towards increased access to technology in the United States, disparities remain regarding digital equity. Digital equity ensures that all individuals and communities have the information technology capacity needed for full participation in all technological aspects of society, democracy, and economy (NDIA, 2022). Research shows that access to high-quality technology may vary based on socio-economic status and the community (e.g., rural areas). The district’s information technology capacity should include reliable access to current and emerging technologies with connectivity for all students and educational professionals, regardless of socio-economic status and zip code (ISTE, 2023). When planning for technology implementation, districts must consider the number of technology devices needed as well as ways to ensure that all children are provided access. The availability of digital devices varies in districts throughout the state, so thoughtful routines and procedures for technology use should be in place with the flexibility to adjust them as necessary.

The accessibility needs of all students, including those with disabilities or MLs, are to be considered when planning lessons that use technology. Implementing the Universal Design for learning approach is one way to ensure all students can achieve lesson objectives. Accessibility features, tools, and digital resources must be available to ensure that all students can successfully use technology for learning. For instance, features such as text-to-speech, enlarged font sizes, and color contrast should be built in educational hardware and software for students with special needs. MLs can be provided with programs that include translation and interpretation tools or provide rich imagery or video resources to support linguistic development and comprehension. In addition, teachers should be mindful of the diverse needs of their students and families. The availability of reliable internet access and technological support at home may vary. Choosing flexible at-home projects or assignments that require the use of technology is essential to accommodate families' individual needs.

#### Summary

Technology is a practical, supportive tool for learning and sharing ideas. Children use digital tools for investigation, creation, and collaboration in inquiry-based scenarios. They also use presentation tools to share their thoughts, ideas, and solutions to problems. In addition, inquiry-based assignments provide opportunities for children to reflect upon and respond to the nature and impact of technology, engineering, technological design, computational thinking, and the designed world. Providing equitable access to developmentally appropriate technology lessons and activities helps children to expand the reach and scope of their learning, understanding, and skill development. While children in primary grades focus on themselves and their community they are also engaged in the global community. Young learners having purposeful access to technology, along with foundational skills, helps them to become digital citizens. Used eﬀectively, technology supports the development of critical thinking, problem-solving, and decision-making skills.

### Teaching English Language Arts (ELA)

Young learners typically demonstrate tremendous growth in literacy proficiency as they progress from preschool to third grade. A New Jersey education in ELA builds readers, writers, and communicators prepared to meet the demands of college and career and to engage as productive American citizens with global responsibilities. One of the ELA goals for preschool to grade 12 students is to develop the necessary skills in reading, writing, speaking, and listening that are the foundations for creative and purposeful expression in language.

Teachers may utilize many different instructional literacy practices to meet the NJSLS-ELA. Best practices in literacy for young learners place emphasis on learning to decode, text comprehension, and expanding foundational reading and writing skills. As children develop from early emergent readers and writers to proficient, opportunities must be provided to build reading comprehension skills and writing skills. Students should engage in intentional oral language activities, have conversations about the meaning of words, tell and retell stories, listen to books read aloud, and participate in many literacy activities which can positively impact students’ development as readers and writers.

#### Reading

Foorman et al., (2019) state in The Institute of Education Sciences’ [IES] practice guide that to achieve reading success, students need instruction in two key areas: reading foundational skills and reading comprehension skills. Foundational skills have been found to support reading for understanding in kindergarten through third grade. Reading foundational skills include print knowledge, phonological awareness, phonics and word recognition, vocabulary, and oral language (Kosanovich et al., 2020; Foorman et al., 2019). Utilizing both informational and literary text supports the alignment to the NJSLS-ELA.

“The most fundamental responsibility of schools is teaching students to read. Because reading affects all other academic achievement and is associated with social, emotional, economic, and physical health, it has been the most researched aspect of human cognition” (Moats, 2020, p.1). This responsibility does not rest solely on third grade teachers, but, rather, it is a shared responsibility of all educators from the time the child enters school.

#### Print Concept

Print concept is the knowledge of the names and sounds of the letters of the alphabet and the knowledge of concepts about print. This can include letter names, the ability to recognize and say the names of letters, letter sounds, and knowing the sound a letter represents. Print knowledge is a precursor to skilled reading.

Research shows print knowledge is linked to later achievement in decoding, spelling, and reading comprehension (Kosanovich et al., 2020). Lessons should include teaching all 26 letter names and sounds. Frequent exposure is important. Teachers start with high-frequency letters (e.g., letters in their names, common signs), focus on a few new letters per week, and spiral back to previously taught letters regularly to build letter knowledge. Teaching concepts of print are essential foundational skills for students (i.e., parts of a book, reading left to right, different print symbols, and the words, not solely pictures, convey meaning of written words). During read alouds, print features can be used to focus children’s attention on print by explicitly commenting on, asking questions about, pointing to, and tracking text that is being read aloud.

#### Phonological Awareness

Phonological awareness is a broad skill that includes identifying and manipulating units of oral language parts such as words, syllables, onsets, and rhymes. Phonemicawareness refers to the specific ability to focus on and manipulate individual sounds (phonemes) in spoken words. Focusing phonemic awareness instruction on blending, segmenting, and manipulating phonemes has been shown to produce greater improvements in reading achievement than time spent on only rhyming and alliteration (e.g., songs, nursery rhymes) (Reutzel, 2015). Reutzel’s research explains that phonemic awareness instruction focused on phoneme-level activities explicitly taught have more sustained outcomes for students. An example demonstrating phonemic awareness may be to ask students to correctly enunciate the familiar first phoneme sound in a student’s name and compare it to other similar beginning phonemes in various words. Phonological activities may be done without print or text as they are focused on sounds, but phonics activities are done with print as they involve letters.

#### Phonics and Word Recognition

Phonics instruction teaches children the relationships between letters of written language and the individual sounds of spoken language. It teaches how to use these relationships to read and write words. Blevins (2019) explains in the International Literacy Association’s *Literacy Leadership Brief*, phonics instruction is helpful for all students, harmful for none, and crucial for some. The brief cites research confirming that explicit and systematic phonics instruction is the most effective instructional practice for all students when it directly teaches skills, follows a continuum of skill complexity, and includes a review and repetition cycle that leads to eventual skill mastery as well as focuses on blending sounds, sound and word dictation, word awareness, and teaching of high-frequency words. Duke et al., (2021) supports developing foundational word reading skills (phonological awareness, print awareness, phonics and word recognition instruction) as critical to developing reading comprehension which is the goal for readers. Knowledge of and the ability to apply grade-level phonics and word analysis skills in decoding words is a critical component of the NJSLS-ELA for grades one to three.

#### Fluency

Fluency is the ability to read orally at a natural pace and with expression, including appropriate pauses at the end of sentences according to The Institute of Educational Sciences’ [IES] practice guide (Foorman et al., 2019). Additionally, the IES suggests teachers need to ensure that students read connected text (i.e., multiple related sentences) every day to support reading accuracy, fluency, and comprehension. Students need to practice reading connected text while they are learning the alphabetic principle and decoding.

Ensuring every child has the necessary skills they need to read is an essential component of literacy education. Teaching children to read is a complex process. It encompasses a range of skills, such as word decoding, comprehension, and fluency. Research has shown that both decoding (the ability to translate written words into the spoken the sounds of spoken language) and comprehension (the ability to understand the meaning of the language being read) skills are both equally necessary for confident and competent reading, but neither is enough on its own.

A fluent reader can decode words accurately and automatically. Fluent readers also read the words in texts with expression and phrasing that reflects and amplifies the meaning of the text. For the reader to use appropriate expression and phrasing, they must understand what they are reading (Young et al., 2020).

Students need to be engaged in activities regularly in their classrooms that support fluency. This can occur through: (Shanahan et al., 2010)

* Read alouds
* Shared reading
* Choral or echo reading
* Repeated readings

#### Vocabulary Acquisition

Students should encounter new vocabulary words in several different contexts throughout the day (e.g., conversations, read alouds, shared reading, etc.). It is important for educators to introduce new, content-specific vocabulary and literary vocabulary through intentional teaching. Increasing a child’s vocabulary has a positive effect on their reading skills and school success in general. This is especially important for children from lower-economic families, students with disabilities, and dual language learners (Colker, 2014).

Activities that support a deeper understanding of vocabulary words are: make connections between a new vocabulary word and other known words across academic areas; relate the word to their own experiences; differentiate between correct and incorrect uses of the word; and generate and answer questions that include the word in conversations, narrative stories and read alouds (Foorman et al., 2019). Determining a word’s literal meaning from a source is as important as the ability to gain an interpretative meaning from figurative and/or connotative word meaning.

Academic vocabulary consists of the critical words students need to understand the concepts taught in school. It includes words used in formal writing and language in academic content areas. “By guiding students to develop their academic language skills, teachers can mitigate some of the challenges that students encounter when learning to comprehend text” (Foorman et al., 2019, p. 6). According to Van Oers and Duijkers (2013), the role of the teacher in supporting vocabulary development during play-based or project-based learning activities enhances children’s learning and vocabulary acquisition.

#### Building Reading Comprehension

In the IES practice guide, *Improving Reading Comprehension Kindergarten through Third Grade* (Shanahan et al., 2010), the panel of authors selected a definition of reading comprehension that emphasizes both what the author has written and the reader’s ability to use their background knowledge and thinking ability to make sense of what they read. The panel defined reading comprehension as “the process of simultaneously extracting and constructing meaning through interaction and involvement with written language” (p. 5). Extracting meaning is to understand what an author has stated, explicitly or implicitly. Constructing meaning is to interpret what an author has said by bringing one’s “capacities, abilities, knowledge, and experiences” (p. 5) to bear on what that person is reading.

The IES guide, *Improving Reading Comprehension in Kindergarten through Third Grade* (Shanahan et al., 2010), elaborates on five recommendations to support reading comprehension to be implemented in coordination with one another. The guide, developed by a panel of experts, presents a set of evidence-based practices that teachers and other educators can use to successfully teach reading comprehension to young readers. Below are the five recommendations for educators:

1. Teach students a variety of strategies that will help them understand and retain what they read and thus become independent, resourceful readers.
2. Teach young readers to recognize how a text is organized, or “structured.” Authors structure texts in a variety of ways to get their point across. Recognizing text structure can build students’ understanding of what they are reading and improve their ability to recall it.
3. Discuss the text with students to improve their reading comprehension. This approach will allow young readers to more deeply explore the ideas in the text they are reading. In guiding the discussion, teachers should model ways to think about the text that can help students when they are reading independently.
4. Emphasize the importance of choosing texts that specifically support the goals of teaching and improving reading comprehension.
5. Motivate students to improve their efforts to comprehend text. Constructing meaning while reading can be demanding intellectual work, and teachers who hold their students’ interest may be more effective in helping them to develop effective reading comprehension skills.

#### Read Alouds

One of the strategies to model reading comprehension strategies, think alouds, and reading fluency for young children, is conducting read alouds. These are lessons enabling young readers to engage in thinking, questioning and discussion while the teacher is reading a text aloud to the class or a small group (Shanahan et al., 2010). Text intentionally chosen by teachers can be either informational or literary with connection to content topics. A combination of both informational and literary texts is used to enrich students' learning experiences. This enables students to develop a range of skills, including critical thinking, analysis, and comprehension, while also fostering an appreciation for different genres and styles of writing. The choice of texts often depends on the educational goals, and the specific content areas being studied in the curriculum.

Read alouds for students should be modeled by the teacher because it models fluent reading for students. By listening to a read aloud (i.e., seeing how the teacher emphasizes different words, pauses at commas and periods, and pronounces difficult words), rereading, and one-on-one feedback, the National Reading Panel (Shanahan, 2005) identified these instructional practices to be essential for the success of fluency teaching. During part of this time, teachers read aloud to students and model reading strategies that characterize proficient reading. Students receive instruction to help them think deeper and talk about books. Furthermore, read aloud experiences can anchor new vocabulary acquisition: “While we need vocabulary to comprehend what we read, vocabulary can also be built as readers are exposed to challenging new words in text” (Wright, 2018, p. 6). By intentionally exposing students to new and challenging words, they may be more likely to recognize and/ or connect the new vocabulary understanding which is crucial for deepening both comprehension and syntheses (Wright, 2018).

In addition, the use of repeated read alouds (i.e., reading aloud the same book from start to finish three to five times), along with the explanation of vocabulary words, leads to significant gains in vocabulary and ensures that multilingual learners acquire vocabulary and comprehension skills. “We can’t wait for children to decode fluently in order to build their knowledge of the world” (Wright, 2018, p. 5). The experiences through read alouds and interactive read alouds create a plethora of opportunities for children to both reflect and generate new understandings.

When children listen to text read aloud for enjoyment, they are motivated to participate and want to know more. This is an opportunity for educators to help strengthen students’ understanding of new words, ideas, and stories. Asking questions about the characters/ topic and talking about the best parts of a book allows students to think about the story/ content and make connections to their own lives.

#### Interactive Read Aloud

An interactive read aloud is a more intentional form of reading instruction than a typical read aloud. Using this instructional strategy, a teacher reads a text to the whole group, occasionally and selectively pausing for conversation and active discussion (Wright, 2018). Students think about, talk, and respond to the text in groups or in pairs through a turn and talk format. Both the reader and listeners actively process the language, ideas, and meaning of the text (Myers & Ankrum, 2018). The importance of this time is critical for the literacy development of students, “book reading routines within early childhood settings, as well as those of the later grades, often serve instructional purposes" (Dynia & Justice, 2015, p. 237). Utilizing this instructional strategy with students including focused, high-quality discussions to help students develop a deeper understanding of what was read, will support students’ overall reading comprehension skills. “Such discussions among students or between the students and the teacher go beyond simply asking and answering surface-level questions to a more thoughtful exploration of the text” (Shanahan et al., 2010, p.23). Teachers can create discussions consisting of higher-order questions that prompt students to think more deeply about the text and articulate key aspects of the story/topic.

Mr. Walsh uses an interactive read aloud during his third grade whole group instruction related to a project his class is conducting. He reads a historical ﬁction text set around the time period related to the project to model the strategy of asking questions. Mr. Walsh knows that all children, regardless of age, need to have the opportunity to have text read aloud to them. He chose a book that is slightly above grade level. As children grow older and their vocabularies increase, reading higher-level books that contain uncommon words becomes critical to vocabulary development (Snow & Matthews, 2016). Therefore, teachers read aloud to all children to expose them to higher-level vocabulary than they would ﬁnd in their everyday conversations and in the books that they are reading independently. Mr. Walsh makes sure to introduce a few key words before reading the text. Further, through this enjoyable process, he models ﬂuency and demonstrates asking questions while reading (i.e., “thinking aloud”). Students are also given the opportunity to practice the strategy in a quick think-write-show activity on their white boards. Following every reading, Mr. Walsh reviews how the focus strategy was modeled and gives students the opportunity to participate in meaningful discussions about the text through the think-pair-share learning strategy. Here, the class may focus on vocabulary, key ideas or details, text features or engage in describing the characters, or comparing and contrasting texts.

#### Shared Reading

Shared reading is when the teacher and students read aloud from an enlarged version of an engaging text that may be beyond most students’ ability to read independently. Multiple re-readings of the text guide students from initially enjoying the text to exploring all aspects of the reading process together. This process also provides opportunities to engage students in expressive, meaningful, and fluent reading. The shared reading instructional method can engage and refine the collaborative element of a literacy-rich classroom. Based upon research by Dynia & Justice (2015), the importance of increasing shared book reading experiences and exposing children to a variety of books needs to be stressed to educators. “Teachers’ use of books addressing a range of instructional foci may help teachers to naturally embed different learning objectives into shared book reading interactions in the classrooms” (p.238). During shared reading teachers pull together many components of the reading process. Shared reading can focus on print work, fluency, high-frequency words, and comprehension, and is found to have effects on students’ language development and comprehension (United States Department of Education, 2015).

Utilizing the instructional practice of shared reading, Mrs. Rodriguez’s first grade ELA lesson will focus on NJSLS-ELA (RI.CI.1.2) to determine main topic and retell a series of key details in informational text while supporting practice in the phonics and word recognition (L.RF.1.3) of high-frequency words. The students will participate in potentially a two-day lesson utilizing a shared informational text displayed on her classroom’s front whiteboard related to firefighters’ jobs. This interdisciplinary lesson incorporates NJSLS-SS (6.1.2.CivicsPI.2) investigating the importance of services provided by the local government to meet the needs and ensure the safety of community members.

Before reading the text with the students as a shared reading experience, Mrs. Rodriguez’s questions the students to elicit the purpose for reading the text, *Firefighters Help*. As she reads with the students, her questions enable the students to discuss and identify the main ideas and key details of the text (i.e., who, what, where, when why and how) to support their reading comprehension skills. Mrs. Rodriguez writes students’ responses on a chart paper to organize the main ideas and key details discussed, and to enable further discussion and review the next day. The chart will potentially contain some of the high-frequency words the students have been studying and can be useful in subsequent lessons.

Once the text has been read and the chart is complete, the next day Mrs. Rodriguez will be able to re-read the chart with the students as a review of ideas and utilize it as a means for students to participate in recognizing the parts of high-frequency words that are regular and the parts that are irregular (NJSLS-ELA L.RF.1.3G).[Note: “research suggested that words become sight words after repeated opportunities to engage in the process of recoding letters into sounds and attaching a meaning to the combined sounds” (Duke et al., 2021, p.712)].

#### Independent Reading

Independent reading is an instructional practice that allows students time to read with access to a wide variety of motivating and interesting books. Student choice of text is essential because it motivates and engages a wide variety of readers. The goal of independent reading is to build positive reading habits (National Council of Teachers of English, 2019). Children would benefit from engaging in quiet time each day to interact with books. During independent reading time, students may read by themselves in a developmentally appropriate manner (e.g., re-reading books, retelling stories, and/or responding through writing thoughts about the text read).

#### Small Groups for Reading

In small group instruction, there are opportunities for students to participate in strategy or skill lessons. Students may work together regardless of their reading skills based on the need for a common strategy or skill. Children may utilize texts to practice a new strategy or skill while the teacher provides support through instruction and feedback. Some small group instruction may be based on skills that use manipulatives or other materials. Specific skills that students require more practice are exercised within a one-on-one reading conference as needed (Serravallo, 2018). The teacher models or explicitly teaches a reading strategy that will support students in learning the skill and then coaches students to practice within their independent books. When young children are learning to read in small groups, it is important for teachers to provide students with decodable text as needed. “Decodable text is a text that is written so children can read it using the letter sounds and high-frequency sight words they have learned” (Foorman et al., 2019, p.37). While students are participating in small group teacher directed instruction, other students are actively engaged in NJSLS-ELA based independent and / or cooperative literacy activities. Educators consistently present projects and learning activities to extend and/or scaffold student learning (NAEYC, 2020).

#### Classroom Libraries

Classroom libraries play an important role in providing students access to books and promoting literacy (National Council of Teachers of English, 2017). Classroom libraries can be arranged for students to self-select texts of their choice to promote engagement. In addition, libraries can provide diverse literature and informational text written by diverse authors to provide students with text from their cultures and other cultures. Friedman (2019) suggests one way to develop an empathic classroom is to ensure the books include characters/ topics that reflect the many different identities and cultures of children in the classroom because it is critical for all children, particularly those of color, to see themselves in stories. Expanding library collections to represent students’ home languages can help to build school and community connections and promote culturally responsive teaching (Curtin & Reynolds, 2022). Connecting students with texts reflecting the various languages spoken by students can support them positively as lifelong readers.

Libraries can be organized in many ways, however it is suggested that the classroom library is organized and inviting, so that students can easily access books. For example, bins can represent bands of complexity. Books can also be categorized by theme, author, series, etc. Nonfiction and fiction texts are all parts of classroom libraries. Coppens (2018) suggests that it is just as important to speak to students about why they are shopping and choosing books as discussing the importance of what they are reading. Through the perspective of books as “mirrors and windows”, primary educators can build a diverse classroom library in which children may see themselves. “Literature transforms human experience and reflects it back to us, and in that reflection, we can see our own lives and experiences as part of the larger human experience. Reading, then, becomes a means of self-affirmation, and readers often seek their mirrors in books” (Bishop, 1990, p. 11).

#### Writing Instruction

Writing time can be a consistent time set aside each day throughout the school year for actual writing output and for sharing out work efforts as well as woven into other content areas throughout the day. Writing time gives students an opportunity to express themselves as storytellers, authors, and illustrators. It also provides a time to apply emergent understandings about letter sounds, letter formation, words, and sentences in functional print contexts. This helps students feel most comfortable and acclimated to the routine, and in turn, may promote student writing output (Cahill & Gregory, 2016).

Children are encouraged to write as much as possible throughout the school day, including center time, in addition to a specific time for teacher-led writing instruction and student-led writing reciprocity occurs daily. Using consistent writing time procedures will support young writers (i.e., printing their name and date, illustrating, material routines). It is also important to model and teach students how to give feedback to their peers and begin building writer resilience (Cahill and Gregory, 2016). Early writers are comfortable drawing pictures, so the first step is just encouraging them to draw. Inviting them to tell the story related to their picture validates the idea that a picture has meaning and can tell a story (Cahill & Gregory, 2016). Subsequently, drawings help to build meaning which will later transition to stories and content with text.

Teachers can ensure that writing time does not become only a handwriting exercise and connects students’ foundational writing skills in meaningful opportunities. Children can practice letter formation and encoding conventions in naturally occurring contexts throughout a school day. Below are some suggestions to encourage positive writing routines for students.

Writers can:

* develop an awareness that everyone writes for a variety of purposes;
* have daily exposure to literacy skills that enable emergent through proficient writing;
* participate in daily routines that includes independent writing time;
* feel confident in their abilities as storytellers, illustrators, and authors;
* engage in regular opportunities to revisit their work and to conference with the teacher; and
* partake in regular opportunities to give and receive feedback while sharing their work with classmates.

#### Print Conventions

Print conventions include the understanding of the organization and basic features of print as well as recognizing, naming, and writing all the uppercase and lowercase letters of the alphabet. Concepts of print are effectively taught to early readers and writers by immersing them in shared reading and writing experiences using pointing, circling, framing, counting, highlighting, verbal punctuation, and matching. These learning experiences will eventually lead early readers to use finger point reading in their own written text as they develop increasing control of the visual system (Reutzel, 2015). Reutzel states that “complete and total mastery of all alphabet letters is a universal prerequisite in order for students to make progress in reading and writing” (p.16). Research has shown that learning the letters of the alphabet requires knowledge of their shape, reinforced by the specific actions it takes to write letters. It is therefore important that some direct instruction of handwriting takes place in conjunction with the teaching of alphabet recognition (Reed, 2019; Graham et al., 2018).

#### Modeled Writing and Mini-Lessons

Teachers model for students what good writing looks like as well as the process involved in composing text. One way to do this is through mini-lessons. During a writing mini-lesson, students gather together for a short period of time for direct and explicit instruction. Rosenshine (2012) found that “the more effective teachers do not overwhelm their students by presenting too much new material at once. It is recommended to only present small amounts of new material at any time, and then assist the students as they practice this material” (p.12). This is the purpose of the mini-lesson. During a mini-lesson, the objective would include one strategy that will support students working towards proficiency in performance expectations in the NJSLS-ELA, domain of Writing. The lesson can be chunked together by types of writing to address narrative, informative/explanatory, or opinion writing for various audiences.

During a lesson, the teacher models the act of writing for the students as well as thinking aloud throughout the process. The teacher verbalizes the thought process to the students, allowing them to understand why and how they are completing the writing activity. This is the most passive form of writing practice for the students. The teacher actively models, while the students observe the practice. Modeling is a key practice done in the classroom to enhance student learning. The gradual release model of instruction can be used within a writing mini-lesson. First, a strategy should be explicitly modeled and demonstrated, then students need time to practice the strategy with a partner, and finally, students independently work and apply the strategy to their own writing (Williams, 2018).

#### Interactive Writing

Interactive writing is a teaching technique in which the teacher and the students collaborate to compose and write texts. It can be used for whole groups, small groups, and individualized instruction. This technique is often used with students in preschool to first grade. The teacher and students “share/ pass the pen” to compose a writing piece. Dry erase boards can be used in whole class format for interactive and monitoring purposes. This largely focuses on how students work with the writing process from oral rehearsal (i.e., writing aloud) to the encoding/ spelling process. Teachers should limit their own time for actual writing and focus more on coaching the students when each student participates (Williams, 2018; Graham et al., 2018).

Interactive writing can be used to demonstrate concepts about print, develop strategies, and learn how words work. It provides children with opportunities to hear sounds in words and connect those sounds with corresponding letters. Interactive writing is a unique opportunity to help children see the relationship between reading and writing. During the interactive writing process, students and the teacher talk together about what they are going to write. The teacher serves as the facilitator of the discussion by guiding, modeling, adding, summarizing, confirming, combining, and synthesizing the children’s ideas.

#### Shared Writing

Shared writing enables teachers to make the writing process concrete and visible to students. This writing process has the least amount of teacher involvement as the students compose the piece together while the teacher transcribes the writing. The teacher acts as a guide throughout while students work on refining and building skills (Williams, 2018).

Young or inexperienced writers need to both observe knowledgeable writers at work and participate in writing events in authentic and well-supported ways. Shared writing allows teachers to both model and actively engage students in the writing process that they most need to improve their writing. Students learn the forms and functions of writing as they observe and participate in writing events that are directed by knowledgeable writers, particularly when these events are followed by opportunities for exploration during independent writing. Clear and targeted modeling of the ways in which writers work is presented by teachers and co-constructed with students during a collaborative, rich discussion, so learners develop an understanding of the purpose, intrinsic motivation, and techniques of writing.

#### Guided Writing

Guided writing typically takes place after whole group instruction in which students are pulled into flexible, small groups based on readiness and needs. The teacher scaffolds support in order to compose a writing piece and the students may assist (Williams, 2018). Active modeling is also a large part of this writing process. Young writers need to experience sustained and successful writing. Guided writing lessons are temporary, small-group lessons teaching those strategies that a group of students need to practice with immediate guidance from a teacher. Students need this expert guidance in a small-group context, particularly as they attempt to bridge the gap between the teacher's modeling and their own independent writing.

During guided writing instruction students are provided with opportunities to experience successful and independent writing within the context of strong teacher support by:

* engaging students in a brief, shared experience;
* teaching one or two specific strategies for writing;
* providing students with time (5–10 minutes) to write at the small-group table individually and as independently as possible; and
* including a brief sharing activity in which each writer's immediate work is shared with an audience and feedback is shared with the writer.

#### Writing Conferences

A writing conference is an instructional conversation that allows teachers to provide specific goal directed feedback. The conversation is between the teacher and the student to work to improve their writing. The teacher will listen to the student’s ideas about their writing and analyze the student’s writing. After listening to the student, a teaching point is chosen to help the student grow as a writer. The teaching point is related to the skill acquisition necessary for the students to reach or exceed the performance expectation as outlined in the NJSLS-ELA. Once modeling or explaining the teaching point to the student is complete, the teacher will then spend a few minutes coaching the student as they apply the strategy. While students are working independently or with partners on their writing, teachers can meet with individual students to confer about their writing and provide specific feedback to support students’ achievement (Hattie & Clark, 2019).

#### Possible Writing Conference Teaching Points

* Planning: Explain what the story will be about, plan the sequence orally, and then write the plan.
* Adding: Add to the piece of writing by asking questions to add more ideas to the piece.
* Text Structure: Write and include a beginning, middle, and end.
* Spelling: Emphasize sound-letter basics; develop encoding and spelling skills.
* Elements of grammar: Syntax and punctuation in sentence composition.

#### Summary

Effective instruction in 1st – 3rd grade classrooms require educators to have a deep understanding of their grade level content standards in all of the subject areas that they teach. In addition, teacher understanding of effective evidence-based practices is vital for supporting student achievement and closing achievement gaps.

Mathematics instruction requires knowledge of the content standards with special attention to the Standards for Mathematical Practice. Students should not only be able to solve math problems such as one plus one equals two, but they also need to know why it is true. These standards allow students to learn math concepts deeply instead of widely and build a solid foundation for advanced mathematics learning. Students are expected to explain their reasoning and make connections between procedures and representations in mathematics. This can be fostered using engaging, real-world tasks that require high levels of cognitive demand. Students' reasoning and sense making are crucial components of conceptual understanding, therefore finding ways to maintain high levels of cognitive demand during task implementation is important (Cheng, et. al, 2011). Using questioning, teachers can leverage these rich tasks to support deep mathematical explanations and rich discourse. Effective use of questioning students can generate students’ responses about their mathematical thinking, problem solving, and strategies. All students are capable of learning mathematics through rich, engaging tasks where they can model, describe, analyze, justify their thinking, and critique the reasoning of others. To provide support for students to develop an identity as being capable of making sense of mathematics, learners are taught at their instructional level in their zone of proximal development. Using small flexible math groups and leveled math centers teachers can meet students where they are along a mathematical developmental progression and take them where they need to go. There has been a shift in the traditional methodology of presenting a whole group lesson based on a single procedural strategy followed by assigned independent practice with little to no discourse, problem solving, or cooperative learning. Research has shown the need for instructional shifts in early learning mathematics classrooms for many years. Through this instructional shift students can make sense of mathematics at a pace and instructional level that is appropriate for them allowing all students to reach their next level of learning.

True science and engineering cannot be learned in isolation or by turning to a certain page in a textbook. Science and engineering are experienced by collaborative learners who are ready to explore the natural and designed world around them. Hands-on experiences are critical. Lessons and units should focus on supporting young learners to make sense of a phenomenon or design solutions to a problem rather than on the accumulation of isolated facts. It is essential that all students are provided adequate time and resources necessary for later learning and help students develop their identity as someone who can solve challenging problems. The NJSLS – S provides a great deal of information that can be used to create meaningful interdisciplinary units of instruction and to create coherent curriculum across grades and from grade to grade. There are many free and low-cost professional learning resources available that can be accessed through the New Jersey Department of Education, New Jersey Science Teachers Association, and the National Science Teaching Association.

The NJSLS-SS deem that instruction in first through third grade has a strong emphasis on developing learners who are civic-minded, globally aware, and socially responsible through project based interdisciplinary instruction. Social studies instruction is most effective when adequate time is devoted to social studies instruction and taught through an interdisciplinary lens (Heafner & Fitchett, 2012). In addition, instruction must be standards-based to incorporate the core ideas and performance expectations and the social studies practices while emphasizing skill development through active learning opportunities. Instructional materials are representative of the diversity of our world, portraying the experiences and stories of individuals of different races, ethnicities, genders, mental/physical abilities, and/or religions and students’ unique and diverse identities are recognized and appreciated as assets to the learning community.

Technology is a practical, supportive tool for learning and sharing ideas. Children use digital tools for investigation, creation, and collaboration in inquiry-based scenarios. They also use presentation tools to share their thoughts, ideas, and solutions to problems. In addition, inquiry-based assignments provide opportunities for children to reflect upon and respond to the nature and impact of technology, engineering, technological design, computational thinking, and the designed world. Providing equitable access to developmentally appropriate technology lessons and activities helps children to expand the reach and scope of their learning, understanding, and skill development. While children in primary grades focus on themselves and their community they are also engaged in the global community. Young learners having purposeful access to technology, along with foundational skills, helps them to become digital citizens. Used eﬀectively, technology supports the development of critical thinking, problem-solving, and decision-making skills.

Literacy instruction combines whole-group instruction for introducing and reinforcing concepts, small-group instruction for meeting individual needs, and integration of literacy into all content areas to provide continuous practice. This understanding ensures that children are motivated and prepared to engage with reading and writing throughout their school day. Small groups allow for more personalized instruction, where teachers can address the individual needs of students. This is particularly useful for differentiated instruction, ensuring that each child receives the appropriate level of support and challenge. Centers provide opportunities for children to engage in literacy activities independently or in small groups. These activities often reinforce skills taught during whole-group and small-group lessons.

Teachers with a deep understanding of all NJSLS content and practices along with knowledge of research-based instructional strategies are the most effective at influencing student learning outcomes and student achievement. Incorporating the research-based instructional strategies discussed in this section can result in impactful in student learning.

## Woman and children using colored pencilsSection 4: Research-Based Instructional Strategies

To bring content to life and to reach all students, educators employ a repertoire of teaching techniques or instructional strategies, including questioning, modeling, co-constructing, and reflecting that were demonstrated throughout the content sections above. This current section shifts to presenting strategies central to addressing the needs of all learners using data-driven instruction and scaffolding. This section also gives an overview of interdisciplinary units and guidance on the project approach to teaching and learning.

### Data-Driven Instruction: Collecting and Using Student Assessment Data

When used properly, assessments are tools for learning and promoting equity. Assessments provide necessary information for educators, students, families, and the public to measure whether students are developing the critical thinking and problem-solving skills they need to succeed in life and help ensure equity of opportunity for all students by identifying achievement gaps (USDOE, Office of Standards, 2023). The methods that educators use to assess must be fair, varied, reliable, and frequent. It is essential that schools and educators provide opportunities for students to demonstrate understanding and reflect on their own learning. This requires teachers to collect and use data from multiple sources to make meaningful and valuable judgments and instructional decisions about children and their learning.

In grades 1-3, it is particularly important to acknowledge the diverse educational experiences students bring to the classroom, as their prior exposure to formal education may vary significantly. Unlike later grades, attendance in preschool and kindergarten in New Jersey is not universally required or consistently full-time. This creates a wide spectrum of readiness and foundational skills among young learners, necessitating a data-driven decision-making model that accommodates these differences. By recognizing these variations, educators can use assessments not just to measure learning, but to tailor instruction to meet students where they are and ensure that every child has an equitable opportunity to build critical skills.

A comprehensive assessment system includes a range of measurement approaches used to provide a variety of evidence to support education decision-making (Sigman & Mancuso, 2017). This comprehensive approach to assessing children includes many methods of gathering evidence about student learning such as observations, conferences, performance tasks and projects, student work, exit tickets, anecdotal notes, students’ reflections on their own learning as well as traditional classroom quizzes, tests, and standardized assessments. Teachers use multiple strategies to gather and share information about what students understand and identify where they may be struggling. Well-designed assessments help students chart their own progress toward learning goals and help teachers modify instruction as needed. A comprehensive system of assessment includes both formative and summative assessments.

#### Summative and Formative Assessments

Summative assessment and formative assessment are both used in educational settings to give information regarding student achievement. Formative assessment happens while learning is still unfolding, helping to inform and adjust instruction, whereas summative assessments occur at the end of a course or unit of study and assess whether students have reached the intended learning goals. While formative assessment gathers student data to improve teaching and learning, summative assessment collects data to evaluate the learning outcomes. Some methods are informal while others come with high stakes, yet all kinds of assessment play a role in shaping understanding (Gezer et al., 2021). The NJDOE has updated information concerning assessments to help identify dyslexia on the Special Education website, [Dyslexia](https://www.nj.gov/education/specialed/programs/additionalsupports/dyslexia/).

##### Summative Assessment

Summative assessments provide information about students’ achievement of academic content standards following a longer period of instruction at the end of a unit, module, chapter, or semester. Student work is typically measured against a standard or benchmark. Summative assessment provides teachers with a snapshot of student understanding focusing on past performance and informs the teacher of students’ success or failure in the learning process (Ahmed et al., 2019). Summative data, such as standardized test data, serves as a wide-angle camera lens. This angle gives educators a sense of where each student was in the broad scope of critical skills that would propel them forward—or hold them back—as learners (Tomlinson, 2014). Results from summative measures can be used for grading and reporting purposes, policy and program decisions, and recommendations regarding resource allocation and professional learning priorities.

##### Formative Assessment

Formative assessment is the ongoing monitoring of student learning to inform instruction and is considered a hallmark of effective instruction in any discipline (Flawn, 2008). It is a process used by teachers and students during instruction that provides feedback to adjust ongoing teaching and learning to improve students' achievement of intended instructional outcomes. In contrast to summative assessments, formative assessments are ongoing and tend to be based on teachers’ intentional observations of children during specific learning experiences (Bates et al., 2019). Formative assessment provides feedback and information during instruction, while learning is occurring and can empower teachers to effectively personalize instruction for students. It is part of daily teaching practice, not an occasional event, test, or quiz. Formative assessment is any teaching practice that elicits, interprets, and uses evidence of student performance to improve instruction and learning. Unlike summative tests, formative assessment is primarily a teaching tool, not an accountability metric. Formative assessment practices have been found to increase students’ academic achievement and attitudes toward school significantly and to affect their self-regulation skills (Ozan & Kıncal, 2018). Using formative assessments designed to check for understanding and provide students with feedback and support is one of the most effective ways to improve and enhance student learning (McTighe, 2021). In Understanding by Design, Wiggins and McTighe (2005) state, “Understanding can be developed and evoked only through multiple methods of ongoing assessment, with far greater attention paid to formative (and performance) assessment than is typical” (p. 6). Research has shown that regular use of formative assessment for students in the elementary grades where instruction is adapted based on student progress improves students’ learning (Flawn, 2008).

###### Learning Progressions

Formative assessment must be conducted through meaningful learning activities. Research has shown that teachers’ regular use of formative assessments improves their students’ learning, especially if teachers have additional guidance on using the assessment results to design and individualize learning activities (Flawn, 2008). An understanding of learning progressions is important when assessing learning over time (Darling-Hammond & Bransford, 2007). For primary teachers, understanding how learning typically unfolds in literacy and mathematics using validated progressions will enable meaningful instruction and assessment. To plan purposeful formative assessment for children, teachers must first identify goals based on the child’s developmental level using learning progressions and determine what would be compelling evidence that demonstrates learning. Teachers’ instructional plans include activities that embody the learning goal.

###### Feedback

The impact of formative assessment arises from the strength of the timely feedback provided to students about their learning and to teachers about their teaching (Andrade et al., 2015). It has been found that feedback facilitates learning. The formative assessment process can be described as establishing learning goals, setting assessment criteria, and providing feedback (Darling-Hammond & Bransford, 2007). Feedback linked explicitly to a learning goal or performance standard, which then provides students with strategies for improvement, is the most effective way to use feedback (Darling-Hammond & Bransford, 2007). Feedback is an integral part of formative assessment if it leads students to critical thinking to reach learning goals. Using open-ended questions to support students' high-level thinking will facilitate explanations and discussions, allowing teachers to formatively assess true understanding and learning and identify misconceptions. Additionally, feedback could have a strong influence on student motivation and self-efficacy (Petre, 2017). The constant and specific feedback given by a teacher to a student, specifically in a small group setting, influences students’ motivation very strongly because through the feedback they can manage to self-regulate their learning activity and successfully meet learning goals at their level of development (Petre, 2017).

###### Observation

**An integral component of formative assessments is observation as an assessment tool.** Teachers understand that they must know their students to design effective teaching supports. This may involve screening and benchmark assessments, however though screening and benchmark assessments are valuable data, they are not sufficient. To gain a fuller picture of a child’s abilities, teachers must thoughtfully observe students during authentic learning events (Webb, et al., 2019). These observations are intended to understand individual learning processes and patterns to better inform immediate instruction. This practice is essential for effectively determining what children know and can do. Through observations of children, teachers can better tailor students’ learning experiences by identifying what students already know and what they can already do, to better plan what they need to learn next. Ultimately, observations along with probing questions are the most effective assessment instruments in the classroom (Webb et al., 2019).

###### Anecdotal Notes

Anecdotal records are brief notes teachers take as they observe children. One of the best ways to gain insight into student learning is to observe children while they are exploring concepts. While observing children, collecting informal, anecdotal notes is an effective way to collect formative assessment information that will help teachers to reflect about what the children are understanding and able to do (Bates et al., 2019). Anecdotal notes and reflection drive instructional planning, helping teachers think more deeply about children’s growth and learning by generating questions and conjectures that fuel additional observations and anecdotal records (Bates et al., 2019). There are several informal ways to take and manage anecdotal note taking such as the use of data binders or note catchers. Taking notes using clear language, abbreviations, and evidence provide concrete documentation of children’s emerging behaviors, knowledge, and skills, and they also ground your ongoing reflective practices (Bates et al., 2019). This type of intentional and authentic formative assessment contributes to children’s learning and development. Anecdotal notes should be quick and easy to write and organize, serving as the basis for reflective practice. Reflection on anecdotal notes will guide teachers’ instructional planning and, as a result, children receive more tailored instruction as teachers become better informed about each child’s individual progress (Bates et al., 2019). In addition, reflecting on anecdotal notes can help teachers to form small flexible groups to meet children’s individual needs (Safir & Dugan, 2021).

###### Self-Assessment

To create a dynamic classroom learning environment that encourages students to think critically and manage their own learning, teachers can utilize self-assessment techniques. Research shows that formative assessment has a positive effect on students’ academic achievement, specifically formative assessment practices that promote learning by more actively involving students in their own learning (Klute et al., 2017). Self-assessment is when students pause to examine what they do and do not know or understand. Self-assessment can be very quick and informal using hand signals or be more structured with a rubric or a journal prompt. Through self-assessment, teachers help students become more confident learners who are willing to take risks and have a sense of ownership for their learning. As a result, students are encouraged to monitor their own success and make decisions that bring about greater success as a student and as a lifelong learner (Fisher & Frey, 2022). Self-assessment is a powerful tool which creates opportunities for students to share, reflect on, and become a partner in their growth and learning (Safir & Dugan, 2021).

#### Understanding and Using Data

Educational professionals have access to more data than ever before, yet research on how often and why teachers use each type of data is scarce. We know from research that collecting assessment data is something that teachers can do quite effectively. The simple collection of data, though, is not sufficient to have an impact on learning outcomes. Rather, teachers and administrators must effectively use the data to inform instruction, and not just to fill the grade book. It is also important that the assessments absolutely measure what it is the students should know, understand, and be able to do (Tomlinson, 2014). This requires time to carefully examine the data and design instruction around the group's needs and to plan differentiated instruction for individual learners. There is no one protocol teachers can employ to use data effectively. However, one key aspect of completing the assessment cycle is to reflect on the data, consider what the evidence is saying about the child, and plan (formally or informally) to support that child’s learning to move them along the learning continuum.

##### Levels of Data

When making educational decisions for children, educators must determine which types of data to use and when to use them. Safir and Dugan (2021) introduced a framework representing the various levels of data to help educators make decisions using data. Level 1 data, or satellite data, encompasses broad quantitative measures such as unit test scores, state standardized test results, attendance patterns, and graduation rates. These data are helpful to identify trends and inequities among marginalized student groups, however the flaws among these data are that they are often lagging, making it difficult for educators to inform instruction (Safir & Dugan, 2021). Level 2 data, or map data, is more focused than satellite data. Map data can be used to identify specific reading, math, and other student skill gaps. Map data such as rubric scores from student work, as well as student and parent surveys, lead educators in a slightly more focused direction than satellite data (Safir & Dugan, 2021). Level 3 data, or street data, illuminates student, staff, and parent experience. It is qualitative, relying on observations, anecdotes, interviews, and conversations to inform and shape next steps. Street data is largely asset based, focusing on what is right, and not what is wrong, allowing educators to meet children and families where they are and take them to the next level. Instead of looking at large grain size data such as grades and test scores, attendance and graduation rates, street data is granular, looking at data from the ground up, at eye level, using stories, artifacts, and observations from the families, students, and educators themselves. This is real-time data, allowing for rapid feedback to inform everyday instructional decisions individualized to students’ needs (Safir & Dugan, 2021).

##### Inquiry Cycles

It is important for this reflective teaching practice to occur with colleagues. Teachers must have the opportunity to participate in collaborative inquiries with other educational professionals in the school community. It is good practice for teachers to examine data and discuss their use regularly in Professional Learning Communities (PLCs). Educators can structure their PLCs around inquiry cycles to improve student learning. An Inquiry cycle is an ongoing process in which educators reflect on data from students’ learning and make changes in practices to close learning gaps. Inquiry cycles can improve teacher collaboration and student outcomes by focusing on data collection and instructional practice (Regional Education Laboratory [REL], 2019). Effective use of inquiry cycles in PLCs can foster meaningful data analysis and improve instruction. Inquiry cycles provide a discussion protocol with a goal statement, clear roles, and agendas (REL, 2019). They foster the use of data to ground discussions within an improvement approach, focused on current practice. In addition, this protocol focuses on research-based instructional practices and provides opportunities for targeted collaboration and peer support as teachers examine data together to improve their instruction.

This inquiry cycle includes these steps:

1. Teachers collect data during daily lessons,
2. PLCs analyze and discuss data to better understand a problem and develop change ideas, informed by research-based practices, to test out in the classroom,
3. Teachers try out change ideas in their classrooms and collect more data,
4. PLCs analyze and discuss new data to determine:
   1. What did we learn?
   2. Did the change idea work?
   3. Should we adapt, adopt, or abandon the change? (REL, 2019).

Another way to look at data is in aggregate form by classroom. Examining child assessment data across the class is useful in many ways. First, these data can offer insight into specific areas in which a teacher may need professional learning or support. Second, these data offer insight into small-group instruction opportunities. Third, these data may provide evidence for curriculum changes or adjustments. Data analysis can provide a snapshot of what students know, what they should know, and what can be done to meet their academic needs. With appropriate analysis and interpretation of data, teachers can make informed decisions that positively affect student outcomes. Teachers generally collect enormous amounts of student data, but when it comes to improving instruction and learning, it is not the quantity of the data that counts, but how the information is used (Hamilton et al., 2009).

### Scaffolding and Differentiation of Instruction

All classrooms consist of students with different skill sets and abilities. This requires teachers to know individual students’ abilities, skills, interests, and needs. Positive teacher-child interactions and careful observation and evaluation of data help develop this understanding. High-quality teachers provide individualized instruction through differentiated supports, flexible grouping, and immediate intervention (DeHartchuck, 2021).

One method to help children learn is by scaffolding instruction. Vygotsky (1978) put forth the concept of the zone of proximal development (ZPD). The ZPD refers to the distance between a child’s actual developmental level and the level of potential development. Teachers need to understand general developmental progressions in literacy and mathematics, as well as individual differences in development, so they can figure out when children are prepared to learn specific skills in particular ways and how to best support them (Darling-Hammond & Bransford, 2007). Using information from a variety of assessments, including observation, teachers learn what children can do independently and what they can do with support. To scaffold the children’s learning, teachers begin with what children can do independently and move forward slowly from there, essentially breaking the learning into achievable chunks.

A way for teachers to facilitate meaningful formative assessment and scaffolded instruction is by creating flexible, small, differentiated learning groups. Small-group instruction is a data-driven intervention matching a student’s readiness level for learning concepts with appropriate instructional strategies, delivering the right content at a pace appropriate for the student (Newton, 2021). This structure gives teachers the flexibility to pull students into small groups and teach them in their zone of proximal development. Flexible small groups are fluid and change over time as students achieve particular competencies and skills (Newton, 2021). This small-group instruction offers a framework for flexible grouping based on students’ academic needs as determined by multiple formative, summative, and/or diagnostic measures. Students are assessed frequently for growth and reassigned to different groups based on their individual needs. This flexible grouping provides students with an opportunity to learn at their level and proceed to deeper levels of understanding.

Differentiation and scaffolding are two critical factors to support effective student learning. Intentional teaching develops scaffolded units that provide an entire class of students with the building blocks for mastery development. Throughout the scaffolded content delivery, teachers use differentiation strategies to individualize the instruction to ensure all students understand the lesson content. Educators take the time required to map out the flow of concepts needed for successful learning to occur. Teachers can then develop differentiation strategies to prepare themselves for assisting students who need to experience the identified concepts differently to meet the lesson's goals.

### Interdisciplinary Units

Delivering content in a coherent and logically sensible way is a challenging task. One way that teachers can do this is by organizing lessons with a unit of study. Many commercially available curricula organize the teaching of a specific subject matter within curriculum units, however, organizing a unit around a central theme offers opportunities for authentic and interdisciplinary learning experiences. Interdisciplinary units connect multiple disciplines (i.e., literacy, mathematics, science, art, etc.) through the study of a central theme, or topic, which integrates content areas in authentic ways while supporting strategically planned learning goals and objectives. Whatever the topic being studied, units provide a developmentally appropriate way to deepen children’s understandings of subject matter and to help them make connections across subject matter.

An integrated approach reflects the idea that children learn holistically. Implementing interdisciplinary units requires primary educators to consider all the ways in which to engage students in meaningful learning experiences. For this reason, it is essential to distinguish the difference between a deep unit and shallow unit. A deep unit is selected by the teacher based on knowledge of the students and the learning potential of the topic with an NJSLS alignment. The topic is investigated in an in-depth manner through real experiences, such as learning trips and follow-up opportunities. A shallow unit is selected by the teacher based on the calendar, a single tradition, or a spontaneous notion. Few real experiences are provided in the unit. Shallow units also tend to incorporate activities that are unconnected (e.g., worksheets, songs, games). Ideas in these types of units do not come from the students, but from the books or the internet (Moravcik et al., 2012).

### Teaching and Learning through the Project Approach

The previous sections provided an understanding of young children that applies directly to teaching. First, the primary years are a critical period in children’s learning that sets the stage for later learning. Second, teachers must consider the whole child and know that development in various domains (physical, cognitive, language, and social and emotional development) is interconnected but that skills in each domain may develop at a different pace. Third, each child is unique, which means that every classroom is a room full of diverse learners, no matter how similar they appear in terms of cultural or socio-economic background. Fourth, effective teacher-child interactions are critical to providing emotional and instructional support in the classroom. Fifth, it is the responsibility of the teacher to respond to children’s strengths and weaknesses through differentiation of instruction and scaffolded learning. Finally, providing children with concrete learning experiences with connections to previous learning, coherence, and relevance across domains is necessary to motivate and engage learners.

Primary teachers must combine these understandings of young children’s learning and development with the teaching of subject matter. Much of the elementary school day schedule is divided into specific time slots devoted to content such as math, science, social studies, yet an understanding of the everyday world involves the integration of knowledge from multiple disciplines. When young children are working in groups on a math project, for example, they also read, write, and use their social and problem-solving skills to find a solution. Life in and outside of classrooms is full of learning experiences that require this kind of integration and the application of knowledge across subject areas. This integration of knowledge is also important because it allows children to build on previous learning experiences and to make connections between a variety of subject matter while also practicing various skills that strengthen their learning and development in various domains.

When the school day is divided by subject matter, children may not realize how they are using a range of disciplines in their classwork. Moreover, teachers are inclined to concentrate on a specific content area that is scheduled at a particular time of day. However, while curricula may be separated into discrete subject matter in schools, the integration of concepts supports best practice and what we know about young children’s learning and development. Often units of study are linked solely to a specific subject, especially if they are part of commercial programs. Understanding project-based learning (PBL), a pedagogical approach to integrating curricula, teachers can connect subject standards and link concepts deeply to enhance students’ learning.

Projects, by definition, are in-depth investigations of real phenomena that are a part of children’s lives (Strachan & Block, 2020). The emphasis is on real phenomena, real ideas that children can explore and, by doing so, learn and apply a range of subject matter while also developing their problem-solving strategies, social skills, and research/inquiry skills (Strachan & Block, 2020).

When working with projects in the classroom, teachers use their current classroom schedule and continue facilitating the same project over time. Although projects involve children in deep investigations of a question or topic, teachers do not have to use every minute of every day to work on the project. Instead, project activities can be included at different points in the school day or week. Some teachers use their social studies or science lessons one or two times a week for project work, while others use centers and incorporate project work in the literacy and mathematics blocks to reinforce and extend students’ subject matter learning.

In PBL, students work autonomously and purposefully to complete a project (Chen & Yang, 2019). They ask their own questions, perform investigations, and develop answers. Student voice and choice are emphasized, meaning students can make decisions about the products to be constructed and how they work. Students also engage in revision and reflection, where students have opportunities to use feedback to make their products better and to think about what and how they learn. Lastly, students present their work or findings to an audience (Chen & Yang, 2019).

Research has shown that students' learning may be limited during traditional direct instruction where students may use a lower level of cognitive processing than they would during project based or problem-based work (Chen & Yang, 2019). Primary classrooms can adapt to a changing world where learners are encouraged to use what they know to explore, create, and construct solutions during the learning process.

#### Beginning the Project

Projects typically begin with a question or a problem to investigate and solve. This question is aligned to learning goals and should connect to students’ interests, identities, and communities. The emphasis is on real phenomenon and ideas that children can explore supported by intentional unit planning. Students learn a range of subject matter while also developing their problem-solving strategies and social and other related skills.

The topic for a project should be:

1. aligned to district approved curriculum and NJSLS content standards
2. linked to children’s questions and interests,
3. suitable for investigating in school and can incorporate varied content and skills,
4. have the potential to be studied for a period of time (at least two weeks), and
5. allow for problem solving.

#### Project Research

A meaningful problem or question gives students a purpose for learning. Children are learning because there is a need to know something and solve a real-world problem or answer a question that matters to them (Buck Institute for Education, 2022). From the questions the children raise, it is then possible for the teacher to act as a consultant or facilitator, helping children to gain new information about the topic through first-hand, real-world experience. This involves fieldwork, such as visiting local sites and interviewing people, drawing and/or writing observations, and providing resources to help children with their investigations, such as real objects, books, and other research materials. Throughout their research, the students document the activities and investigations that they engage in, the products they produce, and the people that they interview. Guided by rubrics, models, and formal feedback protocols, students critique and revise their work by giving and receiving constructive teacher and peer feedback that will improve and guide their project process and product (Buck Institute for Education, 2022). In addition to teachers and peers, adults and experts outside of the classroom can also contribute to the critique process, bringing an authentic, real-world point of view.

#### Concluding the Project

Once the students have completed their investigations, it is important for them to summarize, reflect on, and demonstrate their learning. This phase of the project is just as important as any other phase and should involve the children as co-decision makers, as in the other phases. During this phase, the children can consolidate and integrate information from different experiences in the project (Almulla, 2020). Moreover, this phase gives the teacher an opportunity to determine whether their goals for individual children and the class as a group have been achieved. Students’ documentation of their work can take many forms: a tangible product that students design or build, a digital, written, or illustrated presentation of their solution to a problem/answer to a question. Student product examples may be a digital presentation or website, the launch of a community event, a change effort in the community, a video conference with community or classroom family members, or a presentation to students in the class or another class in the school. Though the student products may vary in complexity and design it is important that others, beyond the teacher, see students’ work and hear about their learning (Buck Institute for Education, 2022).

#### Summary

This section presented research-based instructional strategies central to addressing the needs of all learners using data-driven differentiated instruction and scaffolding. This section also gives an overview of interdisciplinary units and guidance on the project approach to teaching and learning. Project Based Learning (PBL) is an instructional method in which students gain knowledge and skills by working within a unit to investigate and respond to an authentic, engaging, and complex question, problem, or challenge. Projects last for an established period and culminate through students demonstrating their knowledge and skills by creating a public product or presentation for a real audience. Through PBL, students develop deep content knowledge, critical thinking, collaboration, creativity, and communication skills. For more project examples and resources see [PBL Works.](https://www.pblworks.org/)

## Group of smiling children at schoolSection 5: Moving Beyond the Classroom

Eﬀective educators attend not only to children’s learning within the classroom, but also to one’s own learning. The New Jersey Professional Standards requires teachers to engage in ongoing individual and collaborative professional learning designed to impact practice in ways that lead to improved learning for each student. Using evidence of student achievement, action research and best practices, Educators expand their repertoire of skills, strategies, materials, assessments, and ideas to increase student learning. As professionals, teachers must engage in a constant cycle of improvement as they reﬂect on their practices and identify areas for further learning.

### Professionalism

The ﬁrst years of school are foundational to young children’s academic and social success. Children enter preschool as novice learners and complete third grade as readers and writers, individuals capable of engaging in complex problem solving, and who have a command of a range of skills to help them function eﬀectively in a classroom and beyond. As these guidelines illustrate, teaching children in the primary grades is a complex undertaking, requiring educational professionals who can apply their knowledge of subject matter, children’s learning and development, teaching strategies, and assessment to ensure that all children in their care learn. At the same time, teachers must balance the demands of multiple audiences including administrators, policymakers, families, and communities while also adjusting curriculum and pedagogy to meet the needs of an increasingly diverse student population.

Professional educators use their experience and expertise to meet these demands, and they approach their work ethically, acting in the best interests of the children and families whom they serve. Educators must be consistently self-reflective, thinking about all the possibilities that may impact the learning of a child or group of children. Additionally, they often must choose between more than one course of action. Educators must be advocates for their students and ensure that every child is treated fairly and has the same opportunities to learn, regardless of background or circumstances.

### Professional Development

Given the complexities of teaching children in the primary grades, ongoing, high quality, relevant, and timely professional learning experiences are essential for continued professional growth. The professional needs of school or district staff should be surveyed so that professional learning sessions are connected to the contexts in which they work. If educators in the primary grades are to be eﬀective, then their professional needs must be clearly identified. There are many ways that educators can work together to learn and improve in meaningful ways through Professional Learning Communities (PLCs). In addition to PLCs, districts can support their educators’ professional growth through many other forms of collaborative and independent professional learning opportunities. The NJDOE offers statewide guidance and regulations around [professional development](https://www.nj.gov/education/profdev/). These policies and programs are developed in accordance with [N.J.A.C. 6A:9C](https://www.nj.gov/education/code/current/title6a/chap9c.pdf) and are intended to support high-quality- professional development, educator effectiveness, and equitable outcomes. School districts who support teachers with well-designed, engaging, and meaningful professional development opportunities, empower educators to create the same opportunities for learning and development for their students (Darling-Hammond & Bransford, 2007). Several effective forms of professional development are listed below. The following list is not exhaustive, but it shows the range of professional learning opportunities available to educators.

#### **Professional Learning Communities (PLC)**

PLCs in education refers to a group of teachers working together and learning from each other through in-depth, systematic, and collaborative professional development activities. When implemented successfully, it is “an inclusive and mutually supportive group of people with a collaborative, reflective and growth-oriented approach towards investigating and learning more about their practice in order to improve pupils’ learning” (Stoll, 2011, p. 117). PLCs have been recognized as significantly improving the quality of learning and teaching through the promotion of shared values and expectations among teachers to facilitate student learning (Little, 2020). Additional guidance on how PLCs can guide data analysis and inquiry cycles is in section 4 of this document.

#### Online Learning and Self-Study Courses

Online learning offers flexibility and accessibility, allowing teachers to develop professionally at their own pace and convenience. It may include webinars, virtual courses, or interactive modules. Self-study courses include independent reading as well as online activities or courses. Educators can choose content individualized to their needs and access this resource at any time. Self-study courses through flexible online formats provide opportunities to fit educators’ needs. To make professional learning online engaging and interactive, some online self-study courses gamify learning to incorporate game elements such as challenges, quizzes, or simulations. Research has confirmed the importance of adopting self-paced, self-guided study for professional learning (Ranieri et al., 2018). Online professional development has grown and has increased training opportunities for professional learning in education (Ranieri et al., 2018). Educators choose this type of professional development for its convenience, flexibility, and personalization and its immersive and enjoyable nature, enhancing motivation and knowledge retention.

#### Networks

When a teacher joins an in-person or online community or subscribes to education blogs, podcasts, and news feeds, the teacher is building a professional learning network (Trust, 2012). Professional learning networks (PLNs) can provide access to information as well as connections to many individuals with a varied expertise. By interacting with other people working in similar roles, educators gain new ideas and share solutions to challenges they face. There are both locally established networks, such as county curriculum consortiums and state networks such as the [New Jersey Teacher Leader Network](https://www.nj.gov/education/AchieveNJ/leadership/tln.shtml#:~:text=The%20NJTLN%20comprises%20representatives%20of,a%20combination%20of%20these%20entities.) as well as national professional groups that meet regularly beyond district boundaries.

#### Seminars

Seminars can be a professional development session that features a formal presentation, lecture, or panel discussion led by an expert in a specific field. These seminars can offer in-depth knowledge and insights on specific topics in education. Attending seminars provides teachers with specialized knowledge from experts, networking opportunities with colleagues from different schools, and inspiration to explore innovative approaches in their classrooms. Seminars are efficient and timesaving, offering targeted professional development experiences without extensive time commitments.

#### Conferences and Conventions

Many professional organizations and higher education institutions arrange conferences open to educators. These conferences allow educators an opportunity to gain new knowledge and skills from experts in the field, learn about new teaching methods and trends, network with other educators, and improve their teaching practices to benefit their students. The annual [New Jersey Education Association](https://www.njea.org/) (NJEA) convention, for example, is an annual conference which offers a wide range of professional development seminars, workshops, and programs for educators at all levels. National conferences, such as the [National Education Association](https://www.nea.org/) (NEA) Conference, also provide opportunities for educators to learn from top content experts, network with like-minded professionals, attend keynote presentations, and engage in hands-on learning activities. In addition to our state and local education associations, educators should seek out conferences in their area of expertise hosted by state professional organizations such as the [Association of Mathematics Teachers of New Jersey](https://amtnj.org/about/) (AMTNJ), or [New Jersey Association for Gifted Children](https://njagc.org/) (NJAGC) as well as national organizations such as [National Association for the Education of Young Children](https://www.naeyc.org/) (NAEYC) just to name a few.

#### Mentoring

Mentoring new teachers supports the professional learning of both mentees and mentors. Peer mentoring involves experienced educators guiding and supporting their more novice colleagues. It fosters collaboration, reflection, and the sharing of best practices. Teacher mentors focus on reflective mentoring practices and are an important catalyst for self-assessment and growth. Through modeling, resource sharing, and professional conversations, teacher mentors can help their mentees improve their teaching performance (Tonna et al., 2017). Using a developmental, nurturing approach, as opposed to a judgmental, evaluative approach, reflective mentoring promotes self-reflection and growth in the mentee, while building leadership capacity for the mentor (Tonna et al., 2017).

#### Lesson Study

Several studies have found advantages to engaging in teacher collaboration, specifically collaboration during lesson planning, which is a significant predictor of student achievement (Reeves et al., 2017). Lesson study is teacher-led research where teachers work together to target a problem of practice or an identified area for improvement in their students’ learning. Using data and common resources, teachers collaboratively research, plan, teach and observe a series of lessons, using ongoing discussion, reflection, and expert input to track and refine their interventions (Cheung & Wong, 2014). Learning Study is a powerful tool to help teachers examine their practices and enhance student learning (Cheung & Wong, 2014).

#### Instructional Rounds

This practice combines classroom observation, an improvement strategy, and a network of educators. A group of colleagues meet over time, define a problem of practice connected to an improvement strategy, visit classrooms in small groups, and debrief after the observation to build the group’s knowledge and skills (City, 2011). The focus of the observations is on the interactions among teachers, students, and content. Rounds can be done virtually as well. Participants may upload, share, and comment on video artifacts then meet to debrief and reflect on what they have learned. Instructional rounds can be a powerful way of continually informing and improving teachers’ practice.

#### Book Study

An educational book study is a flexible method for professional learning that can foster collaboration, exploration of new ideas, and choice for educators. When conducting a book study, educators choose a book and a specific educational focus to hold all participants accountable for their learning and to ensure rich, focused discussions. As educators read the chosen book, time must be set aside for groups to identify aspects of teaching and learning that are not working for students or teachers and extrapolate potential solutions from the book, sharing new ideas through rich, focused discussions.

#### Effective Professional Development

Effective professional development is structured professional learning that results in changes to teacher practices leading to improvements in student learning outcomes. In addition to some of the formalized professional learning activities listed above, there are many other ways that teachers can work together to learn and improve in meaningful ways. Darling-Hammond, et al., (2017) found that effective professional learning experiences typically incorporate the following elements:

* content focused
* active learning
* collaboration
* opportunities for feedback and reflection
* job-embedded
* coaching and expert support
* sustained duration

Teacher professional learning is a critical way to support student learning of the complex skills students need to succeed in the 21st century. In turn, effective professional development is needed to help teachers learn and refine the instructional strategies required to teach these skills (Darling-Hammond et al., 2017).

#### Summary

Being a professional in education means being an advocate for children and families to ensure that every child receives the resources and support that they need to learn. Professionals challenge the norms of professional learning in one’s school by engaging with colleagues to learn and improve. Educators actively seek opportunities to grow and share their knowledge and resources with colleagues, rather than relegate their professional development activities to a passive “sit and get” model of learning. The same dynamic teaching and learning we see empowering our classrooms must be used in professional development. By focusing on meaningful problems relevant to their everyday work together, primary teachers can embrace developmentally appropriate practices supported by research for NJ students.

## Conclusion

The NJDOE *First through Third Grade Implementation Guidelines* provide all primary educators with research-based guidance and resources to effectively implement the components of an equitable, developmentally appropriate, and rigorous program for their students. These guidelines are intended to be a support for primary educators as they focus on the foundational development of children in various academic and social-emotional domains. Using this guide, educators can initiate deliberative dialogue with colleagues, families, and communities to plan and implement research-based practices to ensure that children in the primary grades receive the best education possible. The information presented in these guidelines is designed to help educators create a supportive and enriching learning environment for all children and to empower families with the knowledge and resources needed to actively participate in their child's education. By working together with educators and school administrators, families play a crucial role in creating a supportive learning environment that fosters success for all students. These guidelines collectively aim to create a well-rounded educational foundation, setting the stage for continued academic and personal growth in later years.

## Text Versions of Diagrams and Mathematical Expressions and Equations

### NJTSS

Triangle with the following legs:

* Positive school culture and climate (base)
* District and school leadership
* Family and community engagement

There is a triangle with three layers (tiers) nested inside the large triangle. The tiers are:

* Tier 1: Universal supports (base)
* Tier 2: Targeted, small group interventions (middle layer)
* Tier 3: Intensive interventions (top layer)

The altitude of the triangle (the line dropping from the vertex, or top point, to the base) is labeled as supports.

[Back to text after NJTSS triangle](#NJTSS)

### Relationships and Convergences

Found in:

* 1. CCSS for Mathematics (practices)
* 2a. CCSS for ELA and Literacy (student capacity)
* 2b. ELPD Framework (ELA "practices")
* 3. NGSS (science and engineering practices)

Notes:

1. MP1 to MP8 represent CCSS Mathematical Practices (pages 6 to 8)
2. SP1 to SP8 represent NGSS Science and Engineering Practices.
3. EP1 to EP6 represent CCSS for ELA "Practices" as defined by the ELPD Framework (page 11)
4. EP7 represents CCSS for ELA student "capacity" (page 7)

Venn Diagram with the following overlapping circles:

* Math (red)
* Science (blue)
* ELA (yellow)

#### Content Contained only in One Circle

| **Math** | **Science** | **ELA** |
| --- | --- | --- |
| * **MP1**. Make sense of problems and persevere in solving them * **MP2**. Reason abstractly and quantitatively * **MP6**. Attend to precisions * **MP7**. Look for and make use of structure * **MP8**. Look for and express regularity in repeated reasoning | * **SP1**. Ask questions and define problems * **SP3**. Plan and carry out investigations * **SP4**. Analyze and interpret data * **SP6**. Construct explanations and design solutions | * **EP4**. Build and present knowledge through research by integrating, comparing, and synthesizing ideas from text * **EP5**. Build upon the ideas of others and articulate their own clearly when working collaboratively * **EP6**. Use English structures to communicate context specific messages |

#### Content Contained in the Overlap between Two Circles

##### Math and Science

The following content is contained in the overlap between the Math and Science circles (shown as purple):

* **SP2.** Develop and use models
* **MP4.** Model with mathematics
* **SP5.** Use mathematics and computational thinking

##### Math and ELA

The following content is contained in the overlap between Math and ELA (shown as orange):

* **EP7.** Use technology and digital media strategically and capably
* **MP5.** Use appropriate tools strategically

##### Science and ELA

The following content is contained in the overlap between Science and ELA (shown as green):

* **SP8**. Obtain, evaluate, and communicate information
* **EP2.** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience

#### Content Contained in the Overlap between all Three Circles

The following content is contained in the overlap between all three circles (shown in white):

* **EP1**. Support analysis of a range of grade-level complex texts with evidence
* **MP3 and EP3**. Construct viable and valid arguments from evidence critiquing reasoning of others
* **SP7**. Engage in argument from evidence

Logos shown:

* Stanford Graduate School of Education
* Understanding Language

**Suggested citation:** Cheuk, T. (2013) *Relationships and convergences among the mathematics, science, and ELA practices*. Refined version of diagram created by the Understanding Language Initiative for ELP Standards. Palo Alto, CA: Stanford University.

[Back to Teaching and Learning Science and Engineering in the Primary Classroom section.](#_Teaching_and_Learning)

### Solving Fifty-Seven plus Thirty-Eight

First image shows three rows of addition:

1. Fifty plus thirty equals eighty
2. Seven plus eight equals fifteen
3. Eighty plus fifteen equals ninety-five

Second image shows partial sums addition in a column:

1. Top shows: Fifty-seven plus thirty-eight equals eighty plus fifteen equals ninety-five.

The third image shows: How to break apart the addends to find the sum.

1. First horizontal row shows fifty-seven plus thirty eight.
2. The next row shows fifty-seven broken into fifty and seven and thirty eighty broken into thirty and eight.
3. The next row shows the tens added together to make eighty and the ones added together to fifteen.
4. The last row shows the answer which is ninety-five.

[Back to text after fifty-seven plus thirty-eight image](#after_57_38)

## References

Please be advised that neither the New Jersey Department of Education, nor its employees, specifically promotes, endorses, recommends, or favors any of the entities or resources listed herein. Instead, this list of entities and resources is provided for informational purposes only. School districts must always evaluate and determine, based on the individualized needs of their student population, whether to utilize and/or expend their resources on the entities or resources herein.

The Department does not guarantee that external resources conform to Level AA of the Web Content Accessibility Guidelines (WCAG 2.1.).

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## The First Through Third Grade Guidelines’ updates 1/2025

### Section 1: Young Children as Learners

Diverse Learners:

Additional resources hyperlinked focused on inclusive practices:

* [High-Leverage Practices](https://ceedar.education.ufl.edu/wp-content/uploads/2024/03/High-Leverage-Practices-for-Students-with-Disabilties-updated.pdf)
* [Universal Design for Learning](https://www.nj.gov/education/udl/) (UDL)
* [Inclusive Education Practices](https://www.nj.gov/education/specialed/programs/additionalsupports/inclusivepractices/)

Additional language and information focused on: free, appropriate public education (FAPE)

considerations for diverse learning styles

### Section 2: Setting Up to Support Children’s Learning

Updates from the current NJTSS model:

* Tier titles and components, [NJTSS-ER](https://www.njtss-earlyreading.org/) website link was added
* Revised language describing screening assessments and examples
* Included the updated [Dyslexia website](https://www.nj.gov/education/specialed/programs/additionalsupports/dyslexia/)

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